

Cliology

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Chapter 1

Introduction

These are my own notes about Cliology, recently reformatted for the World Wide Web.

Chapter 2

Definition

Cliology is the mathematical study of history. It is the prediction of human social events in the large. It does not predict the detailed future of individuals. It predicts the trends of large groups of people.

Isaac Asimov applied the term “psychohistory” to the same discipline in his series of novels beginning with *Foundation*, but that term has since been coopted by psychoanalysts who apply psychoanalysis to historical individuals.

It has also been called “mathematical biophysics” because many of the articles from the excellent & obscure publication, *The Bulletin of Mathematical Biophysics*, dealt with the topic. Most of the articles in that publication dealt with biology rather than history & sociology, so cliology might more properly be considered a part of mathematical biophysics or a discipline which intersects it.

In his book, *Historical Dynamics: Why States Rise and Fall*[6], Peter Turchin calls it “historical dynamics”.

Chapter 3

Notes about Rashevsky's Riots by Oppressed Groups

Here are some notes about N. Rashevsky's mathematical essay, "A Contribution to the Mathematical Biology of Social Behavior: Riots by Oppressed Groups" [5]

3.1 Variables

First, let's build a catalogue of the variables Rashevsky uses in his essay *before introducing the second group of peeps (the oppressed group)*.

variable	what it is	page introduced
$F(\psi)$	net social behaviour $X - Y$	502
$\frac{a}{A}$	just some line	502
X	number of peeps who adopt the majority's behaviour	502
Y	number of peeps who adopt opposite behaviour	502
A	tendency to immitate the masses	502
a	increases with reaction time to news of new styles	502
O	unstable equilibrian point on $F(\psi)$	502
O_1	stable equilibrian point on $F(\psi)$	502
O_2	stable equilibrian point on $F(\psi)$	502
N	total population, $X + Y$	502
$f(\phi)$	distribution function	502
ϕ	natural tendency of a peep to R_1 or R_2	503
ϕ_m	maximum value of ϕ	503
R_1	a behaviour, corresponds to O_1	503
R_2	a behaviour which exludes R_1	503
O'_1	unstable point on $F(\psi)$, tangent to $\frac{a}{A}$	503
O''_2	stable pointon $F(\psi)$	503
O'_2	unstable point on $F(\psi)$	503

Here is the catalogue of variable *after Rashevsky introduces the second, oppressed, group of peeps.*

variable	what it is	page introduced
$F(\psi)$	net social behaviour $X - Y$	502
$\frac{a}{A}$	just some line	502
X	number of peeps who adopt the majority's behaviour	502
Y	number of peeps who adopt opposite behaviour	502
A	tendency to immitate the masses	502
a	increases with reaction time to news of new styles	502
O	unstable equilibrian point on $F(\psi)$	502
O_1	stable equilibrian point on $F(\psi)$	502
O_2	stable equilibrian point on $F(\psi)$	502
N	population of oppressors, $X + Y$	504
$f(\phi)$	distribution function for N	502
ϕ	natural tendency of a peep to R_1 or R_2	503
ϕ_m	maximum value of ϕ	503
R_1	behaviour of oppression, corresponds to O_1	503
R_2	behaviour of freedom, corresponds to O_2	503
O'_1	unstable point on $F(\psi)$, tangent to $\frac{a}{A}$	503
O'_2	stable point on $F(\psi)$	503
O''_2	unstable point on $F(\psi)$	503
N_1	population of oppressed peeps	504
$-\phi^*$	a value of ϕ , corresponds to O'_1	505
ϕ^*	a value of ϕ	505
ϕ_{m1}	maximum natural tendency of peep in oppressed group	506
R_{s1}	N_1 's choice to become subjugated	506
R_{r1}	N_1 's choice to revolt	506
$f_1(\phi_1)$	distribution function for N_1	506
$F_1(\psi_1)$	net social behaviour $X_1 - Y_1$	506
R_o	behaviour of being oppressed	506
R_f	behaviour of freedom	506
Y_1	peeps in N_1 who oppose oppressors	506
$-\phi_1^*$	when masses decide to be free (riot)	506

3.1.1 Questions about the variables

1. “ a increases with reaction time of the individuals in racting to imitation” (page 502, [5]) So is a the time required for an individual to react to the new value of $F(\psi)$, choosing his next behaviour (immitate the masses or do the opposite, whichever that individual is likely to do) in the next time step (and if $F(\psi)$ is treated as a difference equation)?

