

Lemming Cycles

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Introduction to biohistory

This is a book about lemming cycles, a 3–500-year cycle that appears to run through human history, at least to the extent that data is available. It has effects on birth rates and death rates, political unity and fragmentation, and the degree of open-ness to new ideas. One striking aspect of lemming cycles is that their effects can be plotted with almost mathematical precision. Even the variation in length happens in a highly systematic way.

Biohistory proposes that this is the same cycle that can be seen in regularly cycling animal populations such as lemmings and muskrats. Even the length of human and animal cycles are similar, in terms of the number of generations.

To fully understand this book, readers are advised to first read Biohistory, but what follows is a brief summary.

Biohistory posits that there are four biologically based character traits, the levels of which change over time, and which determine most aspects of human history. These aspects include the size and stability of political units, the capacity for hard work and economic development, the tendency to make war, levels of innovation and traditionalism, and more.

The first two are adult C and infant C. Both are driven by influences we call 'C-promoters' which include parental control, food shortage, and limits on sexual behavior and other activities that cause surges of dopamine in the brain, and thus reduce sensitivity to dopamine.

Understanding C

Both adult C and infant C are epigenetically based, meaning that they reflect differences in the way that genes are turned on or off by the environment. Infant C is fixed in infancy, or at least in very early childhood. Adult C is heavily influenced by C-promoters in late childhood, especially age 6-12, somewhat less in adolescence, and least in adult life. However, it *can* change in adult life.

High C societies tend to be hard working. People with high infant C are innovative, good with machines, and have strong impersonal loyalties. At the highest level, such as in nineteenth century Europe, they tend to form republican or democratic governments. The Industrial Revolution took place because there was an unusually high level of infant C in northern Europe at that time. Once machines were developed, they could be adopted by people with lower infant C.

Both adult C and infant C can be passed epigenetically from parents to children not only through childrearing practices but directly through sperm and ova. Related behaviours are listed below.

Behaviours linked to Infant C and Adult C

	Infant C	Adult C
Driven by C-promoters such as parental control in	Infancy	Especially Late childhood (6-12), but also in later life
	Hard working	Hard working
	Market Oriented	Family and children
	Nuclear families	Community
	Impersonal loyalties. Machine skills	
	Strong national loyalties	Larger political units
	Flexible thinking	Consensus minded

Understanding V

The next two traits are adult V and child V. Both are driven by influences we refer to as ‘V-promoters’, which are intermittent stresses that appear to toughen the stress-reaction system, making it more resilient. An especially powerful V-promoter is any influence that makes mothers more anxious, after which the child grows up to be less anxious. However, the mother must not be abusive or neglectful, since that leads to lifetime stress and undermines V. Patriarchy has this effect on boys. And, as will be indicated in this book, so too does being born at the end of a major war but growing up in peace.

High V societies tend to be warlike, meaning that they are primed to fight in groups against other groups. They are confident and have a strong sense of unity, and are fertile. An example of a high V society would be the kind of warlike tribe from the desert or mountain that has, throughout history, invaded the settled lands.

Child V is driven by harsh punishment in late childhood, but undermined by punishment or neglect in infancy. Societies with high child V readily accept powerful rulers, even if distant. They also tend to be highly traditional. Societies with high child V include the traditional peasant cultures of India, China and especially the Middle East.

Behaviors linked to both forms of V are listed below.

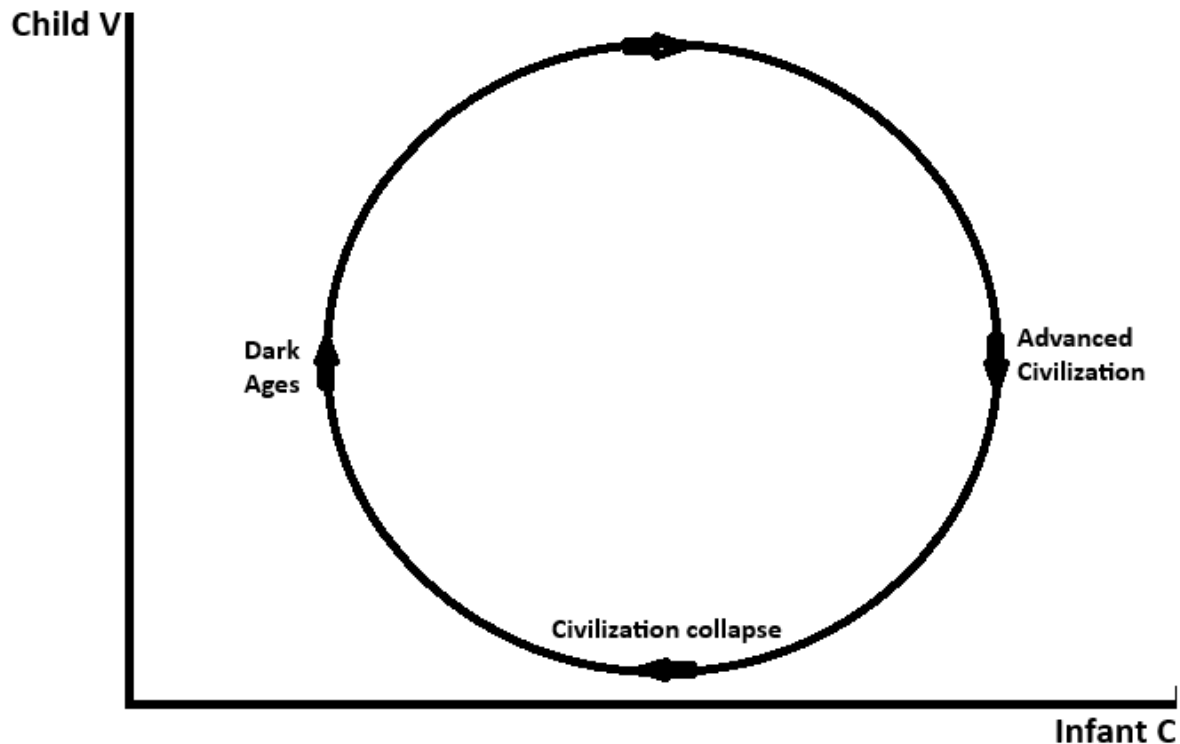
Behaviors linked to Adult V and child V

	Adult V	Child V
Driven by V-promoters	Patriarchy Intermittent stresses, such as the Ramadan fast	Patriarchy Intermittent stresses, such as the Ramadan fast
		Punishment in late childhood (6-12)
	Confident	Confident
	Fertile	Fertile
	Patriarchal	Patriarchal
	Warlike	Traditional
		Hierarchical, accepts wider authority

The Civilization Cycle

The driving force behind the rise and fall of civilizations is the 'civilization cycle', in which high levels of child V and its associated stress drive an increase in C, and especially infant C. High C societies tend to be powerful and prosperous. But high infant C undermines child V which, combined with prosperity, undermines C. Eventually, C is low enough for child V to rise and the cycle repeats. This is laid out in Fig 1.1 below

Fig 1.1 The Civilization Cycle



For three of the societies followed in this book, we will show only the top end of the cycle, in which first child V and then infant C rise to a peak and then fall. These include England, France, and Japan.

In two of them, China and ancient Rome, we will see the collapse phase as well. The societies that rise out of the collapse are very different in each case, but what is important here is how the stage of the civilization cycle affects the length of the lemming cycles.

Fluctuations in the civilization cycle

The civilization cycle explains much of human history, including features such as large impersonal states and fast population growth, which peak at the highest level of infant C. But the progress in these features is not steady, and can even go backwards for a time. This is where we see the influence of lemming cycles, the subject of this book.

For example, between 1000 CE and 1900, England showed a long-term increase in population growth and political stability, reflecting a long-term rise of infant C in the civilization cycle. But in the fourteenth and fifteenth centuries, England experienced an actual decline in population and a period of political weakness, reaching a low point in the Wars of the Roses in the 1460s.

In this book we will identify a 3–500-year cyclical pattern that interrupts the flow of the civilization cycle. It can be seen in every civilization for which there are adequate records, most clearly in the history of China, where it closely associated with the rise and fall of dynasties.

This cycle has been identified as significant by Peter Turchin in such works as *Secular Cycles*, identifying over-population and elite over-production as key reasons for the collapse.¹ These factors clearly have an impact, but alongside them we propose that there is an underlying biological pattern. Most clearly, these cycles closely resemble the regular cycles of small animals such as lemmings and muskrats, whose numbers explode every few years before falling to a fraction of their former level.

Similarities include changes to birth rates and disease resistance, some aspects of behavior, the circumstances in which cycles become longer or shorter, and the generation length – around 10-12 generations in each case. To make their biological basis clear, we will refer to them as ‘lemming cycles’, after the best known of these cycling animals. And it is with these animals that we will start our journey.

Chapter 1. Lemmings and Muskrats

The one thing most people “know” about lemmings is that they commit mass suicide by hurling themselves from cliffs. This is not true, but it is based on a remarkable pattern of behavior.

Lemmings are small rodents living in the sub-arctic regions of Eurasia and North America. Every three to four years their populations surge and their behavior changes. Normally shy and elusive, at their peak of population growth lemmings lose their fear of humans. They become bold and even aggressive, spreading out in waves of mass migration.²

The urge to migrate is so strong that groups of lemmings attempt to cross almost any obstacle standing in their path, including lakes and rivers. Large numbers drown attempting to cross lakes or seas—which is where the “suicide” myth originates—but some succeed in crossing quite large bodies of water.

This dramatic expansion and migration is followed by a population collapse. Then there is a new period of growth until a new peak and mass migration. The cycle is relatively regular, playing out over a three- to four-year period.³

Lemmings are not the only species to display this pattern. Mice, hares, grouse, muskrats and many others have similar population cycles, though of varying lengths. Not all of these species exhibit the same dramatic mass dispersals as lemmings, but the essential pattern is similar.⁴

A key finding from animal studies is that each species takes a similar number of generations to complete an entire cycle. Thus it is that species with shorter generations tend to cycle more quickly.

For example, lemmings reach sexual maturity in 3-6 weeks and can have several litters in a year, so their cycles average 3-4 years. Muskrats breed more slowly, so their cycles are closer to ten years.

Bearing in mind that these figures are only very approximate, the estimated number of generations in a cycle for different species are as given in Table 1.1 below.

Table 1.1: estimated length of cycles for different species.⁵

Species	Cycle length	Generation time	Approx generations per cycle
Lemmings	3-4 years	2-4 months	12-15
Voles/mice	3-5 years	2-4 months	10-20
Muskrats	5-10 years	1 year	5-10
Snowshoe hares	8-11 years	1 year	8-10
Grouse	6-10 years	1 year	6-10
Lynx (predators)	8-11 years	2-3 years	3-5

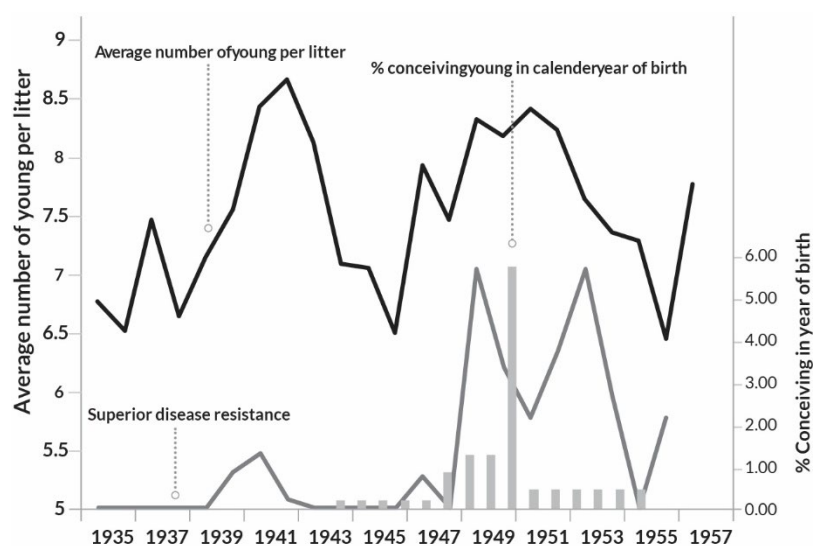
All but the last of these are prey species, generally cycling between eight and fifteen generations, with the median around 10-12. The one major outlier is the Lynx, which has a similar cycle length to its prey but much shorter generation time. The most obvious reason is that lynx numbers depend not on an innate cycle but on the abundance of prey.

Changes in behavior

Growth, migration and regularity are not the only remarkable features of the cycle. Muskrats have been studied intensively and show some clear differences in behavior. During the growth phase they are more resistant to disease, breed earlier and more profusely, and are more tolerant of population density.

