A New Agenda … Values, World Society, Modelling

https://sites.google.com/site/gordonburtmathsocsci/home/a-new-agenda

A New Agenda seeks to explore all aspects of society using all the academic disciplines paying special attention to values ... with special interest in modelling ... not disinterested in practice ... and aspiring to high academic standards.

Commentary, August 2017 No. 44

CRS … CRS conference … values, space, time

1 Thinking about CRS and CRS conferences

John Burton and Michael Nicholson

John Burton: founder of CRS, 1963
Michael Nicholson: founding Director of Richardson Institute of Peace and Conflict Research, late 1960s.

John Burton was founder of the Conflict Research Society – back in 1963. His academic career took him to UCL, to Kent University and to George Mason

University. The Kent connection continues to this day in the work of Hugh Miall, Feargal Cochrane, and (up until his move to Zurich this year) Govinda Clayton and their colleagues at the Conflict Analysis Research Centre at Kent; and Kent is the institutional hub of the Conflict Research Society. The George Mason connection continues in the work of Chris Mitchell and Dennis Sandole and their colleagues at the School for Conflict Analysis and Resolution there. My first two yearbooks, Yearbook 2014 and Yearbook 2015, contain chapters by Kevin Avruch and by Kevin Clements on the work of John Burton.

Michael Nicholson was the founding director of the Conflict Research Society's research institute which soon took the name the Richardson Institute for Peace and Conflict Studies. It started in London and then moved to Lancaster. Michael's name is celebrated in the Michael Nicholson Centre for Conflict and Cooperation founded in 2014 at Essex and headed by Kristian Gleditsch. The website says 'Our Centre is named after Michael Nicholson, a pioneer in formal and quantitative analysis of conflict and cooperation.' At the launch event in 2014 Kristian noted his encounter with Michael's book 'Causes and consequences in international relations'. At the same event David Sanders noted that half a century ago the character of research at the Essex Department of Government was exceptional in the UK at that time – it was 'the American science of politics' as described by Bernard Crick in his book of 1958. David noted that only one person in the UK existed possible to teach IR in that tradition: Michael Nicholson at Essex from 1970 to 1975. Michael informed the character of IR teaching and research at Essex for the next 45 years.
https://www.theguardian.com/politics/2008/dec/19/past

Chris Mitchell … history and formal modelling

CRS Conference
September 18th 2017
19.00-19.30 Christopher R Mitchell: Video interview tribute to Tony de Reuck

See also *In memoriam: Tony de Reuck*, Commentary 38, February 2017, pages 6 to 9.
https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxnb3Jkb25idXJ0bWF0aHNvY3NjaXxneDo1NjI0ZDZmZjBjMGVhZWY

We are very fortunate to have an old (and I use the word 'old' advisedly!) friend and colleague of Michael's here at the conference, Chris Mitchell. The following is an extract from the obituary which Chris wrote for Michael Nicholson:

'Michael Nicholson and I first met when we joined John Burton's old Centre for the Analysis of Conflict (CAC) at University College, London but we arrived there by very different routes. Michael had initially had a distinguished undergraduate and then graduate career at Trinity College, Cambridge, had subsequently held academic appointments at MIT and Carnegie. At the time, he was struggling to convert his Ph.D. dissertation on oligopoly into a book. I had left school at 16, worked in a solicitor's office for two years and then gone into school teaching as a historian before ending up at UCL, taking a degree in International Relations. What we had in common were frustrating personal histories of national service in the R.A.F., then attempting to defend the country against nuclear attack by hoping, somehow, to replay the Battle of Britain. It was during this period of our lives that Michael had risen to the dizzying rank of corporal while I had remained a mere senior aircraftsman. I think

it was also at this time that we both separately came to hold the conviction that systematic research and applied rational thought might somehow be able get the world out of the confrontational mess in which it found itself in the mid-1960's. At least that was my memory of the first of many conversations Michael and I shared, together with our other colleagues - John Burton, Tony de Reuck, John Groom, Frank Edmead. Michael Banks and all the others - in those early days at CAC.'

Chris goes on to say:

"Only once did we collaborate directly, and this was on a paper about the ending of wars, stimulated by an article in the *Journal of Conflict Resolution* (JCR) which presented a formal, rational actor model of when wars end. Michael thought it was logically flawed and I thought it was historically misleading, so we decided to write something in response. He was to undertake the **formal model building** and I was to do the **history** but, of course, Michael being the kind of polymathical individual he was, turned out to be equally interested in the historical case study we had chosen to illustrate our main argument - namely that ending wars was not a classically rational decision process, no more than many other 'decisions' in our field."

Stathis Kalyvas … idiographic and nomothetic

The contrast between these two approaches was also the subject of the guest lecture by Stathis Kalyvas at last year's CRS Conference in Dublin.
https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxnb3Jkb25idXJ0bWF0aHNvY3NjaXxneDoxZTIwZjE4MzhkNGUwMjgx

He asked 'Are civil wars like cancer?'. He noted that we studied conflict in two basic ways. The 'traditional' way was the case study with its area-focused idiographic approach. The modern way was the quantitative comparative, systematic, nomothetic approach. He used the case of cancer research to illustrate the relationship between practice and nomothetic and ideographic research. His takeaway message was that there was a mismatch between macro-level, quantitative studies and the goal of policy relevance.

2 Modelling specific complex situations

Let me say how I like to think about all of this. Firstly I like to think of a world society and world history. In other words I like to think of the totality. Anything else is a part of the totality. There are many parts all fitting together. The totality is a structure of parts (as in systems theory). Ideography looks at a **specific** part and the structure of its parts – its **specific** configuration. Nomothetics looks at a set of parts and establishes **generalisations** about the set.

What word should we use to refer to a part? I like to use the word 'activity': 'a complex structure of social activities' (Burt, 2010, p.163); 'within-group and between group activities over space and time' (Burt, p. 70; in Bo, Chatterji and Chaoyan, 2012). The total activity of world society is a composition of component activities. A case study is the study of a single structured activity.