Chapter 4

Links

1. “Transition State in Patterns of History”, by Yuri Tarnopolsky. <http://users.ids.net/~yuri/HistMath1.pdf>
2. Brief bibliography of books by Nicolas Rashevsky. <http://www.kli.ac.at/theorylab/AuthPage/R/RashevskyN.h>
3. Biographical outline of Nicolas Rashevsky. <http://www.visual-chaos.org/complexity/biographies/rashevsky.htm>
4. Archives of “The American Historical Review” in JSTOR. <http://www.historycooperative.org/journals/jstor/ah74-2-toc.html>.

Has a lot of links. Not sure what they all are, but many appear related.

5. John Sweat has a blog article about cliology at <http://webpages.charter.net/anthropogene/article.html>
6. “Memetics & the Modular Mind”. This was a two-part essay I read in *Isaac Asimov’s Scient Fiction Magazine* or *Analog* in about 1987. I have not been able to find it since, but it was excellent. It was about memetics, not cliology, but the concepts & equations overlap. (In fact, I suspect memetics & cliology will turn out to be the same thing.)

Appendix A

Random Microthoughts

Unless you are me, you can safely ignore this appendix. In fact, you'll save me some embarrassment if you ignore it.

A.1 Predictable Inventability

It's sometimes said that an invention does not have to be discovered by the person who did. If that person hadn't, then someone else would have before too long. (Or maybe someone else did first but didn't get credit.) This principle is important to cliology. If it's true, cliology's accuracy & precision increase. If it's false, cliology's potential accuracy & precision decrease, possibly until cliology is useless.

If it is true that someone would have discovered some invention if someone else hadn't (& before much extra time passed), then the human mind when viewed as an inventor combines existing thoughts to form new thoughts in a predictable way. In other words, the human mind as an inventor creates new ideas by combining existing ideas.

I know of at least a few historical cases where significant inventions were discovered simultaneously. Should document them as evidence. Maybe documenting & analyzing them would be a worthy cliological activity in its own right.

In cultures that are the hot-bed of new ideas for their time, the language is fluid, changing, difficult to document. (Document this.) Is it because the new ideas which cause the culture to be inventive also cause the language to change? Is it because all the inventing requires the individual minds to alter language to express themselves to each other? Maybe the act of inventing & a changing language are interdependent; each encourages & is encouraged by the other.

A.2 Simultaneous Invention

This is a To Do (do some research) for myself.

It's been said that if Mister X hadn't invented This Great Thing, then Mister Y would have invented it before too long. In the long run, history would not be changed if Mister X did not invent This Great Thing. (This is "Simultaneous Invention Hypothesis"? I hope it's not granting too much to call it a hypothesis. I'm educated enough not to glorify it as a theory¹.)

In other words, if Albert Einstein hadn't published Special Relativity in 1905 (or whenever it was, can't remember for sure), someone else would have before too long, like maybe even just a year or two later. (I remember from a physics book that other peeps were asking the same questions he was at the same time, but they did not coalesce their thoughts into a single idea like he did. Check up on that.)

Didn't Alexander Graham Bell file the patent for the telephone only a week before someone else tried to do it? (Check up on that.) If so, if A.G.Bell hadn't given the telephone to the world, someone else would have just a week or two later.