During the decline phase, the opposite occurs: more disease, smaller litters, and breeding sites further apart (see Fig. 1.1 below). In this period they also seem to react poorly to any form of stress, commonly dying from shock if taken into captivity.⁶

Fig. 1.1. Vital statistics of Iowa muskrats



Other species show a similar pattern. During the growth phase, litters are larger and more frequent and the young are more likely to survive. In the decline phase, fertility drops and there are more deaths from disease and other causes, such as predation.⁷

A number of studies have found that animals in the growth phase are bolder and more exploratory, becoming less so as the population peaks, and most timid in the decline and low points of the cycle. The clearest evidence for this pattern comes from bank voles, field voles, and other microtine rodents, with similar patterns reported in some lemmings.⁸ Bold and exploratory behavior means that such populations are more likely to migrate.

There is no generally accepted term for these cycles but, as mentioned earlier, we will refer to them as lemming cycles because lemmings are the best known cycling animals.

One further aspect of these cycles in animals is that local populations tend to cycle together. More distant populations can cycle together, but may also have cycles of the same length but with peaks and troughs at different times.⁹

Changes in Intensity and Length of cycles

In animal populations, cycles can vary in intensity. The most consistent finding is that they are more pronounced in areas with harsher and longer winters, with bigger differences in the size of peak versus trough populations. These are generally the more northerly areas, but can also be inland areas compared with coasts, or at higher altitudes. Cycles in some areas have also become less intense in recent decades, as the climate has warmed.¹⁰

Cycles can also vary in length. Longer cycles are found in areas where food is depleted and there are more predators and higher levels of disease and stress.¹¹

A crucial point is *when* this stretching occurs. In animal populations, the growth phase of the cycle takes about the same number of generations. The decline phase may be the same duration but can extend, especially when predation is heavy. For example, the Kluane Predator Enclosure Experiment found that excluding predators greatly shortened the decline. So too did removing predators from vole populations in Finland.¹²

This finding will be crucial when we come to apply lemming cycles to human populations. It explains not only why some cycles are longer than others, but why some sections of the cycle change when others do not.

Current Explanations

Researchers have made many attempts to explain these cycles. One common explanation is that population collapses are caused by crowding, either as a direct stressor or from lack of resources. It is well known that population density is a major stressor, and stress alone can cause death-rates to rise. Yet lemming cycle collapses can occur even when local populations are sparse. High population density is not enough to cause a decline, and low density not enough to stop a decline.¹³

Other explanations for lemming cycles relate to food or predators. Experiments have been done to change food availability and to exclude or allow predation, without consistent effect.¹⁴ In sum, no experiments or modelling to date have been able to stop these cycles. This suggests that environmental factors limit population growth but do not *cause* these cycles. The foremost experts in this field have come to the conclusion that the driving force would seem to be within the animals themselves.¹⁵

The Biological Function of Lemming Cycles

To help understand lemming cycles, it is important to ask what evolutionary purpose they might serve. It is easy to understand that small and vulnerable species might want to breed fast and fight off disease. But why would they, in certain years, have *fewer* offspring and be *more* likely to die from disease? This is a pattern common to several species on different continents, especially in harsh northerly climates. Why would evolution favor a pattern that regularly causes populations to collapse?

The answer can be found by thinking of lemming cycles as an answer to a problem. Consider a population of small animals, vulnerable to predators, living in a harsh and variable environment. To avoid predators they must be timid, avoid predators, spread out, and keep to well-known areas. In other words, they must act like gibbons, animals adapted to an environment with scarce but relatively stable food supplies.

This works for gibbons *because* their food supplies are stable. But it would not work for animals in areas with big changes in food availability. Local food supplies could disappear and new areas open up at any time. To take advantage, animals must be bold, take greater risks, amass with their fellows, and actively seek out the new.

In other words, they must also act like baboons, animals adapted to a highly variable food supply. But if they did so, they would be quickly wiped out by predators. A troop of baboons may at times fight off a leopard, but not even the bravest lemmings can take down a fox.

The solution engineered by evolution seems to be an alteration between these strategies. In the decline phase, cycling animals such as lemmings are timid and spread out. They breed less and die more easily, so their numbers drop far below the carrying capacity of the land. Predators starve and become scarce.

Then they start to breed – fast. More young are born and fewer die. There is plenty of food to support them. They also become bolder, gather together, and then begin to migrate in large numbers. The remaining predators feast but they breed more slowly, so enough lemmings survive to spread out widely and colonize new lands. Eventually, predator numbers catch up, but by this time the prey population collapses, and the survivors spread out and hide. Again, the predators starve.

The benefit of this system, from an evolutionary viewpoint, is that it reacts automatically to changes in the environment. Harsh winters are a sign that the environment is dangerous and unstable, so that the cycles become more intense.

In more benign environments where there is less need to migrate and cycling would be maladaptive, cycles disappear or at least become milder. The best strategy in such areas is that driven by stable food supplies: spread out and hide.

It also makes evolutionary sense that cycles should become longer when predators are a greater threat. A longer cycle gives more time for predators to die off. And, of course, for this to be effective the stretching *must* be in the decline phase. The growth phase needs to be short so that populations can build before the predator numbers rise.

We propose that the potential for cycling is a common feature of mammals. Evidence for this is that lemming cycles can be clearly seen in human populations, even though at a much milder level than for lemmings or muskrats. That is the key proposal of this book.

It is also likely that such cycles are not found in birds. Populations of species such as ruffed and red grouse fluctuate, but such changes can be more easily explained by weather, food supply and predation. They show no evidence of changes in boldness, and changes in aggression and territory size appear to simply reflect population density.¹⁶

This again makes sense, in the light of evolution. Birds are highly mobile and can disperse with a lower level of risk, so lemming cycles for them would be less advantageous.

Driving Force for Lemming Cycles

The following is a tentative explanation of what drives these cycles, which will be modified as more data comes in. My research team is currently working to get samples from a cycling population of lemmings in Canada, and we have set up a multi-generation study of mice with intermittent food shortages, the kind of environment that should cause animals to cycle.

Biohistory suggests that lemming cycles reflect fluctuations in the level of *V*, and especially of adult *V*. Animals in the growth phase have indications of high *V*. They not only have higher birth rates and lower death rates, but are also bolder and more adventurous. All these are characteristic of high *V* human populations. A key difference in humans is that bold and adventurous behavior tends to be reflected not only in migration but in the tendency to fight wars. It is also significant that lemming cycles in animals are more extreme in harsh environments, which are in themselves *V*-promoters.

We propose that lemming cycles are the result of an epigenetic cascade, causing a fluctuation in *V*. An epigenetic cascade is where epigenetic change A causes—with some delay—epigenetic change B, which drives epigenetic change C, and so forth back to A. These cause *V* to fall and then rise, with the entire cycle taking about ten generations.

The whole process lasts about ten generations. This is because, as studies have shown, it takes several generations for a given environmental impact to cause a complete epigenetic change.¹⁷

The growth phase represents high *V*, the decline phase low *V*. See table 1.2 below.

Table 1.2. Behavioral characteristics of lemming cycles.

Growth phase (high <i>V</i>)	Decline phase (low <i>V</i>)
Higher birth rate	Lower birth rate
Lower death-rate	Higher death-rate

Bolder	Less bold
Less Territorial	More territorial
Migratory	Less migratory

Do lemming cycles involve fluctuations in adult V and adult C?

As to what drives this change, one possibility is that it represents a fluctuation between adult V and adult C, with C being higher in the decline phase and lower in the growth phase. The evidence for this is that social tolerance in several cyclic vole populations is greatest in the growth phase and declines at peak population, with females becoming more aggressive and territorial. Toleration is lower still in the decline phase.¹⁸

In biohistory terms, territorial behavior is an indication of higher C, as expressed in the territorial defence of animals such as gibbons. It is not simply a reflection of low V, since very low V species such as domestic animals are not territorial in any sense.

If so, the mechanism driving the cycle could be the same as that driving the civilization cycle, but happening much faster because it depends on changes in the adult versions of C and V, which can change more quickly. High adult V causes a rise in cortisol, which acts as a C-promoter, causing a rise in adult C. Higher C undermines V, eventually lowering cortisol so that C begins to decline, allowing V to rise again.

At present we are not sure whether the rise in cortisol is a direct result of high V, or of the fact that animals in the growth phase are less territorial and thus live in denser populations. Our mice experiments, and our collection of lemming samples, will hopefully make this clear.

This model explains why populations in harsher environments cycle more strongly. Extreme food shortages raise the average level of V so that the peak level is much higher, causing a more extreme rise in C and thus eventually a more extreme fall in V.

As discussed, the key difference from the civilization cycle is that the primary changes are in adult V and adult C. Whereas the civilization cycle represents changes in child V and infant C.

This model is highly tentative, and yet not difficult to test. It gives precise predictions about what epigenetic and hormonal changes can be expected in each generation. But to summarize, there are key features of lemming cycles in animal populations that show how these cycles operate. These are listed in table 1.3 below.

Table 1.3: Features of lemming cycles in animal populations

	Growth Phase	Decline Phase
Fertility	Higher	Lower
Death rate	Lower	Higher
Behavior	Bolder and more exploratory	More timid
Length of phase	Similar length	Longer in times of stress
Length of cycle	Between 8 and 15 generations in total	

The following chapters will trace all of these patterns in human history. In human populations, however, we will find no evidence of changes in adult C or infant C. Key behaviours can be explained by changes in adult V.

Apart from these aspects, there are other changes that can best be explained by changes in child V. These include attitudes that are more or less accepting of powerful authority, and the degree of openness versus rejection of new ideas. We might expect peak child V to reflect peak adult V in the previous generation. In fact, we will find that child V peaks two generations after the highest level of adult V.

Lemming cycles make no biological sense for humans, given that our ancestors bred more slowly than key ancestral predators such as lions. They are presumably an inheritance from the time when our ancestors were timid creatures scurrying between the legs of dinosaurs. But they can be traced without much difficulty in all societies with good historical records. And they explain much that is strange and mysterious about human history.

So let us start with a society with unusually good information about demographic history, and also one where foreign invasions have had relatively little impact. We thus can see lemming cycles in an unusually clear form. That society is England.

2. Lemming Cycles in England

Lemming cycles in animals are most clearly revealed by population growth and decline, so let us start with demography. In both Europe and Japan for almost a thousand years, there was a trend to faster population growth until recently, associated with rising infant C in the civilization cycle. But that broad trend masks variations in the *rate* of population growth.

In this chapter we will apply lemming cycle theory to England, looking especially for the changes identified in the last chapter. In particular, changes to birth rate and resistance to disease.

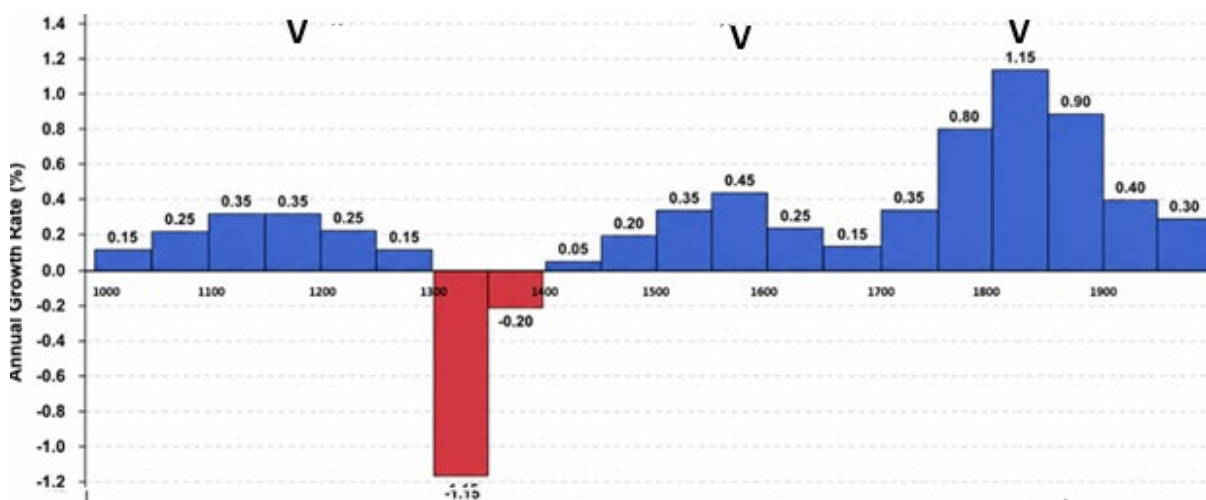
Population Changes in England

Patterns of population rise and decline are fairly well known through much of the period in question, although exact figures are only available from the nineteenth century. Before that, the numbers are approximate but sufficient for our purpose.