Commentary 41, May 2017, pages 8-9:

"And ever since the Oxford conferences and Steve Brams' *Theory of Moves*, I have been thinking about chess. The work of Adriaan De Groot around the 1950s; Bobby Fischer's 'rich treasury of experience'; "A structured knowledge of chess positions enables a grandmaster to spot the correct move quickly." A chess situation involves a configuration of pieces and a series of moves involves configuration dynamics. Chess knowledge involves a set of structured configuration dynamics with values and probabilities."
https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxnb3Jkb25idXJ0bWF0aHNvY3NjaXxneDo3ZjA0NmU4MDViYjFjNmVk
https://wimse.fsu.edu/media/expert-mind.pdf
http://en.chessbase.com/post/adriaan-de-groot-che-psychologist-1914-2006-

This month saw a quite exceptional game of chess. "The former world champion Viswanathan Anand has played a game that will doubtless go down in chess history as joining that elite coterie of games described as immortal." WHITE (Anand) versus black (Caruana). The situation after Black's 22nd move was critical. The configuration of pieces had the following aspects:

rook (black) attacks QUEEN (WHITE)
rook and queen attack PAWN
queen capture would check KING, giving mate
KING hemmed in by ROOK

QUEEN takes rook
Bishop takes QUEEN

So either White loses QUEEN or gets mated and black wins. However

PAWN checks king then
BISHOP takes pawn checking king
PAWN can become a (second) QUEEN checking king
etc.

And eventually WHITE wins. Thus exemplifying 'a chess situation involves a configuration of pieces and a series of moves involves configuration dynamics'.

Keene, Raymond. "Chess. Anand's immortal." *The Times, Times 2*, August 15, 2017: 15.
http://www.firstpost.com/sports/sinquefield-cup-2017-viswanathan-anand-steals-show-with-brilliant-win-against-fabiano-caruana-3904455.html ;
https://www.youtube.com/watch?v=a-gnKM6KOnA ;
http://www.chessgames.com/perl/chessgame?gid=1883685 ;

A social situation involves a configuration of people and a series of social moves involves configuration dynamics?

I am hoping to write about the configuration dynamics of a social situation in a case study about 'Baby Gard, 4th August 2016 to 28th July 2017'. The latest reported move in this case is:
The Times. "Charlie's mother helps parents of baby 'given days to live by doctors'." *The Times*, August 25, 2017: 10.

3 Sir Michael Atiyah

Proof of Feit-Thompson Theorem

Sir Michael Atiyah won the Fields Medal in 1966 and the Abel prize in 2004. Now 88, he has produced a new proof of the Feit-Thompson theorem. The original proof in 1963 "runs to 255 pages of densely argued text". Sir Michael's new proof has just 12 pages.

"The theorem itself is extremely simple to state, and the proof is horrendous," Sir Michael said "… a theorem this beautiful must have a beautiful proof."[1]

Islam and the West: a personal perspective

Atiyah, Michael. "Islam and the West: a personal perspective." The Martin Ryle Trust and Conway Hall Ethical Society. 14th September 2016.
https://conwayhall.org.uk/event/islam-west-personal-perspective-2/
http://www.sgr.org.uk/events/islam-and-west-personal-perspective

Centuries of interplay between Islam and the West offer perennial lessons for peace

The trustees were honoured to have Professor Sir Michael Atiyah, OM, FRS, deliver the inaugural Martin Ryle Trust lecture, which took place on 14 September 2016 in Conway Hall, London.

Entitled *Islam and the West: a personal perspective*, Sir Michael's talk was sweeping and ambitious, yet retained at its heart a straightforward message: that diversity in culture and faith reflects the natural diversity of humanity, and that society is bettered when its people are educated to understand this and make connections, rather than to resist it and make divisions.

The subject of Michael Atiyah's lecture was the ebb and flow of conflicts and collaborations between Christendom and the Islamic world in the Mediterranean region from the 16th century (when Elizabeth I was on the English throne) to the present day — a dramatic period of history spanning half a millennium and, significantly, preceded some 300 years prior by the massacre of Muslims and Jews in Jerusalem during the Crusades.

If the scope of the talk was ambitious, the task of coaxing a distinct thread out of it in the 45 minutes allocated was perhaps even more so. Yet, despite technical hitches with the slide presentation, Atiyah deftly delivered on both fronts by means of a wide-ranging series of vignettes through time, illustrated with carefully selected slides, incisive observations, an occasional flash of irreverence and a uniquely personal touch.

Atiyah is the son of a Lebanese father and a Scottish mother and grew up in Egypt and Sudan. His early years — and a fascinating family history — at the intersection of Islamic and Christian communities informed the central theme of his lecture.

He began with snapshots of the Mediterranean region in the 16th century. A map from the time showed the Holy Roman and Ottoman empires to the north and North Africa to the south, dominated by Islam; while a drawing of the Corsair fleet, also known as the Barbary pirates (which were hardly lone wolves, Atiyah reminded, but rather a substantial naval force to be reckoned with) illustrated the ongoing battle for power, territory and resources.

The main issue always, he pointed out, was the balance of power between Islam and the West. The strategies deployed by both sides to gain an advantage were war, trade, religion and oppression. Trade was the lifeblood of the economy; it continued throughout and in

[1] Linklater, Magnus. "Mathematician, 88, hopes to prove himself again with new solution." *The Times*, August 12, 2017: 9.

spite of conflict. Slaves were the foundation of the economy and part of the booty of war. All were interlinked, and official accounts didn't always reflect the true picture. A key tactic on both sides was secret surveillance: double crossing and subterfuge were routine.

"If you see any analogies between that time and the present, you'll have got the message," he said.

Cross-cultural links, whether official or underground, were as critical to politics as to everyday life. Those places that were geographically and culturally well positioned to enable these links often accrued power and wealth — an example at the time being Albania, an Islamic country with close ties to Venice, from where the caliph recruited many of his chief ministers.

The theme of bridging and connecting prevailed as Sir Michael took a diversion into a slice of his family history. The Atiyah family, he explained, are Christians, of the early Greek orthodox variety, which dates back to 300 AD. His great grandfather Yusef was converted to Presbyterianism by US missionaries, who were at the time contributing to efforts by Western powers to influence events in the Ottoman empire.

For this transgression, Yusef's father kicked him out of the house, after which Yusef became a minister and religious scholar. He wrote texts aimed at showing Muslims the "superiority of the Christian faith" — but he wrote them in Arabic, reaching out in a welcoming and gentle manner to the Muslim community and acknowledging stories shared by both faiths. Research has since revealed this to be the first non-confrontational official engagement between the Christian West and the Islamic world since the Crusades. Unsurprisingly, Yusef is celebrated as a great figure in the Atiyah family.