If Newton hadn't discovered calculus when he did, someone else would have before long. In fact, there is controversy about who discovered calculus. If I remember right, there is question about where Leibnitz got the idea for it – independantly or from a letter from Newton – but after that single question, Leibnitz ran with it on his own, even using better notation (in my opinion) than Newton's. So even if Leibnitz got the idea from Newton, if Newton hadn't pursued it (like he was hit by a bus or was just too busy), then Leibnitz would have run with it as he actually did, & the world would have had calculus on pretty much the same schedule that we really did. This is a perfect example in support of Simultaneous Invention Hypothesis.

If SIH is true, it's good news for Cliology because it means inventions are more predictable than if SIH were false. SIH means you can be pretty sure that a particular invention will happen at roughly a particular time regardless of who discovers it.

If SIH is false, Cliology cannot predict changes in technology very well because it must predict individual actions & insights.

How to test SIH?

If SIH is false (in other words, invention relies on the almost unique insights of a unique inventor), there will be relatively few cases of disputed invention. Definitely that. I also suspect that, if an invention relies on the unique insights of a unique person, then the value of many inventions will be unrecognized by the world when they are released? Why? Because other people weren't thinking about those same things, so even after they see the invention, there's a good chance they won't see value or use in it. Sure, some people will, but the more people see use/value in it, the more likely it is that the invention did not require that unique inventor. So if SIH is false, I would think that many inventions which are useful in the present (whenever that might be) were invented years &

¹The "Intelligent Design" morons often say that Darwinean Evolution is "just a theory". Other ideas which are proud to be "just a theory": Newton's / Kepler's / Galileo's laws of gravitation; Einstein's Special & General Theories of Relativity (by which microwave ovens, cat scans, & transistors exist).

years ago (century ago?) & waited around until the world came to understand them & found a use for them.

If SIH is true, you will see lots of cases of disputed invention. What's more, the world will often find a use for inventions shortly after they are released. In fact, particular needs might drive the invention, so when the invention is released, there's a need for it with open arms already.

How is this useful for cliology?

There are two types of inventions: Those which are earth-shatteringly new & those which are better/faster/cheaper versions of previous inventions. (The technology by which the better/faster/cheaper invention works might be totally different from its predecessor, but the use for the invention is just better/faster/cheaper.)

The earth-shatteringly new inventions might be impossible to predict for cliology. Maybe those are the wild-assed, out-of-the-blue, unpredictable ideas that cause a discontinuous change in the world. (Note: Language was surely an earth-shattering idea, but it required thousands of years to change peeps from basically animals to thinking peeps. So even an earth-shattering invention might have predictable effects once the cliologist knows about the invention.)

But better/faster/cheaper inventions could be predicted by cliology. Maybe there are predictable rates at which the time to perform particular activities reduces. Maybe there are predictable rates at which the cost to create particular objects decreases. Even if the technologies on which these things depend change radically, the effect is simply better/faster/cheaper, & if there are predictable rates of change, cliology could use them.

My gut says that if SIH is true, most inventions are better/faster/cheaper (which could be predictable), which would be good for cliology.

Communication might be a good research topic to test SIH. The latency in communication decreases (exponentially?) when you consider face-to-face only, curiour (the post), smoke signals, semaphores, electric (telegraph & telephone). Also notice that electric began with telegraphy (which was faster but costly because it required a specialist), then went to telephone (which was less costly because anyone with a voice & an ear could use it), to digital (which had the same latency but wider uses because it could transmit more data types than just sound).

A.3 Measurables

1. date
2. population
3. deaths & their causes
4. prices
5. amount of trade, amount of "business"

6. amount of population that has a voice in the government
7. slavery?
8. human rights?

A.3.1 Date

The date must be measurable. This is history, after all.

A.3.2 Population

Population should be measurable, or estimable. Governments have used censuses for thousands of years. For ancient civilizations, the informal estimates from history books might work.

A.3.3 Deaths & Their Causes

Number of deaths can be measured like population.

It is probably useful to categorize them, most importantly into Natural causes, wars, & “by a person’s own government”.

Note that natural causes change over time.