From the late eleventh century, the population of England was on the rise. The rate increased in the twelfth and thirteenth centuries. Then, in the late fourteenth and early fifteenth centuries, population actually declined. Another rise began in the late fifteenth century, continuing into the seventeenth century. After that, population remained static in the early eighteenth century before rising in the late eighteenth to early twentieth centuries.

This gives three surges, interspersed with periods of static or falling population (see Fig. 2.1 below). The cores of the growth periods, when V is highest, are marked with the letter V.

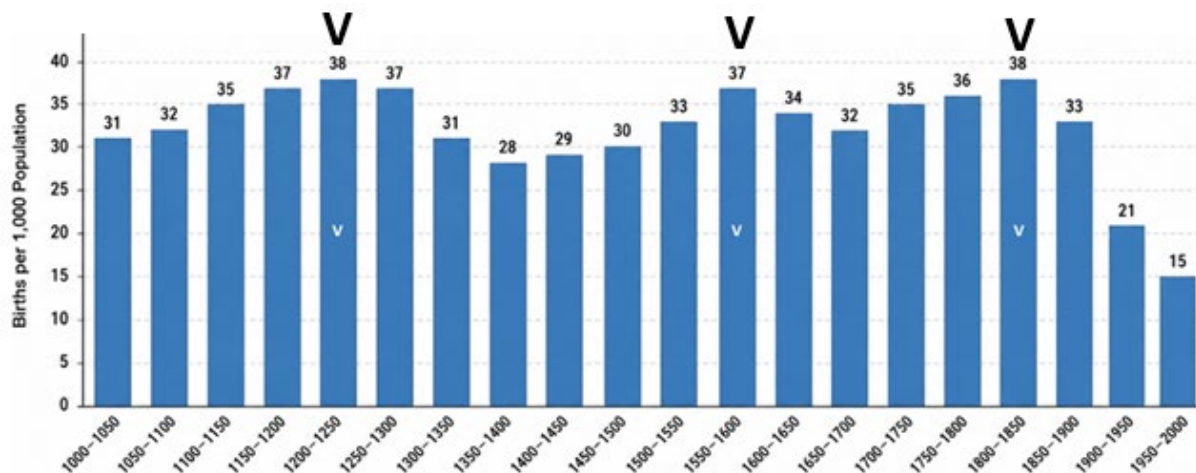
Fig 2.1: Population growth or decline and V periods in England: 1000-2000 CE.¹⁹



But this alone is not enough to plot of V, because other factors than fertility and resistance to disease can affect population. The birth rate was actually higher in the early thirteenth

century than the twelfth, but lack of available land increased the death rate.²⁰ A better idea can be gained by plotting birth rates., as in Fig 2.2 below.

Fig 2.2: Estimated birth rates in England: 1000-2000 CE.²¹



Using these figures we can plot what we may now call the ‘V years’ in 1225, 1575, and 1825, bearing in mind that these could be out by a few decades given the approximate nature of the evidence. These V years are 350 and 250 years apart, respectively, which is a lot longer than for lemmings or muskrats. But the resemblance is closer if we consider generation length.

Between 1200 and 1550, the typical male generation was 28-32 years. For females it was 23-27 years, giving an average generation length of 27.5 years. The typical male generation length between 1550 and 1850 was 26-30 years and for females 22-26, giving an average generation length of 26 years.²²

This means these V years were 13 and 10 generations apart, respectively. When we consider that animal cycles are between 8 and 15 generations apart, this is reasonably close. Biohistory proposes that these English cycles of growth and decline are, in biological term, the same phenomenon we see in muskrats and lemmings.

But note that the 1575-1825 cycle is significantly shorter than the earlier one, a subject we will come back to later.

Lower birth rates, lower resistance to disease

Now we need to consider *why* population growth was faster in the growth periods and slower or negative in the trough periods, the centre of which we can place half way between the V years, around 1400 and 1700 respectively. One reason, given in Fig 2.2 above, is that birth rates were lower in these times.

People were having fewer children, as were muskrats in their decline phase. Besides the failure to produce surviving heirs, some noble families in the fifteenth century simply did not produce children. This appears to have been in part voluntary, as if during the decline phase

the desire to reproduce simply wasn't there. For example, *coitus interruptus* was commonly used in the fourteenth century.²³

We see a similar overall pattern in the demographic slump of the late seventeenth and early eighteenth centuries. It was a relatively prosperous time and yet, as indicated in fig 2.1 above, the population of England grew very little.

This was not the only reason. In cycling species such as lemmings and muskrats, animals in the trough phases are more susceptible to disease. The same applies to England.

The Black Death, which struck Europe in 1348, killed between 30% and 50% of the population.²⁴ Further instances of bubonic plague occurred around 10-20 years apart in the late fourteenth and early fifteenth centuries, though they were less severe.²⁵ They became less severe still after 1500. A last major outbreak in 1665 may have killed 15-20% of Londoners.²⁶ This was just 35 years before the next trough year of 1700.

But plague was only one cause of death, and not even the deadliest. In the fourteenth century, around half of all children died of disease.²⁷ Only between 10-25% of these deaths were from plague. More common reasons included infections such as pneumonia, bronchitis, and dysentery.²⁸

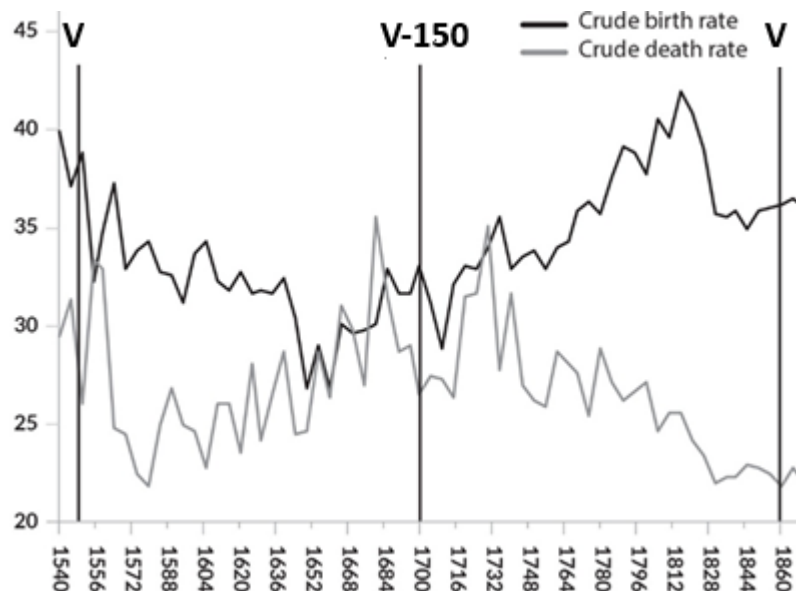
During this period, death was unusually common at all levels of society. In the fifteenth century, 10% of undergraduates died during their period at university. Infant mortality was also high, with many noble houses dying out because they were unable to rear sons. Neither of these groups were ill fed, and noble families tended to live on country estates which were much healthier than the towns.²⁹

This higher death rate of ordinary people cannot be explained by poverty. Wages were considerably *higher* in the disease-prone fifteenth century than in the periods before or after.³⁰ It just seems that people in the fourteenth and fifteenth centuries, in the trough phase of the lemming cycle, were more susceptible to disease than in the centuries before or after.³¹ Just like lemmings, muskrats, and other cycling species.

These facts defy conventional socioeconomic explanations. Why should people have fewer children in more prosperous times? Even the wealthy, who were fully able to support more children, gave birth to less of them. And why would more commoners die when wages were high? But this is exactly what we would expect from the lemming cycle pattern in its decline phase, with V-150 periods around 1410 and 1700.

A more detailed description of birth rates and death rates since the sixteenth century is given in Fig 2.3 below. For most of this period, birth rates and death rates show an entirely opposite pattern.

Fig. 2.3. Crude birth rates and death rates (per 1000) in England, 1541–1871.³²



Political effects of lemming cycles

Human lemming cycles are similar to those of animals in their effects on birth rates and death rates. But they also have political and cultural effects that have no equivalents in lemmings or muskrats. Examination of human populations allows us to see clear patterns, and to establish a model that can explain these patterns. We will develop these patterns by looking at English history, where there is good demographic information, and apply it to other societies.

Animal studies would prompt us to look for signs of higher C in the trough phase of the cycle, but there is only slight evidence of this in human cycles. For example, one indication of higher C would be a later age of first marriage. Between 1500 and 1900, English women seem to have entered their first marriage latest between 1650 and 1720, which is in the trough phase. Age of first marriage became progressively earlier to the early nineteenth century, the first part of the growth phase, but then rose later in the century—still in the growth phase.³³

On the other hand, over the past thousand years the English seem to have worked the fewest hours between 1300 and 1450, in a trough phase, but then steadily more to a peak in the mid nineteenth century, the centre of a growth phase.³⁴ The best indicator of working hours would seem to be the level of C in the civilization cycle, which peaked in the nineteenth century. There is no indication of a lemming cycle effect.

What we can observe is clear evidence of changing V. One political aspect that we might expect of maximum V is warlike aggression. This would be the human equivalence of the bold, migratory behavior of lemmings at their time of maximum growth. Such wars do occur, though not at the peak of V but more commonly a generation later when the peak birth generation matures. Maximum fervour for war seems to require not only high V, but the experience of growing up with a large number of siblings and peers.

Even this depends on actual population growth. In England, for example, the V year can be placed around 1825 or even 1850, the mid-year of the nineteenth century growth spurt. But in 1850, the birth rate was relatively low as a result of what biohistory refers to as a 'recession cycle', described in chapter seven of Biohistory. So, while the mid nineteenth century was a time of national pride and self-confidence, warlike aggression did not peak until the Boer War of 1899-1902, a half century later. This was 25 years after the birth rate rose to a new peak rate around 1875.

Similarly, in chapter seven, we will locate a recent Chinese V year in 2015. But population is actually declining in China, as a result of the one child policy and prosperity. So while China today shows the confident and national cohesion of V periods, there is no sign of the rising war hunger that would otherwise peak around 2040.

In chapter nine we will examine these wars, but they are not clearly evident through most of human history. They occur most obviously when infant C is high, creating a ultra-strong sense of national unity. Prime examples are the Napoleonic Wars, and the First World War.

The V year itself seems to be associated with a relatively strong sense of national unity and cohesion, reflecting the confidence and high morale we have linked to V. The V year also, other things being equal, sees the highest birth rate and lowest death rate from disease.

Changes in child V

High V should result in increased child V, since V causes parents to be harsher with children. However, there is a significant delay. Information from a number of societies, given in this and the following chapters, suggests that child V peaks about two generations after the V year, at what we biohistory refers to as V+60.

This is presumably because it takes more time for V to be fully reflected in child V, as a result of the same epigenetic cascade that is most likely responsible for the entire cycle.

Indications of child V are acceptance of powerful authority, and a strong attachment to tradition. These are characteristic of the advanced peasant societies of traditional India, China and the Middle East, all of which severely punish older children. When studying history, we will see evidence that governments are most absolutist at around V+60.

The opposite extreme of the cycle, when child V is lowest, is associated with strong local loyalties, often resulting in feudal disorder. In a 300-year cycle, this would appear at the opposite end to V+60, which is V-90.

Recall that in animal cycles, the longer cycles stretch in the decline phase but not the growth phase. Since V-90 to V to V+60 is mostly in the growth phase, we would not expect these gaps to increase too much in longer human cycles. In fact, we will see that they are strikingly uniform.

Another strong correlate of lemming cycles is the degree of openness to new ideas, which we might expect to peak also at V-90 and be lowest at V+60, reflecting the lowest child V. And highest at V+60, reflecting highest child V. However, openness tends to peak around V-45, reflecting perhaps a combination of high V energy and confidence, with relatively low child V. Attachment to tradition and orthodoxy peaks at the opposite phase, around V+105.

This pattern is summarized in table 2.1 below.

Table 2.1. Lemming cycle characteristics

V is the central year of population growth, and a time of cohesive national unity and confidence

V+60 is the peak of child V, which we have linked to more traditional thinking and acceptance of powerful authority. This is also the characteristic of cosmopolitan empires with weak local loyalties.