Atiyah provided further insights into his cross-cultural upbringing, including sight of an early photograph of his family at their ancestral home in Lebanon and descriptions of subsequent spells in Egypt (where he was schooled in British colonial tradition at Victoria College, Alexandria, "the Eton of the Middle East") and Khartoum, where members of his family enjoyed senior positions within the British administration.

While acknowledging the privilege afforded by this background, Atiyah's observations demonstrated great sensitivity to the suffering and destruction wrought by the British in their determination to expand. He showed slides of Alexandria in 1880 and 1882, before and after its obliteration thanks to British naval bombardment, and made reference to the famous 1898 battle of Omdurman on the outskirts of Khartoum, in which thousands of Sudanese were killed by British forces at the hands of Kitchener (who subsequently brought in a flux of Arabic-speaking Christian Lebanese, including the Atiyah family, to help run that part of the empire).

He also showed slides of the Place of Martyrs in Beirut, comparing its architectural beauty in the late 19th century with the devastation following Israeli bombardment in 1982 in what the Israelis called "Operation Peace in Galilee" — a blatantly Orwellian use of the word peace, he acknowledged.

Moving forward to later years, Atiyah zoomed in on key moments of cross-cultural collaboration that transcended, preceded or followed hostility or betrayal, showing a picture of UK Prime Minister Anthony Eden and Egypt's President Nasser in 1955, whose apparent friendship was later to sour dramatically, and another of General de Gaulle talking to the Druze princess and singer Emira Amal al-Atrash, who had been a British agent in Syria before transferring her loyalties to France. She was killed in a car crash in 1944. "No doubt," said Atiyah, "not accidental."

Michael Atiyah's remarks on the symbolism of the Green Line in Beirut were extremely poignant. As recently as 1990 this separated Muslim and Christian communities in the city, representing both a frontier and the psycho-cultural divide that still today drives civilisations to destroy each other.

He closed by drawing the audience's thoughts back to an earlier time: 1492, a momentous year, for not only was it the year in which Christopher Columbus first set foot in America, but also the year in which the last of the Moors were expelled from Granada, concluding the exodus and annihilation of Muslims from Spain, and in which Islamic forces over-ran the Christian capital of Constantinople at the other end of the Mediterranean. The reminder reaffirmed the see-sawing, repetitive nature of the struggle for power and territory

through the centuries in that region, and accentuated the call for greater attention to the benefits of cross cultural links, and to the importance of learning lessons from history.

The lecture was introduced and chaired by Dr Phil Webber, chair of the Martin Ryle Trust and author of numerous books and reports on nuclear weapons. Dr Webber provided the background to Martin Ryle, to the charity founded in his name, to Scientists for Global Responsibility and its forerunners Scientists Against Nuclear Arms (SANA) and the British Society for Social Responsibility in Science (BSSRS) and of course to Sir Michael Atiyah himself, who as well as being an eminent and much-decorated scholar of mathematics has also spoken out on matters of peace, specifically against nuclear weapons, and was for a time president of the Pugwash Conferences on Science and World Affairs.

A poignant focus of the introduction was the dedication to Professor Sir Tom Kibble, a fellow Martin Ryle Trust trustee who was instrumental in setting up the lecture, and worked on its arrangements until his unexpected death earlier in the year. "For that reason, and in memory of his quiet and persistent commitment to social justice and peace, we dedicate this lecture to his memory. Thank you, Tom," said Dr Webber.

The trustees were delighted that the event attracted an audience of more than 150. Most stayed on for an enthusiastic discussion about the implications of the talk for present day conflicts and the prospects for peace, during which Sir Michael also reaffirmed the need for vigilance regarding nuclear weapons.

"Evidence suggests we're rather slow to learn from the past; but we should keep trying," he said.

"If I had to give a forecast for the future, it would be that it's better to be a failed optimist than a successful pessimist."

We would like to extend our thanks to Sir Michael Atiyah for his time and insights and to everyone who attended, especially the families of Tom Kibble and Martin Ryle.

By Vanessa Spedding, on behalf of the trustees of the Martin Ryle Trust.

3 Value, space and time (my Oxford talk)

Values, World Society and Modelling – the fourth Yearbook

Gordon Burt, Conflict Research Society (CRS)

CRS Conference, Pembroke College Oxford, 18-19 September 2017

Slide 1
Values,
Burton, John W. *Conflict: Human Needs Theory*. New York: St. Martin's Press, 1990.
World Society
Burton, John W. *World Society*. London: Macmillan, 1972.
Modelling
Nicholson, Michael. *Formal Theories in International Relations*. Cambridge: Cambridge University Press, 1989.
Gordon Burt, CRS
CRS Conference, Pembroke College Oxford, 18-19 September 2017

Welcome to Oxford! My wife Catherine says I shouldn't say this because I myself only arrived in Oxford yesterday. But anyway, it's great to see you all!

When I joined the Conflict Research Society in 1982, there were two key figures. I never met John Burton but everybody talked about him. Values and 'human needs' were at the heart of John Burton's approach to conflict resolution.[2] 'World Society'[3] was the title of one of his books. Michael Nicholson I did meet – and continued to meet over the next couple of decades. 'Formal Theories in International Relations'[4] was the title of one of Michael's books – 'formal theories', in other words modelling. So there you have it: values, world society and modelling.

This is my book about mathematical social science.[5]
[show book]

This is my first Yearbook. On the front cover, values are represented by the picture of my family; world society is represented by the map of the world; and modelling is represented by the three graphs.
[show book]

This is my second Yearbook. The front cover has the same pattern: my family, a world map and three graphs. The third graph represents the abstract conceptualisation of value: value space in three dimensions … the percentage triangle and the preference hexagon.
[show book]

This is my third Yearbook. A hundred years of USA presidential elections, modelled by a bouncing ping-pong ball or by a swinging pendulum.
[demonstrations]

[2] Burton, John W. *Conflict: Human Needs Theory*. New York: St. Martin's Press, 1990.
[3] Burton, John W. *World Society*. London: Macmillan, 1972.
[4] Nicholson, Michael. *Formal Theories in International Relations*. Cambridge: Cambridge University Press, 1989.
[5] Burt, Gordon. *Conflict, Complexity and Mathematical Social Science*. Bingley: Emerald. 2010.
—. *Values, World Society and Modelling Yearbook, 2014*. Newcastle: Cambridge Scholars, 2016.
—. *Values, World Society and Modelling Yearbook, 2015*. Newcastle: Cambridge Scholars, 2017.