A.3.4 Prices

Prices can be measured or estimated much of the time, but the values are relative. Even gold or silver isn’t an absolute measure of price; it only seems so because our culture values it. The most absolute measure of price I can imagine is the perceptions or emotions of the people buying & selling the goods, & I don’t know how to measure that.

A.3.5 Amount of trade

In modern times, might be able to get information about the amount of goods exchanged or the amount of “business”² which takes place. Hopefully could find estimates of same for older cultures.

A.3.6 Amount of population with a voice

Possibly a useful measure. In a democracy or republic, it is presumably the number of voters. (Do I need to distinguish between “number of voters” & “number of voters who actually vote”?)

Even in other forms of government, some people have a voice. In a medieval European monarchy, nobles & the church had voices. And if things get unbearable enough, commoners can form a revolt, which is a form of voice.

²As in “The business of America is business”. That kind of business.

Considering that a voice in the government can be applied with ease (voting in a regularly scheduled election) or applied with difficulty (a rebellion or revolution), maybe it would be useful to measure the ease at which a person's voice could be applied.

A.3.7 Slavery? Human rights?

You'd think you could measure slavery with a Boolean value, but it's not so simple. Factors which suggest slavery isn't Boolean include:

duration Some forms of slavery say that a slaver can never legally be his own master. Others say that a slave could in theory become a free man.

serfs Serfs belong to land. Suggests there is more than one type of slavery.

indentured servants Slaves for a time?

slave rights Some forms of slavery still give slaves some kinds of rights as property, or at least outlaw waste. Others give slaves no rights whatsoever. Are these different degrees of slavery?

These factors suggest that slavery is a scalar or a vector, not a Boolean.

Is slavery one facet of a larger concept of human rights? If so, should slavery be measured independantly at all? What are the other factors in human rights? Is it useful to distinguish between the human rights a society grants its own people & those it grants all people?

A.4 Goals

Initial results don't need to be detailed.

Obtaining most of these values from measurements on a country would constitute smashing success:

internal human rights How many rights does a government grant its own people in practice?

external human rights How many rights does a country admit to peoples of other countries?

warlike How eager is the country to make war, or does it solve problems in other ways?

How to measure human rights?

Any output from the formula must themselves be measurable.

Obtaining similar predictions for corporations would also constitute success.

A.5 More Factors

The big idea is to produce predictions about the actions (& welfare?) of large groups of people such as countries, religions, large corporations, not of individuals. Is it possible that the attitudes of individual people in key positions is important? I think so. A king might not have total control, but he has a lot. And kings aren't the only individuals who have lots of control. Consider popes, bishops, presidents, prime ministers, CEOs, union leaders & other rabble rousers, & "entertainers" in the modern world.

Is it possible that an intended advantage of a government that separates power is to prevent the personality from any individual from affecting policies too much? If so, the United States of 2001 is losing that advantage.

A.6 Methods

Could use equations as from classic physics & memetics.

Could use discrete simulations of organizations as entities.

Could use a-life techniques of organizations as races or communities.

Could turn these techniques inside-out, use them to operate on fundamental factors for which organizations are by-products or emergent properties. For example, maybe the movement of certain types of products or ideas is key, & organizations are places of high concentrations of those things. Or maybe defense, safety, prosperity, hope, & *status quo* are fundamental, & organizations are loci of those things (or of factors which prevent those things). Equations or simulations could track the movement of those fundamental factors, with predictions about organizations happening as a sort of by-product.

Appendix B

Other File Formats

- This document is available in multi-file HTML format at <http://lisp-p.org/ovk/>.
- This document is available in Pointless Document Format (PDF) at <http://lisp-p.org/ovk/ovk.pdf>.

I write almost all of my documents in \LaTeX ([4], [2]). I compile to PDF with `latex`, `dvips`, & `ps2pdf`. I compile to HTML with `latex2html` ([1], [3]).

Appendix C

Change Log

when	who	what
2005-Jun-22	gstover	Added Predictable InventabilityA.1

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