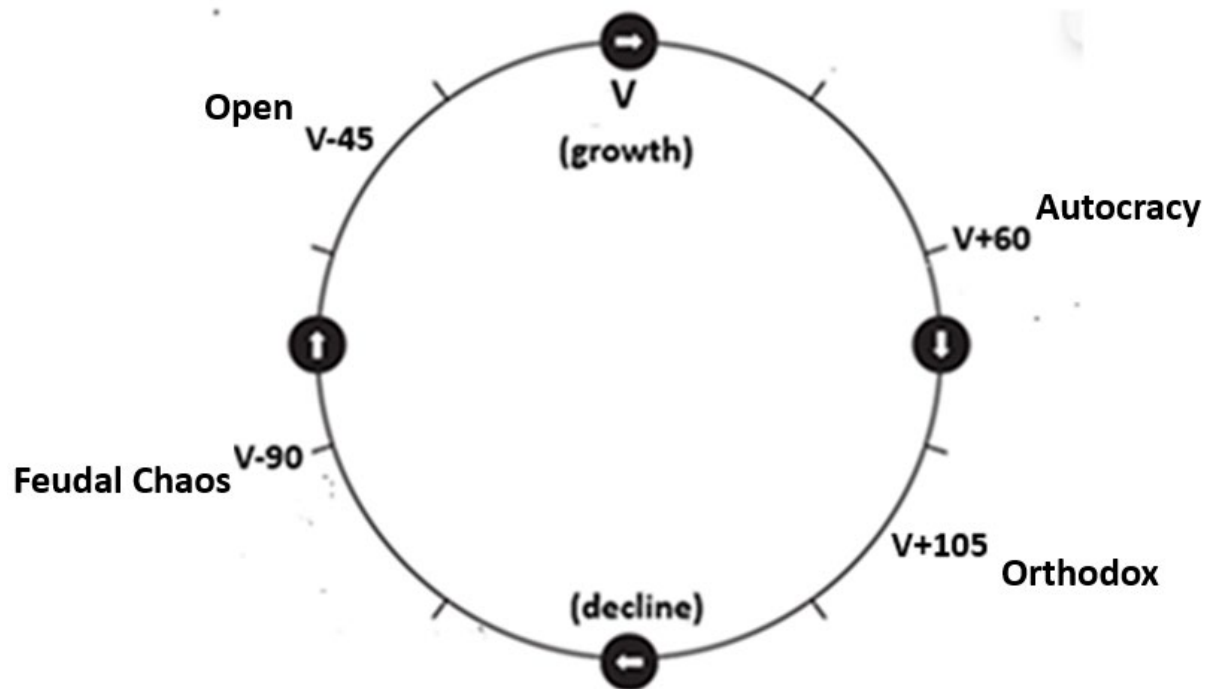
V-150 is the central year of population decline or stagnation

V-90 is the low point of child V, when local loyalties are strongest and people are least likely to accept central authority.

V-45 The period when societies are most open, combining the energy and confidence of V with the flexibility of low child V

V+105 The period when societies are most closed, the opposite to V-45. Though in longer cycles this should come later, since it extends into the 'trough' phase of the cycle.

Fig 2.1: Lemming cycle graph



Having set up a model, which is consistent with fluctuations in V and child V , let us now trace this through a number of societies. We will start with the single most striking aspect of the lemming cycle in human populations, the chaos that commonly breaks out at $V-90$. Again, our first case study will be England.

3. Feudal anarchy, and recovery

We noted in the last chapter that V-90 is the time when child V is lowest, and people are least likely to accept powerful authority. Of all the political effects of the lemming cycle, those at V-90 are the most striking. The advanced peasant civilizations of China, India and the Middle East all maximized child V by punishing children in late childhood. As a consequence, they had political systems with weak local loyalties. These peoples were willing to accept even rulers with very different cultures, such as the British in India and the Manchus in China.

V-90 is the exact opposite. Obedience to a distant power is weak, and local loyalties strong. This means that local nobles can rely on the support of their followers, and completely ignore the wishes of a distant ruler. It is easy for barons to rebel when they know their soldiers will follow them, regardless of who claims to king or emperor. The result, most often, is feudal anarchy.

These V-90 conflicts are highly distinctive in the rapid shifting of alliances, as local leaders change support from one national claimant to another as they see advantage. This is quite unlike other civil wars such as the American civil war of the 1860s and the English civil war of the 1640s, which had two distinct sides. For example, there was never a possibility that Ulysses S. Grant could have switched to the South and taken his army with him. Or that Cromwell could have persuaded his Ironsides to support the King.

Also very characteristically, following these V-90 conflicts there is a rapid recovery of central power, leading up to the V year. These feudal conflicts and the rapid recovery of central power are so distinctive that they can be used to trace lemming cycles in the absence of demographic data.

This book will trace lemming cycles in five societies through 9,000 years of history, and the only case times this pattern fails to appear is when C is at its lowest point in the civilization cycle but rising fast. Here, the change from feudal anarchy to central power takes longer than 90 years, presumably because the effects of rising C swamp the V-90 effect. We will see this pattern occurring once in the earliest history of France, China, Korea and Japan.

In all other cases, the 90 year gap is strikingly similar. But let us follow this pattern through English history.

We start with the Norman Conquest of 1066. As will be discussed later, England was peculiarly vulnerable at this time, because it was in the trough phase of the cycle when V is at a lemming cycle low. This means a low level of martial vigour and of national unity.

After 1066, a powerful monarchy was then imposed on England by the Normans, with replacement of almost the entire ruling class.³⁵ But this lasted only 70 years.

The Twelfth century: feudal chaos, rapid recovery

Between 1135 and 1150 the country was plunged into civil war, with local conflicts all over the country. It was centred on the struggle for the throne, but many nobles changed side opportunistically, as the balance of power shifted. The suffering of the population was such that the chroniclers wrote 'Christ and his saints slept'.³⁶

This period represents the V-90 year of 1135, the low point of child V, when local loyalties are strongest and autocracy weakest.

A characteristic of these V-90 conflicts is that the recovery of central authority is fast. Royal authority was restored by Henry II (1154–1189), who reasserted central control, dismantled unauthorized castles, and rebuilt royal justice. This recovery was consolidated by a succession of generally strong rulers—Richard I, John (despite setbacks), and Henry III (1216–72).³⁷ This fast recovery of central authority is typical of the time between V-90 and the V year (1225), when national unity is at an all-time high.

Conflicts in this period were of a very different nature from the anarchy of 1135–50. Barons sought to limit royal power, laying the foundations of what later was to become the English parliament. A particular landmark was when they forced King John to sign Magna Carta in 1215.³⁸

The most powerful king in this period was Edward I (1272–1307), a fearsome autocrat who subdued both Wales and Scotland.³⁹ His reign brackets the V+60 year of 1285, when child V is at a peak, autocracy strongest and local loyalties weakest.

This had two main effects. Weak local loyalties gave Edward's nobility little scope to resist, allowing him to collect heavier taxes than previous kings.⁴⁰ It also meant weaker national loyalties, with the result that many Welsh and Scottish nobles freely supported him.⁴¹ Robert the Bruce, who set Scotland free after Edward's death, had been a supporter of England during most of his reign. And when Edward invaded Wales in 1277, some 20–30% of his soldiers were Welsh.⁴²

Slow Decline, The Wars of the Roses

From then on, central authority weakened, reaching a low point in the 1460s during the Wars of the Roses, somewhat earlier than we might expect from a V-90 year of 1485.⁴³ But, as will be discussed later, this may be because the V year should actually be placed earlier.

Nominally, this conflict was over the crown but beneath it, as in 1135–50, was a maze of local disputes. Ambitious men with obedient retainers took the opportunity to seize neighbouring lands, gaining support by aligning themselves with one or another royal faction and shifting allegiance as they saw advantage.⁴⁴

As discussed in chapter one, a typical example of such behavior can be found in Richard Neville, the Earl of Warwick. He switched allegiance from the house of Lancaster to the

Yorkists, then switched again and restored the Lancastrians (briefly) to power, earning him the title of “Kingmaker.”⁴⁵ Most of his vassals simply followed him.⁴⁶

In a similar way, Lord Stanley decided the battle of Bosworth Field in 1485 by throwing his support at the last minute to Henry Tudor, whose claim to the throne was remarkably weak. This change of sides occurred during the actual battle, and most of Stanley’s supporters followed him.⁴⁷ His decision was likely influenced by the fact that he was married to Henry’s mother.

Close examination of these times of feudal disorder shows the strength of local loyalties, even before war broke out. The Paston letters, written by a landowning family in fifteenth-century Norfolk, give a vivid picture of society at this time. The fourth of these letters concerns events in 1423, thirty years before the national conflict began. William Paston had become involved in a lawsuit against one Walter Aslak, who was notorious for having kidnapped and butchered a local man and members of his household. To silence his enemy, Aslak posted notices in prominent places—including cathedrals—threatening to kill Paston in a similar manner if he stirred from home. Paston tried both legal remedy and an appeal to the Duke of Norfolk but failed totally. Aslak was protected by a powerful patron.⁴⁸

This was no dispute between claimants to the throne, because there was no dispute at this time. In fact, royal power was irrelevant to the dispute. And this is precisely the point. When people are loyal to those they know, local leaders are stronger and the central government weaker. This is why Paston appealed to the Duke of Norfolk, and Aslak to his own patron. The victor was the man with the stronger patron, or in this case the more interested one.

In such times, ambitious men turn against their monarch if it suits their interests, and they are able to do so because their followers are more loyal to them than to the ruler. As long as a royal pretender has some ghost of a legitimate claim, a local baron can switch sides and be confident of taking his vassals with him, which will depend in turn on him supporting his followers in their own conflicts. Tenants and retainers followed their lord both for support in times of need, and because there was a deep-rooted assumption in English culture that they should do so.⁴⁹

This pattern of local loyalty was not unique to the fifteenth century but characterised much of medieval England. Even during the English Civil War of 1642–49, many people chose sides primarily according to local ties, family connections, and the influence of neighbouring gentry, rather than from loyalty to King or Parliament.⁵⁰

What made the fifteenth century different was that the relative strengths of loyalties had shifted towards local leaders, so that even an effective and capable king like Edward IV could be removed (temporarily) from his throne. No state regime can be totally secure when primary loyalties are local.

Could the character of the ruler explain periods of disorder?

One reason given for such periods of disorder is the character of the ruler. For example, Henry I died in 1135 without a male heir and, in a patriarchal society, there were objections to his

daughter succeeding him. Even though Henry had made his leading nobles swear to accept Matilda, many came to support Henry's nephew Stephen after his death.⁵¹

Henry VI came to the throne as an infant in 1422, following the unexpected death of his father. Even when assuming personal rule he proved ineffective, experiencing periods of mental illness. He was simply unable to control his rebellious barons.⁵²

But these are not adequate explanations. Henry III in the mid-thirteenth century was a weak character briefly deprived of power by a coalition of barons led by Simon de Montfort. This involved armed conflict, but not the violent chaos of the mid-fifteenth century. Nor was Henry deposed.⁵³

Similarly, when Henry VIII died in 1547, he was succeeded by his nine-year old son, but there was no insurgency. And when Edward died six years later, he was succeeded by his sister, who was not only a woman but a Catholic, in what was becoming a Protestant kingdom. Mary later became notorious for burning Protestants, but no effective rebellion was raised against her. An attempt to enthrone the Protestant Lady Jane Gray to forestall Mary's coronation simply collapsed.⁵⁴

In later chapters we will see evidence that a powerful new regime can maintain order in the decline phase of the cycle, but nothing can prevent the outbreak of anarchy at V-90.

National Unity Restored: the Tudor V period

Again, as usual after V-90 conflicts, the recovery of central power was rapid. We are so influenced by the success of the Tudor monarchy that it is hard to envisage how unlikely this would have seemed in 1485.

Henry Tudor had an astonishingly weak claim to the throne. His grandfather was a Welsh squire who secretly married the dowager queen, Henry V's widow. Given that there was no royal assent, this marriage could have been seen as illegitimate. But their sons, Edmond and Jasper, were half-brothers of King Henry VI, who made them earls.

Edmond was then able to marry Margaret Beaufort, a descendant of Edward III whose family had been expressly denied rights to the throne because they were originally illegitimate. And when his son Henry came to the throne as Henry VII, he strengthened his claim by marrying the daughter of Edward IV. But even then, he faced two serious rebellions.

And yet, by the time of Henry's death in 1509 the Tudor monarchy was secure. His son Henry VIII (1509–1547) and grand-daughter Elizabeth (1558–1603) were the most powerful monarchs in English history⁵⁵, with Elizabeth's reign bracketing the V year of 1575 when national unity was at a peak.

Following the V year comes the V+60 year of 1635, when child V is at a peak and local loyalties weakest. Only 32 years earlier, in 1603, the English and Scottish thrones had been united in the person of James VI of Scotland, who became James I of England. It is striking that English and Scottish monarchies were combined twice, the first time temporarily by

Edward I and the second more permanently by James I. Both happened within a few decades of V+60 years.