This is my fourth Yearbook.
'Parents face their worst fears as time runs out for baby Charlie. Boy who became a global cause célèbre.'
The Times, Tuesday July 25 2017, pp. 6-7.
[show]

Space and time … and values

However what I want to focus on in this talk are the concepts of space and time. The 2015 Yearbook in particular focuses on the foundational notions of space and time and how social aspects vary over space and time. The treatment of space covers both geographical space and also abstract space. Particular attention is given to value spaces. When I first read the titles of the other papers in this panel, I was delighted to see that there was a strong link with Chapters 6 and 7 of my 2015 Yearbook. Values, models and time are all indicated in the titles of the panellists' papers.

Slide 2
Values, models and time
Altaf Ali: Identifying **Conflict Escalation** Patterns with Nonparametric Bayesian **Models**
Meredith Reid Sarkees: "The most **peaceable era** in our species' existence"? Examining the **Declinist** Argument
John Tirman: The Epistemology of **War**: **Measuring** the **Human Costs** of Armed **Conflict**
Steven Ratuva: **Indexology**, **pseudo-science** and **human ranking**: Reducing **peace** into a **quantifiable** commodity

Values are referred to: conflict, war, peace, human costs. There are values too in the terms 'indexology', 'pseudo', 'human ranking' and 'commodity' – and of course implicit values throughout.
'Models' are referred to, also 'measuring', 'index', 'science' and 'quantifiable'.
Time is referred to: 'escalation', 'era' and 'declinist'.

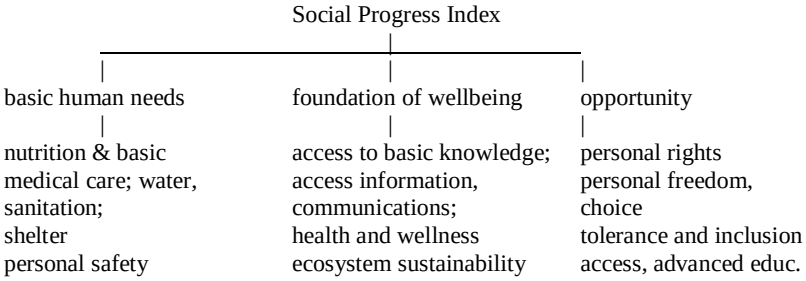
There is also an indication of contested theories with terms such as argument, epistemology and 'reducing … into … a … commodity'. I'd like to link this to three hypotheses and debates. They are hypotheses and debates about different social values. For example Seymour Lipset, in 1959, suggested that two social values, democracy and GDP, were related, the former increasing with the latter. This raises the general question of how different social values are related. Sometimes there is a criticism that a paper gives a strong focus on social value A while completely ignoring social value B. For example in his highly controversial presidential address to the ISA in 2003, Steve Smith presented a forceful critique of IR, arguing that it ignored structural violence. He pointed to the social values in the UNDP indicators and also presented an interpretative viewpoint. As a final example, Steven Pinker and Joshua Goldstein were jointly awarded the Book of the Year Prize at our fiftieth anniversary conference at Essex in 2014 for their books on the decline of war. Our Kent conference in 2015 continued the theme with a plenary by Scott Gates and a talk by Larry Ray. Larry was one of the four authors who reviewed Pinker in the journal *Sociology*, noting inter alia Pinker's neglect of structural violence.

Slide 3
Hypotheses and debates about different social values
Seymour Lipset, 1959: democracy increases with GDP
Steve Smith: critique of IR … ignores structural violence … interpretation
Steven Pinker v British *Sociology*: declining violence … ignores structural violence … interpretation, etc.

How do different social values relate? Chapter 5 of the 2015 Yearbook looks at the Social Progress Index which has been developed by Michael Porter and his colleagues.

'The Social Progress Index is an aggregate index of social and environmental indicators that capture three dimensions of social progress: Basic Human Needs, Foundations of Wellbeing, and Opportunity. The 2017 Social Progress Index includes data from 128 countries on 50 indicators.'
https://www.socialprogressindex.com

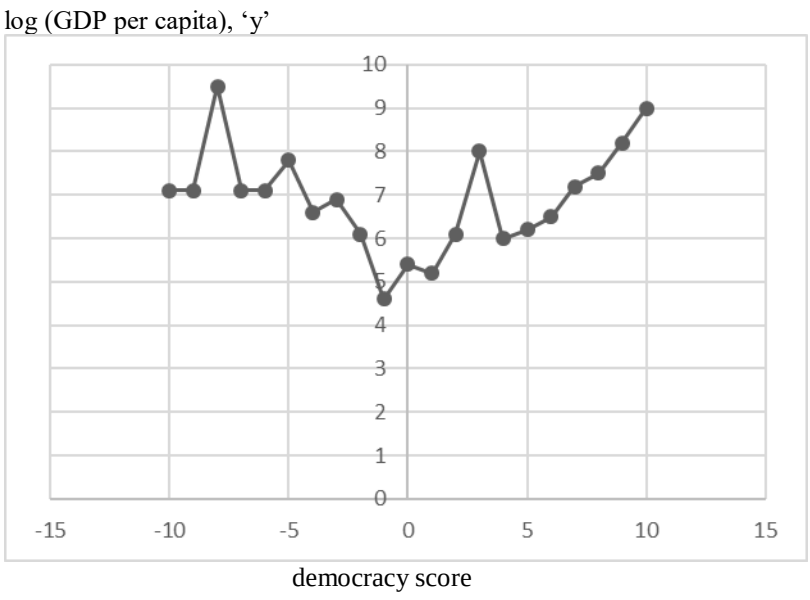
Slide 4
Figure 6.1 The Social Progress Index: the component-level framework



GDP and democracy

What does the SPI tell us about Seymour Lipset's hypothesis that democracy increases with per capita GDP? Certainly the Social Progress Index has high positive correlations with GDP per capita and with life satisfaction and high negative correlations with extreme poverty. However it has only weak negative correlations with inequality; and there is perhaps a U-shaped relationship between personal rights and GDP per capita. A separate study addresses the Lipset hypothesis directly. Contrary to Lipset, my analysis of the data suggests a U-shaped relationship between democracy and GDP per capita. See Figure 6.3, Yearbook 2015, 111-123.