Following this, the monarchy became steadily weaker. Charles I was executed in 1649, and his son James dethroned without a struggle in 1689. The reason was his Catholic faith, felt to be more of a threat after his wife gave birth to a son, but his removal made a sharp contrast to what happened when Mary came to the throne.

Supreme power now rested in Parliament, reflecting growing impersonal attitudes as infant C rose in the civilization cycle, meaning there would be no return to feudal chaos. But control of Parliament was increasingly in the hands of landowning aristocrats leading up to the next V-90 year in 1735.⁵⁶ The same web of patronage and loyalty existed as in the Wars of the Roses, but exercised more peacefully due to higher levels of infant C.

Among many other measures that favored the aristocracy, a ban on imported wheat kept food prices and thus farm profits high.⁵⁷ Their position was maintained by a parliamentary gerrymander that put many seats under the control of local landowners (so-called 'pocket boroughs' and 'rotten boroughs') while the growing towns were under-represented.⁵⁸

It is no contradiction that the 1750s and 1760s reflected both growing impersonal loyalties in the civilization cycle, and a surge of local loyalties in the lemming cycle. This was a result of rising infant C, and a low point of child V.

Rising infant C meant increased respect for impersonal institutions, such as Parliament and the rule of law. Low child V meant local loyalties are strongest so that landed aristocrats have the greatest prestige. The net result was an increasingly strong Parliament, but one that largely reflected the interests of the landed elite.

This is the same combination that led to City States, such as those of ancient Greece. They combined written constitutions and codes of law (high infant C) with rejection of distant authority (low child V). And while many were democracies, others-including Corinth and Sparta-were governed by oligarchies or hereditary elites.⁵⁹ Impersonal attitudes can be quite compatible with local and even aristocratic loyalties.

The Victorian V period, and King Alfred

But as England moved towards the V year of 1825, aristocratic power declined. This was reflected in the Great Reform Act of 1832, which made electoral districts fairer, and the repeal of the Corn Laws in 1846.⁶⁰

By 1850 Britain had become a world power, with a high degree of vigor, optimism and national unity characteristic of V periods. Weakening national loyalties following the V+60 year of 1885, aided by declining infant C, led to Britain joining the League of Nations in 1919, the United Nations in 1945, and the European Economic Community (briefly) in 1973.

Going back beyond precise demographic data, we can identify an earlier English V year around 850 CE, at least as it applies to the Kingdom of Wessex. Evidence such as the

clearance of woodland and establishment of new villages suggest growth taking off in the eighth century, especially with improved political stability after mid-century. Population grew even faster in the ninth century, consistent with an 850 V year, before being set back by the Viking invasions after 865. It grew again in the tenth century, slowing somewhat in the eleventh.⁶¹

The political landscape shows much the same pattern. The kings of Wessex had been especially feeble in the 750s and 760s, with repeated revolts by nobles. In 757, King Sigeberht was deposed by his leading nobles after a one-year reign.⁶² This suggests a V-90 year around 760.

Royal authority began to recover in the 790s, and was especially strong under Alfred (871-899), giving him the power to resist and eventually roll back the Viking invasions. By 927, his grandson Athelstan's capture of York had brought all of England under his control.⁶³ This is consistent with a V year around 850, with local loyalties weakest at a V+60 year of 910.

It is also consistent with the lemming cycle pattern that royal power became weaker after this time. Aethelred II, who came to the throne in 978, was hindered in his resistance to new Viking attacks by political divisions and unreliable noble support. England was then conquered by Danish kings in 1013 and 1016, and by the Normans in 1066.⁶⁴

A striking feature of the Norman conquest is that was largely made possible by the result of a single battle, at Hastings in 1066, after which the leading English nobles and churchmen submitted. It then only needed the new king to suppress rebellions in Exeter, the Midlands, and northern England.⁶⁵ This is in striking contrast to the fierce and continued resistance of the people of Wessex, a much smaller power, to the Viking invasions of the ninth century.

People in lemming cycle troughs, as was the case in England around 1050, are vulnerable to conquest. Lacking the national unity and martial vigor of high V periods, they show limited resistance to foreign invaders. This is a pattern we will see repeatedly throughout human history.

But there is another aspect of society that can be reliably linked to the lemming cycle, a change over the V year in how people think.

4. Open versus orthodox

A final behavior we can link to the lemming cycle is what may be termed 'open versus orthodox', in relation to thought and religion. This, as with political changes, has no parallel in animal populations, but it is consistently associated with human lemming cycles.

Before the V year, societies tend to be 'open'. They are brimming with new ways of thinking and tolerant of differences, with many competing schools of thought. They readily accept foreign ideas.

After the V year, societies become increasingly 'orthodox'. They are intolerant of dissent, and act to enforce a single, dominant ideology. They may reject borrowed ideas from abroad, and emphasize native traditions. Established religious systems tend to have the most power and prestige at such times, including respect and reverence for local representatives such as priests. In Christian societies there is a greater stress on ceremony and liturgy, in which a form of words spoken by an ordained man have a unique power and significance. Also, on the power and authority of church leaders such as bishops.

As indicated in the last chapter, a consistent lemming cycle pattern is that societies are most open in the decades leading up to the V year, reaching a peak at around V-45. They tend to be especially closed or orthodox at the opposite extreme of the cycle, around V+105, though later when the cycles are longer. This can best be explained by a combination of high V energy and confidence, with relatively low child V. Such periods are often described as times of 'Renaissance' or 'Enlightenment'.

This pattern can be clearly seen in Wessex. In the early ninth century, leading up to the V year of 850, there was little central control of Church doctrine, with religious practice varying locally.

Following the V year, and especially in the reign of Alfred (871-899), there was a considerable revival of learning but in a form that strengthened orthodox Christianity. Obedience and conformity were emphasized even more through the Benedictine Reform of the tenth century, which was at its peak in the reign of Edgar (959-975).⁶⁶ This corresponds with a V+105 year of 955.

The Twelfth Century Renaissance

The same pattern can be seen leading up to the 1232 V year. The so-called "twelfth century renaissance" peaked in the reign of Henry II (1154-89) and saw a revival of learning with new ideas coming from the continent.⁶⁷ This corresponds to a V-45 year of 1187.

At this time, In Western Europe as a whole, Church doctrine was firmly rooted in established belief. But many theological questions had not yet been organized into a systematic form. There was a rapid expansion of cathedral and monastic schools, together with vigorous competition among masters and schools of thought. Dispute and disagreement were accepted parts of intellectual life, provided that they did not conflict with Christian orthodoxy.⁶⁸

A change of emphasis can be seen in the late thirteenth century. Orthodoxy was firmly enforced, though at this time with relatively few heresy trials. Jews were increasingly restricted, and then expelled from England in 1290. By the late fourteenth century, Wycliffe and the Lollards created a major challenge for the Church, and the authorities considered dissent over doctrine to represent social and political disorder.

This trend peaked in the early fifteenth century, when between fifteen and thirty people executed for heresy, more than in the previous three centuries combined.⁶⁹ This is later than we might expect for a V+105 year of 1337, for reasons to be discussed later.

Reformation and Counter-Reformation

English religiosity remained strong in the fifteenth and early sixteenth centuries, prior to the Reformation. There was no decline in such measures as attendance at Mass and donation to chantries.⁷⁰ But one significant change was the decline in the status of parish clergy relative landowners. Priests became relatively poorer, with tax records and wills showing a standard of living closer to prosperous farmers rather than gentry. They also had a reduced role in administration.⁷¹

A striking sign of the weakness of traditional orthodoxy was the ease with which Henry VIII proclaimed himself head of the English church, ending a papal domination that had lasted for a thousand years. Between 1536 and 1541 he dissolved the monasteries and plundered their wealth. There were local rebellions, such as the Pilgrimage of Grace in northern England, but very little resistance from Parliament.⁷² This corresponds to a V-45 year of 1530.

Orthodoxy has a somewhat different meaning after the Reformation, given that it depended so much on the English monarch. The English Church remained Catholic in doctrine under Henry, turned Protestant under Edward (1547-53), Catholic again under Mary (1553-58), and with a modified form of Protestantism under Elizabeth (1558-1603).

A measure of religious intolerance is that between 420 and 470 religious dissenters were executed in the late sixteenth century. These included 280-290 Protestants burned by Mary, and 120-140 Catholics executed by Elizabeth, plus some Anabaptists and Separatists.⁷³

Fewer people were executed in the early seventeenth century, but religious fervor and intolerance remained strong. There was a bitter religious division between Puritans and followers of Archbishop Laud from 1625, who strove to enforce uniformity and a greater focus on liturgy and ceremony. This became one of the major drivers of the Civil War that broke out in 1642.⁷⁴

This was also the time of the Counter-Reformation and religious wars on the European continent, most notably the Thirty Years War (1618–48) that destroyed perhaps 15-20% of the population of Germany.⁷⁵ Lemming cycles were similar on the continent but had slightly different peaks and troughs, a matter to be discussed in future chapters.

In this case the peak of intolerance comes earlier than our proposed V+105 year of 1680. Again, for reasons to be discussed.

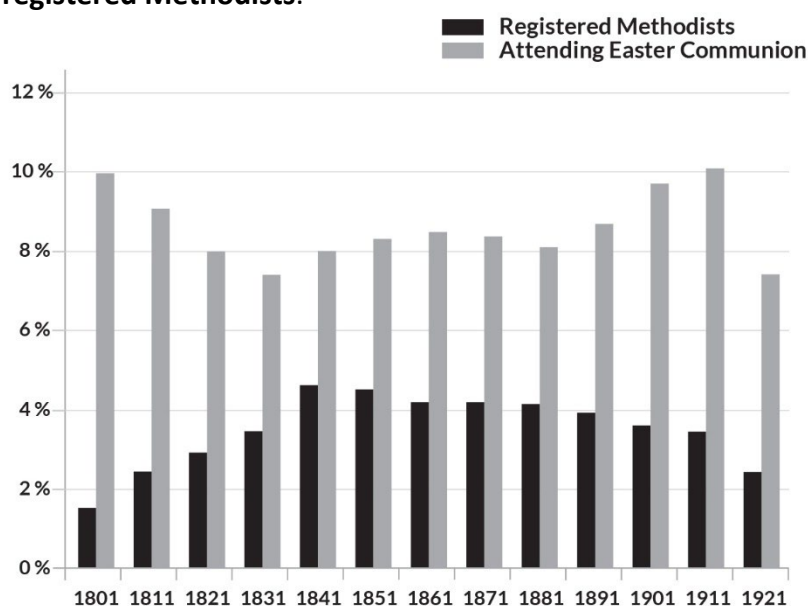
Growing Toleration, and Methodists versus Anglicans

Partisan fervor ebbed from the 1670s, culminating in the Toleration Act of 1689. Quakers and other dissenters were no longer to be fined or imprisoned, though Catholics and many other dissenters suffered legal disabilities.⁷⁶

The “Enlightenment” of the late eighteenth century was another movement in thought which fits this pattern and is appropriate to a V-45 year of 1780. Traditional ideas were being challenged by radical thinking, which was best exemplified by the Revolution in France.

English thought from this time onward became far more unconventional and divorced from tradition than in earlier centuries, reflect ultra-high levels of infant C in and around the nineteenth century. But one sign of a lemming cycle pattern is the rise of Methodism in the eighteenth century, an unorthodox religious movement which often broke free from the established church. As we approach and pass the V year of 1825, Methodism declines and there is a steady increase in communicants to the Church of England, reflecting a trend towards increasing orthodoxy (see Fig. 4.1 below).

Fig. 4.1. Percentage of over-15 population attending Anglican Easter Communion, and registered Methodists.⁷⁷



In another trend reflecting the move towards orthodoxy, the Church of England itself became more tradition-minded over the course of the nineteenth century. Starting in the 1830s the Oxford Movement began to place more emphasis on liturgy and priestly authority, and clergy

influenced by them were in the majority by mid-century. This was largely at the expense of evangelicals, who put a greater stress on personal morality and individual scripture reading.⁷⁸

However, in a broader sense, Britain remained highly innovative and open to new ideas as child C reached its peak in the nineteenth century, and then began to decline. This is the same pattern we have noted in France, and we will in other societies.

Orthodoxy dates are affected by the civilization cycle

We have noted that the peak of 'orthodoxy' comes later than the V+105 year of 1337, and earlier than the V+105 year of 1680. In these cases, it is important to consider how lemming cycle effects interact with those of the civilization cycle.