Slide 5
Figure 6.3 Democracy score and log(GDP per capita), 'y'

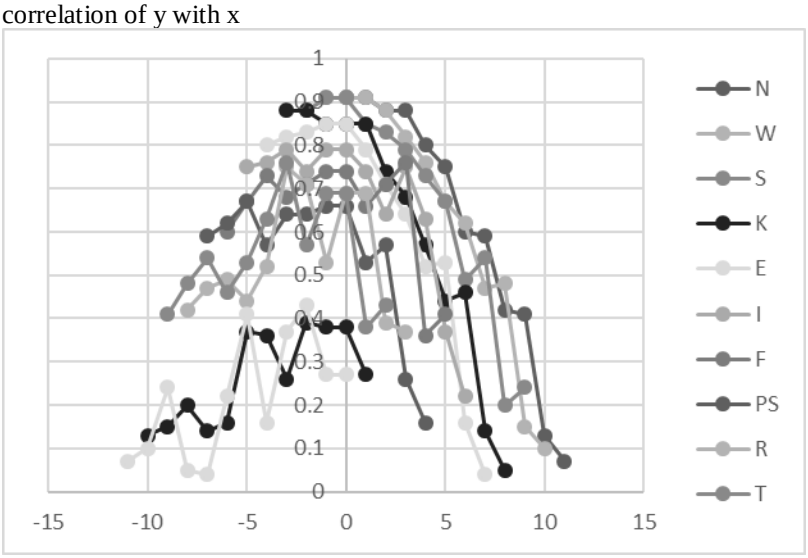


Relationships between social values

GDP and democracy are just two social values. What about all the other social values in the SPI? How are these values related? Our answer is that values which are close to one another are strongly related; and values which are distant from one another are weakly related. The figure shows that correlations between values depend on distance. They exhibit single-peaked correlation profiles.
[This is based on the correlation matrix – leaving aside the point that correlations do not capture everything about a relationship (for example the existence of a U-shaped relationship).]

Slide 6
Figure 6.2 Single-peaked correlation profiles on the SDI continuum for each SDI variable

correlation of y with x



distance of variable y from variable x

[If there are n variables then they can be represented as n points on the n-dimensional unit hypersphere, with correlations inversely related to the angular distance between pairs of points.
The figure below shows how the correlations between SDI components relate to distance on the unit hypersphere (strictly the principal great circle of the hypersphere). The main point of the figure is to show the varying levels of relationship between the variables. This reflects their scattered location on the hypersphere in social value space.]

Slide 7
Social value space
n variables
n points on the n-dimensional unit hypersphere
correlations inversely related to the angular distance between pairs of points
principal great circle (cf factor analysis)

Change over time: linear, exponential, simple harmonic, unit root

For the rest of the talk I want to consider time and how things change over time. Mathematically, possible types of change include linear, exponential, simple harmonic, unit root and many more.

Prompted by Steve Smith's linkage of structural violence to UN measures of social wellbeing, I propose that structural violence manifests itself in low measures of social value and define it accordingly. It follows that if social value is increasing then structural violence is decreasing. In Chapter 6 of my 2015 Yearbook, the UNDP Human Development Index is taken as a measure of social value and an equation expresses how it has increased in the period 1980-2013.

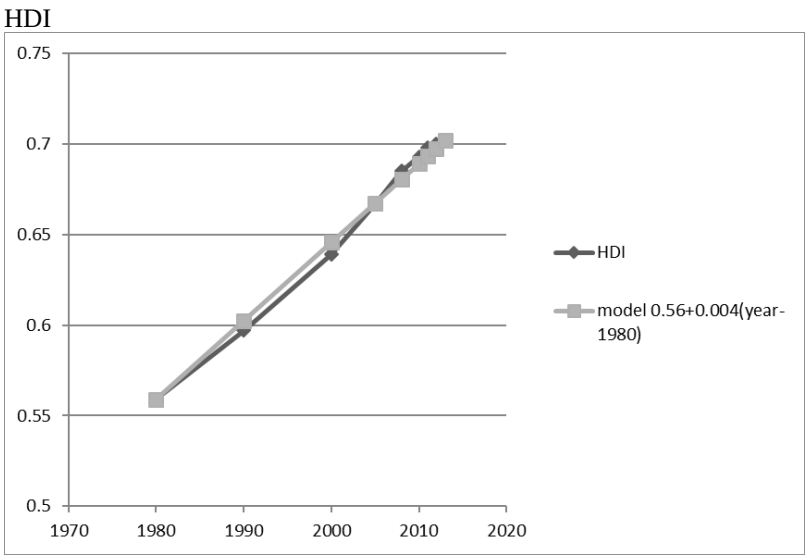
Slide 8

Social value and structural violence

p=1-n
p: social value (positive)
n: structural violence (negative)
p is increasing – so n is decreasing
p(t)=HDI(t)=0.56+0.042(t-1980)
Ray et al., Pinker, Smith, Kenny, cited in Yearbook 2015, 139-151.
UNDP Human Development Index (HDI), 1980-2013. Yearbook 2015, 134-136.

Slide 9

Figure 7.1 The UNDP Human Development Index (HDI), 1980-2013

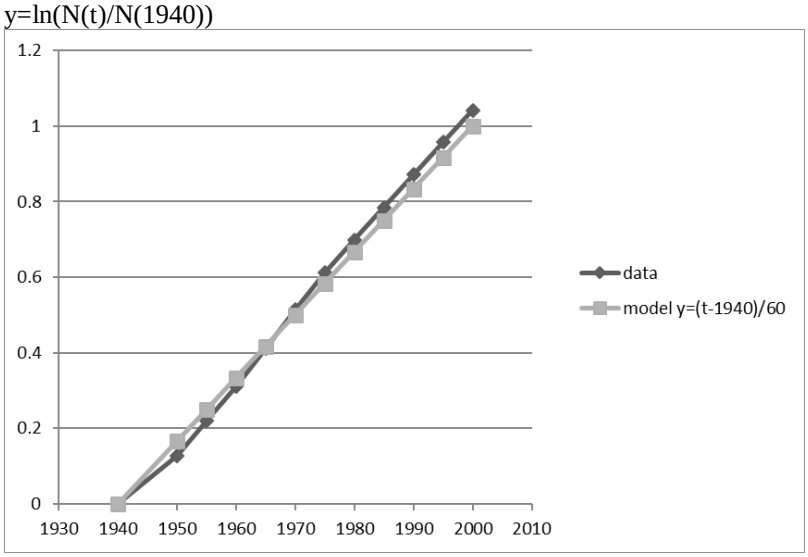


An example of exponential increase is world population.

Slide 10

Figure 7.7 World population, 1940-2000

y=ln(N(t)/N(1940))



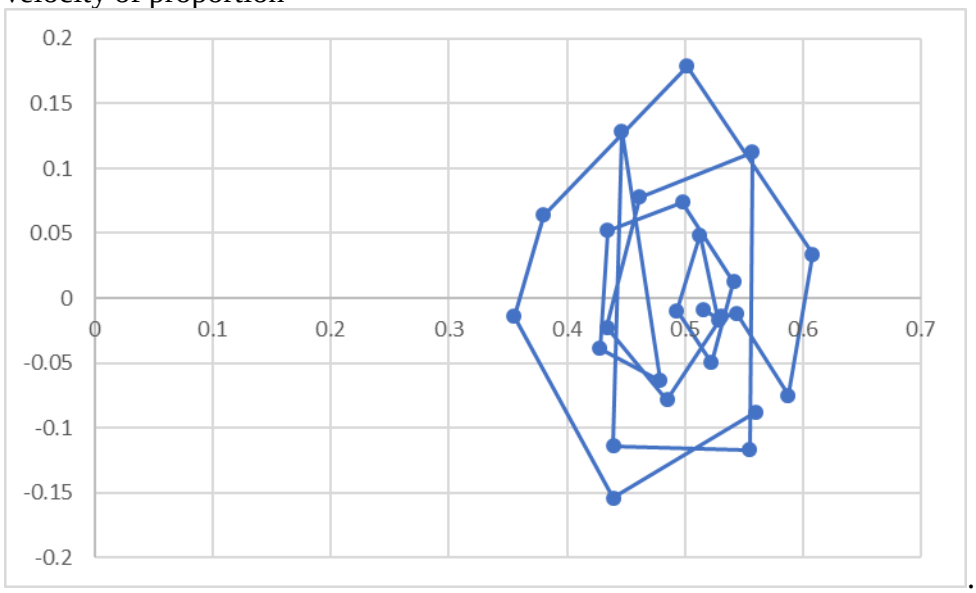
time t

An oscillating simple harmonic motion is exhibited by the votes in the USA presidential elections 1921-2017. The measure is the Democrat proportion of the vote. The first graph shows the trajectory of the velocity and the second graph shows the trajectory of the acceleration. The patterns approximate to damped simple harmonic motion.

Slide 11

Figure 1 Democrat proportion and its velocity, 1912-2017

velocity of proportion



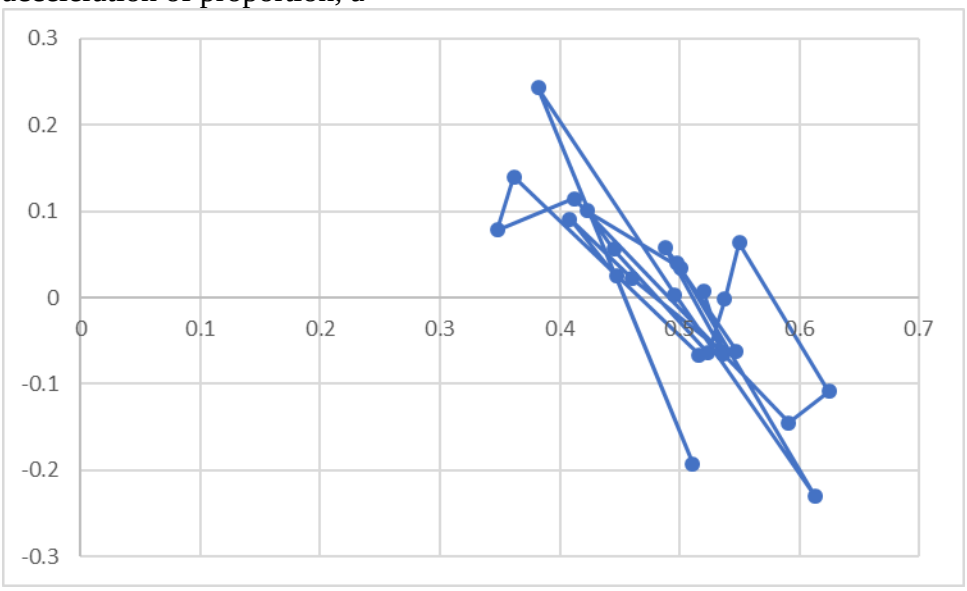
.

x = Democrat proportion

Slide 12

Figure 2 Democrat proportion and its acceleration, 1912-2017

acceleration of proportion, a



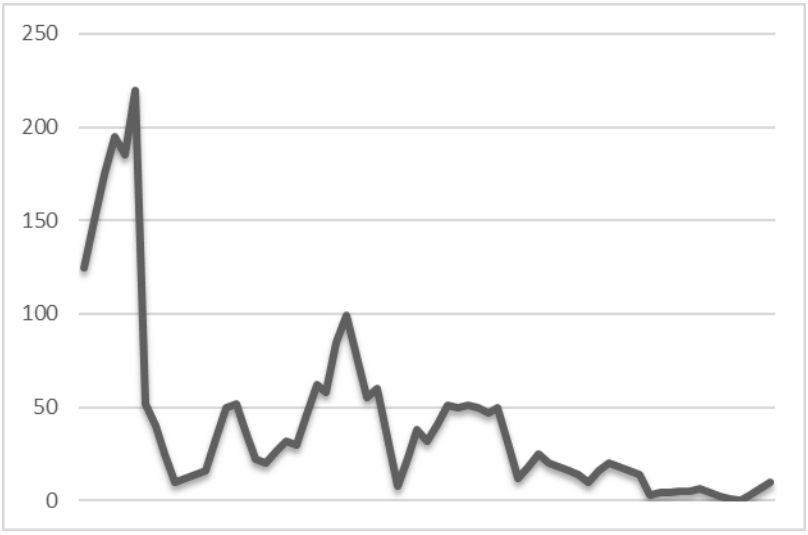
. x = Democrat proportion

War death rates … unit root model

A more randomly fluctuating trajectory is exhibited by the war death rates. Some argue that war death rates are declining and Figure 7.8 was used in 2015 by Scott Gates and others as evidence of this. Look – you can see a clear downward trend!