England in this period was going through two trends in the civilization cycle. The first, as noted in chapter 13 of Biohistory, was a rise of child V and stress to a peak in the sixteenth century. Child V reinforces traditional thinking, and stress promotes harsh punishments. Since harsh treatment of heretics is a key way of measuring orthodoxy, this might tend to push the first peak forward from 1337 into the fifteenth century. And could act to pull the second date backward from 1680 into the late sixteenth century.

The second trend, as noted in chapters 11 and 12 of biohistory, is a long-term rise in infant C. Infant C is associated with independent thought, so as this trait rose from the seventeenth century, England naturally became more tolerant.

As in other aspects of the lemming cycle, including population growth and political order versus disorder, lemming cycles can be best understood as fluctuations within a long-term trend.

English Lemming Cycles Become Shorter with time

Another lesson from this study is that lemming cycles seem to have become steadily shorter in English history. Bearing in mind that these early dates are not exact, since we have no demographic information, note the following cycle lengths:

850-1225: 375 years.

1225-1575: 350 years

1575-1825: 250 years.

However, note also that the crucial gaps between V-90 and V, and between V and V+60, do *not* change. As we study other societies, we will see this as a standard pattern. This fits the findings from animal studies as cited in chapter one. In longer cycles it is the decline phase extends and not the growth phase. That is because when an animal population is under severe predator stress, a longer decline phase gives more time for predators to die off.

The shortening of cycles becomes even clearer if we use political rather than demographic data to plot V years, which can shift the dates by up to 25 years. The civil war of Stephen's reign extended from 1135-50. The Wars of the Roses were most virulent in the 1460s, and the power of English aristocrats was at a peak in the 1750s and 1760s.⁷⁹ Placing V-90 years in 1142, 1465 and 1750, V years can be re-set at 1232, 1555, and 1850. Setting in King Alfred's V year of 850 gives us the following lengths:

850-1232: 392 years

1232-1555: 323 years

1555-1850: 285 years

A Tudor V year of 1555 rather than 1575 also fits nicely the peak era of the Tudor monarchy, and a V+60 year of 1615 is only twelve years after the union of the Scottish and England monarchies.

Further support for a later date in the Victorian era is that national pride and confidence likely peaked in the 1850s and 1860s, which many contemporaries saw as the height of Victorian civilization. This reflected British industrial supremacy, imperial expansion, naval dominance, and political stability.⁸⁰ It is a much better fit than the 1820s, which was a time of political uncertainty and much lower national confidence.⁸¹

Exact placement of V years will only happen when we have completed physiological studies of changes related to the lemming cycle in animals, a project that we expect to complete in another 2-3 years. Then, ideally, we would look for similar epigenetic changes in human remains, if that is ever possible. For the time being, to be consistent with the findings from other societies, we will use these adjusted V years.

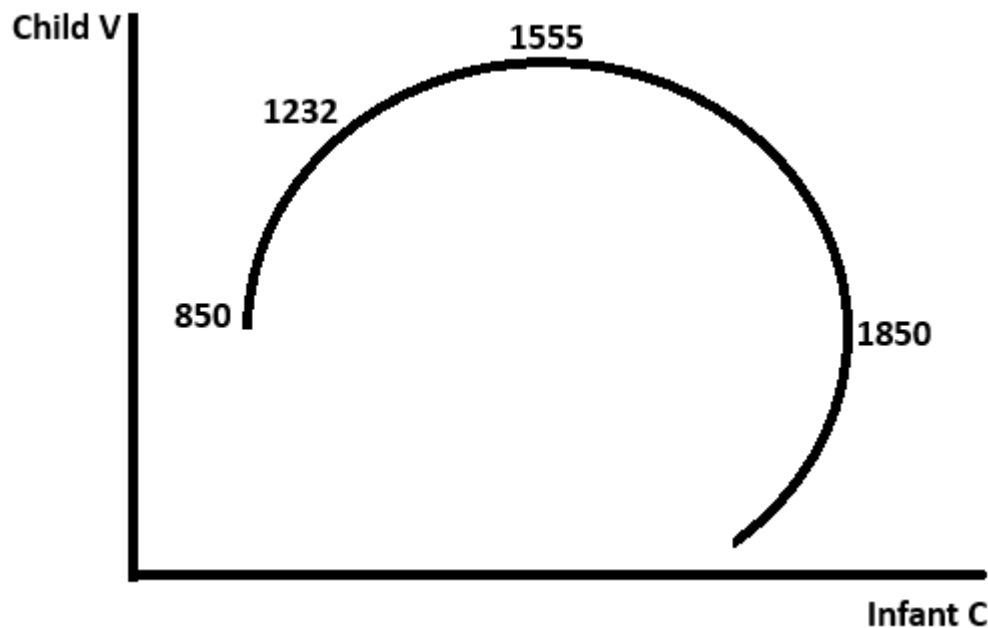
We have seen that in English history the earlier cycles are longer. If the animal model is correct, this suggests that the level of stress in England was highest earlier, and steadily less with time. To account for this, we need to look at the civilization cycle.

Lemming cycles are longer when child V is rising

In the civilization cycle, child V and thus stress rose to a peak in the sixteenth century. This is indicated by behavior such as punishment of children, the use of torture, and steep and unstable hierarchies.

From this we might expect the longest cycles to be at the peak of child V in the sixteenth century. And yet, it is *rising* stress that seems to lengthen human cycles. Child V, which involves a great deal of stress, rose to the sixteenth century and then fell. A simple model suggests that it was rising fastest in 850-1232, slower in 1232-1555, and actually falling between 1555 and 1850.

Fig 4. 1: English V years related to the civilization cycle



It seems then that longer cycles occur when child V is rising, and shorter when it is falling. The faster it is rising, as in the 850-1232 period, the longer the cycle. We will find this exact same pattern when we come to study other civilizations, such as China, or France after the fall of Rome. When child C is rising especially fast, cycles can be up to double their 'standard' length.

Another feature of lemming cycles in animals, as previously discussed, is that the decline phase of the cycle becomes longer when cycles extend, while the growth phase does not. This is presumably why the gap between V-90 and V years does not seem to change when cycles extend, since this gap is largely in the growth phase of the cycle.

For example, the 850-1232 cycle is about 30% longer than the 1555-1850 cycle. If the gap between feudal chaos and peak V was extended to a similar degree, the civil war would have broken out in 1115. Alternatively, the V year would need to be pushed forward to the late thirteenth century, which does not fit either the political or demographic data. This pattern will become even more obvious when we come to examine very long cycles.

The Lemming Cycle Pattern

From the English data, we can gain a clear model of the lemming cycle to apply to other societies. Population growth and decline can be affected by a number of factors, including foreign invasion and the scarcity or abundance of land. Even allowing for this, there is clear evidence of a lemming cycle pattern in English history. Birth rates tend to be highest in lemming cycle peaks, and infectious disease most virulent in the troughs.

The effect of lemming cycles on population growth and decline is clearer in English history than in any other society, because England suffered no serious invasions after 1066.

In political terms, feudal anarchy peaks at what we refer to as the V-90 period, when child V is weakest and local loyalties undermine the power of the central State. Then follows a rapid recovery to confident national unity at the V period, with royal absolutism greatest and local loyalties weakest at V+60, the peak of child V. Then a slow decline in central power to a new V-90 period.

In terms of thought, the period leading up to the V year tends to be relatively open to new ideas and tolerant of differences. After the V year there is an increasing trend to tradition and orthodoxy, with more emphasis on liturgy and priestly authority. This pattern will express itself somewhat differently across the world. For example, Japanese V periods show a marked swing from eagerly accepting outside influences, to rejecting them. But the patterns are strikingly similar.

In future chapters we will apply this template to a number of different societies, looking for political and cultural changes and incorporating demographic information where available. We will begin with France.

Chapter 5. France

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As mentioned earlier, one characteristic of animals such as muskrats is that length of cycles in neighboring populations tends to be the same, but their timing varies from region to region. For example, a species may show ten-year cycles over a wide range, but one population is in the growth phase while the other is in decline.

Humans show the same pattern, and the closer they are geographically the more similar the cycles tend to be. For example, French cycles are almost the same length as English cycles, but with V years just a few decades earlier. This apparently minor difference has had a serious impact on relations between the two countries.

One advantage of studying French cycles is that they can be traced back all the way to Roman Gaul. Not only is historical information better for France than Britain after the fall of Rome, but the original population largely remained in place, which in Britain it did not. This is reflected in the fact that French derives from Latin and English largely from German.

As we will see when dealing with the Roman Empire in a later chapter, Rome had a V year around 350 CE when powerful emperors restored order after the chaos of the mid-third century (V-90 at 260 CE), followed by a slow decline. This seems to have applied to the Empire as a whole. In the fifth century, as Roman authority in Gaul collapsed, Germanic peoples established their own kingdoms. But by the end of the century, Clovis I of the Merovingian dynasty had united most of Gaul under Frankish rule.⁸²

But from then on, the nobility grew in power, the last strong ruler being Dagobert I who died in 639. His successors were given the derisory nickname of “*rois fainéant*,” or “do-nothing kings.”⁸³ By the end of the seventh century, the Frankish state had effectively broken up, with authority passing from the Merovingian kings to powerful regional nobles and the mayors of the palace.⁸⁴ This is consistent with a V-90 year of 690. All this amounts to a fairly steady decline from Imperial unity in the early fourth century to complete anarchy by the end of the seventh, with the fall of Rome being only an incident along the way.

Charlemagne

Central authority was restored by Charles Martel who took power in 718 and ruled until 741, though nominally as a servant of the Merovingian king. He was known as Charles the Hammer for a creditable series of victories, most notably the Battle of Tours which halted a major Muslim incursion into France. The Frankish state reached its zenith in the reign of his grandson Charlemagne (768–814), who formed an empire covering not only modern France but most of Germany and northern Italy.⁸⁵

This is consistent with a V year around 780. We see again here the typical lemming cycle pattern of a slow decline in central power and a rapid restoration, and the 90-year gap fits quite well—even though the V periods 340 and 780 are 440 years apart. Extending the gap by 50%, to be in line with the rest of the cycle, would predict a low point of central authority in

the mid seventh century, or a peak of Carolingian power after the death of Charlemagne, neither of which would fit the historical record.

Also consistent with a 780 V year is the population seems to have reached a low point around 700, before beginning a slow recovery that peaked between about 750-850. Though Viking incursions after the mid ninth century would have contributed to any slowdown.⁸⁶

A still better indication of lemming cycle effects is the devastating plague that swept the Roman and post-Roman world in the late sixth century, often known as the Plague of Justinian. This is exactly half way between the V year of 340 and 780, the point in the lemming cycle when resistance to disease should be lowest. There were further instances in the seventh century, though leaving less mark on the historical record. After 750, instances of plague are no longer recorded.⁸⁷

There was also at this time a “Carolingian renaissance” in literature, art and architecture, but around the V year rather than (as is more typical) before it. The best explanation is that this brief flowering depended heavily on royal wealth which had not been available in earlier reigns. Charlemagne was not only rich but a great admirer of the arts, even though himself not a scholar.⁸⁸

The religious pattern fits well, also. It will be remembered that anti-clerical attitudes are prevalent before the V year and orthodox religion strongest after it. Charles Martel, whose reign covered the V-45 year of 735, was able to seize a large number of church properties to reward his followers. Although less sweeping than Henry VIII's later dissolution of the monasteries, this was one of the largest confiscations of church wealth in early medieval Europe.⁸⁹ It is striking that both these efforts happened in the decades leading up to V years.

Growing Weakness

The reign of Charlemagne's son and successor “Louis the Pious” (814–840) extended up to the V+60 year of 840. As the nickname suggests, Louis was respectful of the church and relied on it to buttress his power. He certainly made no attempt to seize its property, and even made generous grants of land and immunities. This is all the more striking given that he faced a number of serious rebellions and was at one stage briefly deposed, so he had ample motivation to seize church wealth.⁹⁰

Note that the Carolingian V year of 780 is seventy years earlier than the English V year of 850, a gap that will persist for more than a thousand years.

The decline of royal authority continued until the Carolingian line died out, and Hugh Capet was elected king in 987, but at this time the monarchy had no real power. Eleventh-century French kings had very little influence beyond the Île de France, the province immediately surrounding Paris. And even here they were at constant war with the local barons. The lords of other provinces such as Burgundy and Aquitaine had similar problems.⁹¹

The low point of royal power can perhaps be set in the reign of Henry I (1031–1060). At this time, Duke William of Normandy had become one of the most powerful rulers in Europe, Geoffrey Martel of Anjou dominated much of western France, and the dukes of Aquitaine

ruled a territory larger than the royal domain. But the local barons had their greatest autonomy in the late tenth and early eleventh centuries, roughly 980-1050. Historians often refer to this time as the 'castle revolution'.⁹²

Attitudes of the time show an intense localism. The fief rather than the kingdom was known as a "patria" or fatherland, and outsiders were seen as strangers or even enemies. Even the defeat of an enemy did not bring lasting gains. For example, Robert II (996-1031) had fought a long war to bring Burgundy under royal control, but his son Henry surrendered it to his rebellious brother Robert in 1032 as the price of peace.⁹³

This is an extreme form of the localism we noted in the Wars of the Roses, suggesting a V-90 period around 1015, when loyalties are most strongly local and distant rulers have the least power to constrain obedience. This point represents the low point of a decline that had been in place since the death of Charlemagne in 814, 200 years earlier. However, there is a major problem with this date.

Revival of the Monarchy: Breaking the Pattern

In normal lemming cycles, the recovery of central power is fast, within a few decades the peak year of feudal chaos. This is why we refer to such years as V-90.

But in this cycle, the pattern does not apply. The curbing of local barons in France did not begin for more than a century, until Louis the Fat (1108–1137), began to curb the power of the local barons, a process completed by his son Louis VII (1137-1180). As these kings gained control of the Île de France, the provincial dukes and counts also began bringing local barons under their control.⁹⁴

This is, in fact, one of the strongest arguments for the temperament of ordinary people rather than that of rulers driving changes in political order. If the character of individual rulers was the crucial factor, then each province should show distinct patterns. In fact, they all experienced much the same changes at about the same time.

But our crucial problem is that all evidence points to a new V year around 1180, following which Philip Augustus (1180–1223) gradually royal supremacy throughout France. Though the great provinces kept a great deal of autonomy, and parts of the southwest remained under the control of the English kings.⁹⁵ This is compatible with a low point of local loyalties at a G+60 year of 1240, similar to that which allowed Edward I of England to subdue Wales and (briefly) Scotland later in the century.

Consistent with an 1180 V year is that population growth seems to have been speeding up in the early twelfth century, possibly reaching a maximum level of 18-22% in the second half of the century.⁹⁶ Though scholars differ widely in their estimates of population growth during this period.⁹⁷

This makes the gap between the peak of feudal chaos and the V year something like 165 years, far longer than anything we will see in other periods of history. Perhaps the only way to make sense of this is that the tenth century may represent the low point of C in the civilization cycle, given that low C also contributes to localism. Thus, the early stages of recovering central

power may represent rising C in the civilization cycle. We will also see an overly-large gap in Japan in the sixth and seventh centuries, at a similar phase in their civilization cycle.

In other ways, the typical lemming cycle pattern is followed in this cycle. French intellectual and religious trends around the 1180 V year were similar to those in England, discussed earlier. The twelfth century was a time of rigorous debate, with relative tolerance for different points of view. The thirteenth was far more closed. The Fourth Lateran Council of 1215 set out key doctrines, the Inquisition was established to combat heresy, and groups such as the Cathars suppressed.⁹⁸

The Hundred Years War

We have seen that the English state began to lose power in the early fourteenth century, but that the French decline started earlier, as is consistent with French cycles being some decades in advance of England. The financial position of the French monarchy became worse after the death of Louis IX in 1270, and virtually collapsed after the battle of Poitiers in 1356. Indeed, one reason the English gained control of much of France is that the French crown had less money to pay troops. Though English leadership and tactics, including use of the longbow, were contributing factors.⁹⁹

The low point of French royal power can be placed in the early fifteenth century, when the successes of Henry V owed as much to French internal chaos as to the famed longbow. This was not only the well-known struggle of Burgundians versus Armagnacs, but a series of local conflicts all over the country.¹⁰⁰ This suggests a V-90 year around 1425.

From then on, as is normal with lemming cycles, the recovery of power was swift. Loyalty to the French crown resurged with the victories inspired by Joan of Arc. Louis XI, who reigned from 1461–83, played a similar role to Henry VII of England in the next generation. He was known as the “Universal Spider” for the cunning and intrigue with which he restored royal power.¹⁰¹ This was helped, of course, by the collapse of England into its own V-90 crisis around 1465. The French monarchy reached a peak of power and influence in the early sixteenth century¹⁰², consistent with a V year around 1515, moving towards a V+60 year in 1575.

Wars of Religion

But the peak of child V in this year had a very different impact in France than it would in England some forty years later. V+60 years often see a peak in royal absolutism, as local loyalties are at a low point. But they also can show a high level of intolerance, and a desire to crack down on religious dissent. Recall that the English Civil War, breaking out seventeen years after the English V+60 year, was in part driven by the efforts of Archbishop Laud to take the English church in a more ‘Catholic’ direction, leading to conflicts with Puritans and others.

The first decades of the sixteenth century was a high point of Renaissance humanism in France, with comparatively open discussions within the Church. But as Protestantism began to spread, the French monarchy started to crack down, especially after 1534 when anti-

Catholic activity came to be seen as a threat to both Church and crown.¹⁰³

In 1562 Francis, Duke of Guise, attacked a congregation of French Protestants worshipping in a barn at Vassy in Champagne. Around fifty were killed, and more than one hundred wounded.¹⁰⁴ In the next 36 years, the French fought a number of destructive civil wars, separated by fragile truces and with growing extremism on all sides.¹⁰⁵

Royal power, noble privilege

A major divergence from England in political terms is that the French monarchy survived the challenges of the late sixteenth century to become increasingly absolute, especially during the reign of Louis XIV (1643–1715). His reign actually included what we will see as the next French V-90 year in 1670. In such years, local loyalties are strong enough that landed aristocrats can have a great deal of power.

When infant C is low, that commonly leads to feudal anarchy. But when it is high, as in early modern England and France, the State remains strong but aristocrats are unusually privileged. Recall that in eighteenth century England, parliament was largely controlled by the nobility. Measures such as the Corn Laws kept landed incomes high by forbidding the import of food.

French nobles in the late seventeenth and early eighteenth centuries were even more privileged. They were exempt from many direct taxes, and kept feudal rights over the peasantry. Entry into the higher ranks of government and the army were increasingly restricted to those able to prove noble ancestry. This level of privilege, maintained by the French Crown, was increasingly resented and became a key reason for the French Revolution.¹⁰⁶

In biohistory terms, we might propose that in 1670, noble privileges reflected, at least to some extent, the loyalty felt by ordinary people for local leaders. A century later, these privileges were at odds with psychological attitudes, leading to bloody vengeance when the monarchy was swept away in 1789.

The French Revolution and the Napoleonic Wars

The French Revolution can best be understood in these terms, and as a response to a late eighteenth-century V year when national vigor reaches a high point. Population growth seems to have been rapid from the 1730s, while slowing later in the century as a result of declining fertility. Scholars disagree as to when this slowdown began in the 1760s or in the 1770s.¹⁰⁷

But the behavior of the French people, including the aggression that overthrew the government in 1789 is best explained by a V year around 1775, decades in advance of the rest of Europe. Following the Revolution, France embarked on a campaign of conquest that is a remarkable example of the warlike fervor that can follow V years. This is the human equivalent of the migratory behavior of lemmings in their growth phase, when they become far bolder.

The success of French armies in this period can be at least partly explained by the high V character of the population. Another factor was significant military reforms, reflecting the openness of societies approaching the V year, but in this case put into place somewhat after it.¹⁰⁸

Acceptance of radical change was shown in other areas as well, though (again) only put into place after 1789. In terms of radical innovations such as the metric system and the sweeping away of feudal privileges with the Napoleonic Code, the French were well in advance of the rest of Europe. The slogan “liberty, equality, fraternity” is an expression of people relating directly to the state and each other, rather than through traditional hierarchies.

This was reinforced by very high infant C in the civilization cycle, which causes individuals to innovate and to show strong national loyalties. And as in every other society that reaches a peak of infant C and begins to decline, France remained highly innovative in the centuries that followed.

Growing weakness relative to Germany

But as France passed beyond its V year and other countries rose towards theirs, the balance of power shifted. This applied relative to Britain but, even more significantly, to Germany. French fertility dropped rapidly in the nineteenth century. The birth rate fell from 32 to 21-22 per 1,000 population by the end of the century, and by the 1930s had dropped to around 16. Population growth almost ceased.¹⁰⁹

The German population, by contrast, grew increasingly fast during the century, reaching a peak of 12-13% per decade in the 1880s and 1890s, indicating a V year around 1890. The crude birth rate was as high as 37-38 per 1,000 people in the 1880s, little changed from the beginning of the century.¹¹⁰ This was close to double that of France.

In 1800, the population of France was slightly greater than that of the lands that later became Germany. By 1914, Germany had around 70% more inhabitants than France.¹¹¹

But the change was more than just in population size. As discussed previously, warlike aggression tends to peak not at the V year, but 25 years afterwards when the peak V cohort comes of age. We will call this V+25, though bear in mind all these dates are only accurate to within a decade or two.

In 1805, France was just five years past V+25, Germany 110 years before its own V+25 year of 1915. In this year, France overcame nations with larger armies and greater populations.

In 1870, France was now 70 years past their V+25, Germany only 45 years short of theirs. In the Franco-Prussian war of 1870-71, the Prussians won with relative ease.

In 1914, France was more than a century after its V+25 year, and Germany right on its own V+25 year. It took four years for France, England, Russia and (eventually) America to bring Germany to defeat.

Worse was to follow. In 1940 France, by then in the low V trough of its own lemming cycle, was defeated by Germany in a mere 46 days. A greater contrast to the Napoleonic era can

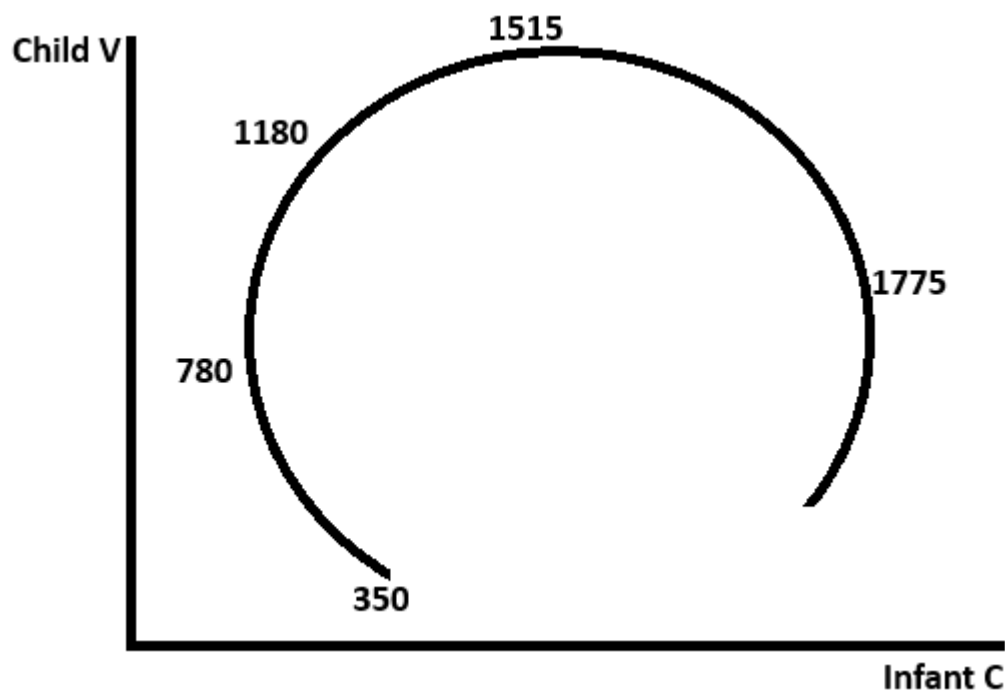
hardly be imagined.

Bearing in mind that V years may only be accurate to within two or three decades, French lemming cycles have been several decades ahead of English ones for well over a thousand years. Also, both cycles show the same pattern of being longer when stress is rising in the civilization cycle, and shorter when it is falling. See table 5.1 and Fig 5.1 below.

Table 5.1. Lemming cycles in England and France

English V years	French V years	Length England	Length France
	350		
850	780		430
1232	1180	382	400
1555	1515	323	335
1850	1775	295	260

Fig 5.1 French lemming cycles plotted against the civilization cycle



England and France show how lemming cycles change in periods of rising C. In the next chapter we will turn to China, seeing how cycles change when C falls to a low point, and then rises again.

6. Ancient China

China is rich in detailed historical information going back three thousand years. It is also helpful that Chinese history focuses strongly on dynasties, which is how most Chinese lemming cycles express themselves.