Slide 13

Figure 7.8 Battle deaths per 1,000,000 people per year, 1946-2014



However ‘Look – you can see a clear downward trend!’ is not the same as carrying out a statistical analysis. An autoregressive model for the death rates suggests a ‘random equilibrium’ death rate of 28.7. An autoregressive model for successive ratios suggests a ‘random equilibrium’ ratio of 1.02. This latter approximates a unit root model.

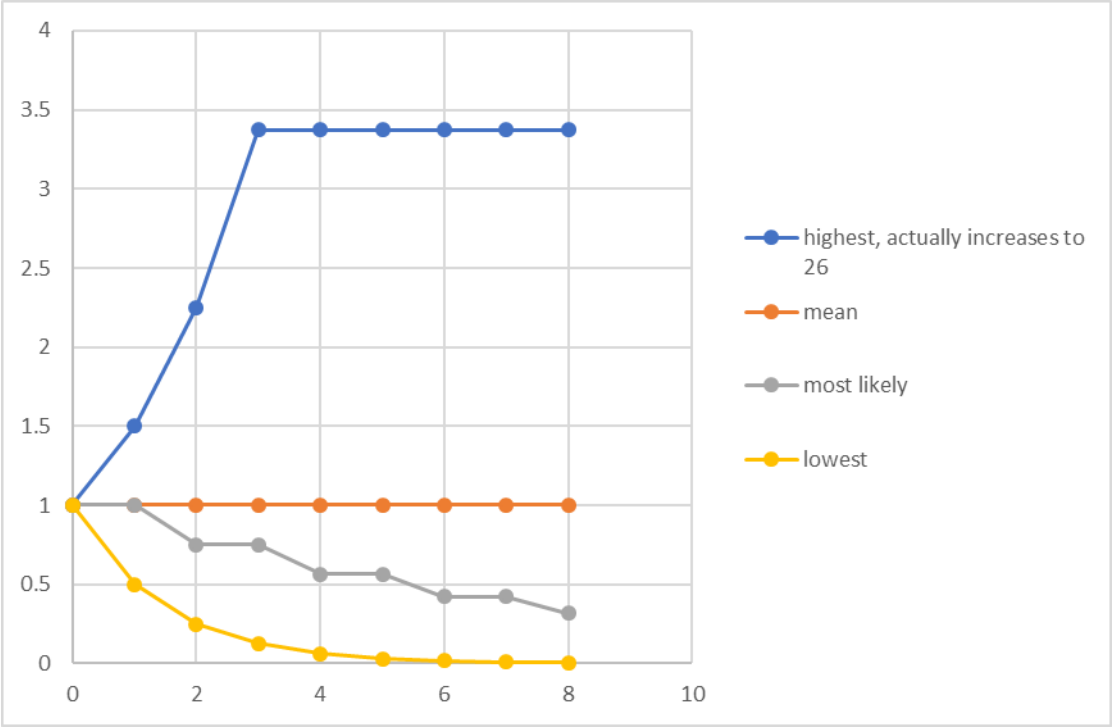
Slide 14

The war death rate – its time series

t: time
x: war death rate
r: the ratio
$r(t)=x(t+1)/x(t)$
$x(t+1)=4.3+0.85x(t)+\varepsilon$
‘random equilibrium’ x is 28.7 death rate
r(t) has mean 1.02 and median 0.99
$r(t)=1+\varepsilon$
$r(t)=0.879+0.137r(t)+\varepsilon$
‘random equilibrium’ r is 1.02

The unit model is interesting. The expected ratio is 1, corresponding to the mean. The death rate is expected to be the same. However this is not the most likely course of events. The most likely trajectory is one of declining death rates. (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

Slide 15



Appendix

The mathematical physics of the pendulum

position x, velocity v, acceleration a, time t, amplitude k, frequency ω
$x=k\sin\omega t$, $v=k\omega\cos\omega t$, $a=-k\omega^2\sin\omega t$
The x & v relationship is an ellipse: $\omega^2x^2+v^2=k^2\omega^2$.
The x & a relationship is a straight line through the origin: $a=-x$.
The x & v trajectory is orbiting round the ellipse.
The x & a trajectory is oscillating along the straight line.
A damped pendulum has k decreasing over time.

The USA political pendulum, 1912-2017

x = Democrat proportion = Democrat / (Democrat+Republican)

velocity:
The x & v relationship is a shrinking circle, a spiral: $(x-0.5)^2+v^2=0.0225k(t)$
where k(t) starts at 1 and then decreases.
The x & v trajectory is orbiting round the spiral anticlockwise.
[$x(t,t+1)=(x(t+1)+x(t))/2$; $v(t,t+1)=x(t+1)-x(t)$]

Figure 1 Democrat proportion and its velocity, 1912-2017
velocity of proportion
x = Democrat proportion

acceleration:
x & a relationship is a straight line through x=0.5: $a=-1.5(x-0.5)$
x & a trajectory is oscillating along the straight line
[x(t+1) as is; $a(t+1)=v(t+2,t+1)-v(t+1,t)$]

Figure 2 Democrat proportion and its acceleration, 1912-2017

acceleration of proportion, a
.
x = Democrat proportion

War death rates … unit root model

This leads us to re-examine Figure 7.8. This has the appearance of a declining trend. However if we look at the ratio of successive terms, we find that the mean m of the ratios is 1:

$$m\left(x(t+1) / x(t) \right) = 1 \qquad [7.15]$$

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.

A time series with a unit root

Consider the process x(t) where x is in (0,∞) with x(0)=u, and t takes integer values in (0,∞). Suppose the process is deterministic with recurrent relation, x(t+1)=x(t). In other words x(t+1)/x(t)=1. The process is constant: x(t)=u for all t.

Now consider a related random process. Suppose:

x(t+1) = x(t) + e where e is a random variable with values in (-x(t),∞)

x(t+1) / x(t) = 1 + e* where e*=e/x(t), e* is in (-1,∞)

If E(e*)=0 then 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: the constant process x(t)=u for all t.
https://en.wikipedia.org/wiki/Unit_root
http://faculty.chicagobooth.edu/ruey.tsay/teaching/uts/lec11-08.pdf

Example
Suppose that the distribution for e* is (A) e*=-0.5 with p=0.5; and (B) e*=0.5 with p=0.5. Then E(e*)=0. Note that case A gives x(t+1)=0.5; and case B gives x(t+1)=1.5. Note that 0.5x1.5=0.75<1.
The set of all possible sequences for x(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
$x(t+2n)=(0.5)^n(1.5)^n=0.75^n<1$.
So
log(x(t+2n))=nlog(0.75)
Because of the binomial distribution this corresponds to the most likely outcome at each stage. In other words a declining trend is the most likely outcome.
However the following are also possible
$x(t+2n)=0.5^{2n}$
$x(t+2n)=1.5^{2n}$

Renshaw, E. (1991) *Modelling Biological Populations in Space and Time*. Cambridge: Cambridge University Press.

5 Literature and music

Waiting for Gordon. Or …

A five-minute play.

Actors: Catherine and Gordon

[This weekend Catherine and I are going up to Hartlepool for a friend's party. We're all asked to do a turn …]

[Stage faces audience.
Two upright chairs, side by side, facing audience.]

[Catherine and Gordon walk on stage and sit in the chairs.]

[For about a minute Catherine and Gordon just sit and each separately engages in desultory non-verbal behaviour.]

Catherine: What's the time?

Gordon: Ten past.

Catherine: Ten past! So why hasn't it started?

Gordon: It has. It has started.

Catherine: It's already started? But where are the actors?

Gordon: We're the actors. That lot out there is the audience.

Catherine: We're the actors! Christ! What are we supposed to do?

Gordon: Nothing. You're not supposed to do anything.

Catherine: Whyever not?

Gordon: Because we're waiting. We're just waiting.

Catherine: Waiting for what? Waiting for whom?

Gordon: Waiting for me.

Catherine: Waiting for you? But you're already here!

Gordon: Maybe. Maybe not.

Catherine: Maybe not? Where are you then if you are not here?

Gordon: Well, maybe I'm dead – like that woman in the Harold Pinter play we saw.

[Catherine leans over and gives Gordon a pinch.]
Gordon: Ouch! What was that for?

Catherine: Just as I thought: you're not really dead are you?
Is this a Harold Pinter play then? I don't think I know it. What's it called?

Gordon: Waiting for Gordon.

Catherine: Waiting for Gordon. Mmmm. And who might the playwright be I wonder?

Gordon: Well, um, er … me. It's me actually.

Catherine: Well, that does surprise me. You've written a play. … And whom does this play happen to be about, I wonder? It's about yourself. … You don't think that's just a tiny bit narcissistic, do you?

Gordon: Narcissistic? No, I don't think so. Not necessarily. I might be an anti-hero for example.

Catherine: Stop! Stop right there!

Gordon: What?

Catherine: Things are going to have to change. You are going to have to change.

Gordon: Change? Change? Me, change? Oh, I don't think I could do that. What would be the point? What could one possibly want to change?

Catherine: Well … the title for a start.

Gordon: The title? But that's what I'm really good at. Waiting for Gordon. Waiting for Godot. Don't you see? Really witty!

Catherine: The title goes.

Gordon: So what would you call it?

Catherine: I'd call it 'Catherine the Great'!

Gordon: 'Catherine the Great'? 'Waiting for Catherine the Great'? I suppose it might have possibilities.

Catherine: No. Not 'Waiting for Catherine the Great'.

Gordon: No?

Catherine: No! 'Catherine the Great waits for no man' … [rising out of her chair]
'Catherine the Great waits for no man'
Let's party! … [walking off stage]

[Gordon remains seated looking lost and bemused.]

Thanks, Stan

[Stan died this month – ninety-odd years old. There were ten of us: a relative, an old friend and her driver, six of us from line dancing and the person who led the humanist commemoration. It was one of the most complete and rounded commemorations I have been at. My own personal reflections follow.]

Sadly it was only in the last couple of years when I started visiting him in hospital and then in the care home that I got to know Stan. To begin with I used to go there and wonder what he and I could find to talk about.

In my mind was that sketch where Tony Hancock was in hospital and Sid James came to visit him, Sid James filling in the awkward silences by eating the grapes he had brought in for Hancock!

With Stan and I it was a bit different. I would start by talking about something I had been doing that week and then it would occur to me to ask Stan if he had ever done anything like that. And it always turned out that, yes he had!

Catherine and I had been with our family in Basel in Switzerland. Had Stan ever been to Basel? Yes he had. Stan and I were both intrigued by the ferry in Basel which went backwards and forwards across the Rhine – it had no engine and was simply powered by the river current.

Stan's father had worked for Mercedez Benz and this had taken the family around Europe in the pre-war years. One of our discussions I recall was of car engines.

In his room at the care home there was a picture and also a model of a Lancaster. Stan had been a navigator in a Lancaster during the war. On occasion he would talk in a quiet way about his experiences of that time.

Another time I was mentioning that a friend had been to Cuba on holiday. 'My mother was from Cuba', said Stan. If I remember right she was a singer and it was that musical connection which brought her together with Stan's Dad who was a trumpeter in various jazz bands.

Stan himself played the trumpet. So our discussions would often turn to music and in the last few months I started bringing in U-tube recordings. Louis Armstrong. Sidney Bechet. And somebody I had never heard of: Jack Teagarden. I asked him for requests and again it was something I had never heard of 'Exactly Like You'. Unlike me, Stan had a deep appreciation of the music and it was the instrumental that was important – he couldn't wait for Louis Armstrong to stop singing and start playing!

Once I took my ten-year old grandson Robert in to see Stan. Here the common bond was a love of the Beano!

Stan and I watched a bit of Wimbledon but we agreed that badminton was more our game.

We also put the world to rights. And in his reflections on life Stan always brought a gentle, thoughtful perspective. In his room too were a number of figures of American Indians and in our discussions we noted the remark made by an American Indian to Carl Jung: 'Western man. He is always hurrying. Why? Where is he hurrying to?'

Stan and I covered a lot of ground. And I haven't even mentioned that he saw the Crystal Palace burn down! Thanks, Stan, for sharing your memories with me.

Menuhin and Grapelli

One time Stan mentioned that his dad had seen Yehudi Menuhin and Stephane Grapelli play together. We played some of the following on YouTube.

Menuhin and Grapelli

Pick yourself up: see them both playing
https://www.youtube.com/watch?v=bLCMmmtcljY

[Fred Astaire https://www.youtube.com/watch?v=mxPgplMujzQ]

Autumn leaves
https://www.youtube.com/watch?v=XiiUHKQg4rQ

Jealousy: see them both playing
https://www.youtube.com/watch?v=dzIEaNRoj3k

Grapelli

It had to be you
https://www.youtube.com/watch?v=mZVJ9DlBKyg