Traditionally, Chinese historians have identified a repeated pattern of dynastic change, in which a powerful new dynasty gradually decays into chaos, followed by a rapid resurgence of central authority. They saw it as the key theme of history, with the decay of central power reflecting the moral decline of successive emperors until the “Mandate of Heaven” was lost.

¹¹²

Biohistory also sees dynastic cycles as reflecting changes in character, but we propose that they can best be attributed to the people as a whole rather than the ruling house. This same pattern has been observed as in England and Japan, with the V-90 period representing the chaos, and a powerful new regime arising as the V year approached.

Early Chinese history is not as detailed as it later became, but a reasonable case can be made for a V year around 1035 BCE. The Zhou had put an end to the earlier Shang dynasty in 1046. Following the suppression of a series of revolts in 1035, they established their authority over much of northern China through a network of hereditary lords who remained loyal to the Zhou ruler.¹¹³

The eleventh century was also a time of innovation and change. This period developed the idea of the Mandate of Heaven, with the notion that Heaven granted authority only to virtuous rulers, and could withdraw it from tyrants. This idea, and the rituals devised at this time, came to form much of the basis of later Chinese culture.¹¹⁴

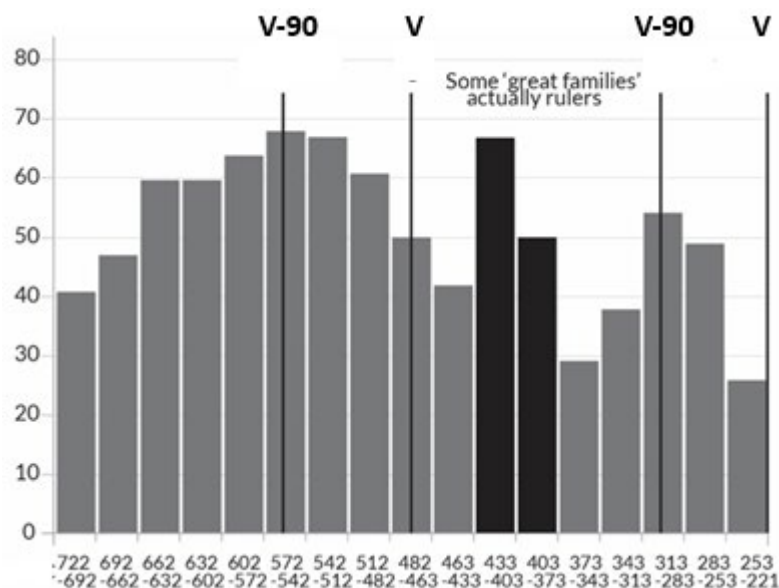
Zhou authority gradually declined from the mid tenth century, following our proposed V+60 year of 1075. By 771 it had totally collapsed, with regional lords giving ceremonial reverence to the Zhou rulers but in practice independent.¹¹⁵

Confucius, and the first great age of Chinese philosophy

We can tentatively place a second V year around 470 BCE. In the early-sixth century a high proportion of men mentioned in Chinese histories were from great but not ruling families, a rough index of aristocratic power, indicating a V-90 year around 560. The proportion of aristocrats mentioned fell rapidly in the early fifth century, suggesting an increase in royal authority (see Fig. below). This occurred not in China as a whole but in the newly independent states.

Confucius (551–479 BCE) lived in this period and frequently lamented the erosion of legitimate political authority. In the *Analects*, he complained that ministers and great families had usurped powers that properly belonged to rulers, reflecting a widespread concern.¹¹⁶

Fig 6.1. Percentage of prominent men from great but not royal families in China, 722–253 BC.¹¹⁷



Another sign of the lemming cycle is that the sixth and early fifth centuries BC saw the first golden age of Chinese philosophy. Confucius developed an ethical and political philosophy centred on virtue, education, and moral government. Laozi articulated the Daoist ideal of harmony with the natural order. Sunzi transformed military thought through his emphasis on strategy and flexibility.¹¹⁸ This innovation of thought is consistent with the years leading up to a V year, such as that of 470.

On the other hand, these V-90 years do not show signs of feudal disorder leading to a rapid recovery of central power, as in other periods of history. Instead, there was a relatively steady trend to increasing administrative control in the various Chinese states. Governments became increasingly able to raise taxes and directly control their populations.¹¹⁹

This is the same exception we saw in twelfth century France, though more drawn out in the Chinese case. We will also see the same pattern in early Japan and Korea, at times when C is low in the civilization cycle but rising fast.

The First Chinese Empire

We can locate a V year around 220 BCE, when the Qin dynasty came to unite the Empire. One sign is an extraordinary flowering of Chinese philosophy in preceding decades. Over three thousand years of Chinese history, only about seventeen philosophers have been given their own section in a Fung Yu-lan's *A History of Chinese Philosophy*, long regarded as the standard general history of this subject. Six lived in what amounts to a single generation between 330 and 263 BCE, consistent with the explosion of new ideas we typically find at V-45 (265 BCE).¹²⁰

V years tend to be followed by reduced local loyalties and growing stress on orthodoxy in thought. This helps to explain why China could be unified under the Qin by 221 BCE, and why the infamous 'burning of the books' in 213 BCE marked the end of the golden age of Chinese philosophy.¹²¹

The Qin regime was soon overthrown, to be succeeded by the Former Han dynasty. For some decade this enjoyed a period of peace and stability, typical of regimes that follow the V year. There was also evidence of a further decline in local loyalties. The local states, which had kept some independence in the early Han period, were finally abolished after a revolt in 154 BCE. This is consistent with a low point of local loyalties at the V+60 period of 160 BCE. Following this came the high point of Han military power, with Wu ti (141–87) sending vast armies into central Asia. But these armies did not have the military élan and effectiveness of the V period. They were largely composed of conscripts and criminals and suffered terrible losses.¹²²

From then on, the government went into decline. Wealthy landowners established tax free estates, reducing revenue and weakening imperial authority. The court became increasingly dominated by powerful families and palace factions, while the burden of taxation fell ever more heavily on small farmers. Growing social and economic tensions led to a series of popular uprisings beginning in 22 BCE.¹²³

This was in part a reflection of the lemming cycle, but it also represented something more long lasting. China was experiencing the collapse of C in its civilization cycle, which would lead eventually to three centuries of disunity.

Later Han Dynasty, and Collapse

But the decline was reversed for a time, and here we can see a lemming cycle effect. After a near collapse of government power at the end of the century, central authority was restored to some extent by Wang Mang (9–23 CE) and more effectively by the later Han dynasty, which reached a peak in the late first century under the Emperors Ming and Zhang (57–88 CE).¹²⁴ This is consistent with a V period in 80 CE and a V-90 period around 10 BCE.

It is the same pattern we will see in the Roman Empire just a few centuries later, when the Roman decline was reversed by a resurgence of central power in the late third and early fourth centuries.

In China, decline continued in the second century, reflecting both lemming and civilization cycles. The Han dynasty was weakened by repeated rebellions, the growing power of regional military commanders, and increasingly bitter factional struggles at court. In 220 CE the dynasty collapsed, the beginning of nearly four centuries of disunity.¹²⁵

Eventually, C began to recover in the Chinese civilization cycle. A clear sign is that North China was united under the northern Wei dynasty in 439–524. However, this recovery was halted by a period of disunity in 524–77 when military leaders and successor states struggled for power. Then in 589 China was united by the Sui dynasty, followed closely by the resplendent Tang dynasty (618–907), often considered the greatest in Chinese history.¹²⁶

7. Chinese Renewal

Tang Dynasty

Placing a V year in the powerful first century of the Tang, at 650, allows a V-90 year in 560, explaining the temporary setback of the mid-sixth century.

The seventh century also showed the military vigor typical of V periods. A militia system had been set up in the mid-sixth century, reaching a peak in the seventh. Military service held considerable prestige at the time and was one of the major routes to social advancement. The success of relatively small armies in the north and north-west shows their effectiveness.¹²⁷

But enthusiasm for military service began to ebb after about 660, and the high point of military success in the 740s was achieved by professional armies including many barbarians.¹²⁸ As is very often the case, the V+60 period around 710 saw declining national energies balanced by increasing absolutism, as local loyalties fell to a low point. Immediately following this came the last strong Tang ruler, the Emperor Xuanzong (712–756), whose reign ended in rebellion and disaster as the lemming cycle progressed.¹²⁹

This period also shows the familiar swing between 'open' and 'closed' attitudes, though with a significant delay. The Sui and early Tang periods showed extreme tolerance of different religious and intellectual traditions including new schools of Buddhism. Zoroastrianism, Christianity, Manichaeism, and Islam.

But after the An Lushan rebellion broke out in 755, official attitudes became less tolerant. The power and wealth of Buddhist monasteries was increasingly criticized, while foreign merchants and religions were viewed with distrust. There were calls for a return to traditional Confucian values.¹³⁰ 755 is exactly the V+105 year, though in terms of theory the peak of orthodox thinking should come a few decades later. The Tang cycle is longer than the standard one, and V+105 extends into the trough period of the cycle, which is the part that extends.

From 750 the Tang dynasty became gradually weaker, typical of the decline phase of the lemming cycle. Provincial military governors, originally appointed to defend the frontiers, became virtually independent rulers with their own armies, finances and appointments. Revenues declined as the government lost control over taxation in many provinces. Finally, the Huang Chao Rebellion of 874-884 so weakened the empire that the last Tang ruler was deposed in 907.¹³¹

Song Dynasty

The next half century saw five short-lived dynasties succeeding each other in the north, while the south was divided into a number of independent kingdoms. Reunification began with the founding of the Song dynasty in 960, which by 979 had subdued almost all of China.¹³² This hiatus was much shorter than that of the third to sixth centuries, since it was purely an effect of the lemming cycle and did not represent any fall in C.

The Song government remained powerful throughout the eleventh century, with a peak in the period between 1022-1067. This period showed stable administration, an expanding examination system to select officials, effective taxation, and close imperial supervision of provincial officials. The Chinese military remained strong, though weakening towards the end of the century.¹³³

This suggests a V year around 1030, with V-90 in 940. Note again the typical lemming cycle pattern of a rapid rise in central control from the period of maximum chaos.

Intellectual trends show the familiar lemming cycle pattern. The early Song period was fertile in new ideas. Thinkers such as Zhou Dunyi (1017–1073), Shao Yong (1011–1077), and Zhang Zai (1020–1077) laid the foundations of Neo-Confucianism. And scholars such as Shen Kuo (1031–1095) made major advances in astronomy, mathematics, geology, cartography, and engineering.¹³⁴

Approaching the V+60 year of 1090,

Though the controversy surrounding Wang Anshi's New Policies from 1069 divided the scholar-official class into reformers and conservatives, and political loyalty increasingly outweighed free scholarly debate. This trend peaked when Zhu Xi's Neo-Confucianism became the officially prescribed orthodoxy for the civil service examinations in 1313.¹³⁵

Mongols

The Song were never as strong in military terms as the Tang had been, and in 1127 invaders from the steppe took the northern capital, with the Song retaining control of the south. Finally, the Mongols took over first north China by 1234 and then the south by 1279.¹³⁶

This did not represent a dynastic collapse so much as a weakening regime unable to resist barbarians of unprecedented power. In 1279 Mongol rulers controlled not only China but Russia as far as Ukraine, Iran and Iraq.¹³⁷

Even so, the lemming cycle quickly undermined the new regime. By the late 1280s, the simmering discontent noted by Marco Polo was kept in check only by the immense military power of the Mongol Empire. Although Kublai Khan maintained effective control, resentment of foreign rule was widespread, and after his death in 1294 the authority of the Yuan dynasty gradually weakened.¹³⁸

The last strong Mongol ruler died in 1307, to be followed by seven rulers in twenty-six years and outright civil war after 1328. In 1351, the Red Turban rebellion shattered Yuan authority. But this interregnum was to be brief. In 1368, the new Ming dynasty expelled the Mongols and restored effective control.¹³⁹

Ming Dynasty

After a brief civil war between 1398 and 1402, the Yongle Emperor (1402-1424) brought the Ming to a peak of power and stability, though the Empire remained strong for the rest of the

century. This suggests a V year around 1440, with V-90 at 1350

The fate of the Mongol Yuan dynasty shows what happens when a regime takes power "too early." The Mongol conquest, completed in 1279, took place seventy years before the next V-90 year (1350). In other words, a dynasty supported by the most powerful army ever, lasted only a few decades because it hit the decline phase of the lemming cycle.

Cultural changes reflect the typical lemming cycle pattern of the swing between open and closed, before and after the V year. The early Ming period was outward looking, expressed most vividly in the great maritime expeditions of Zhen He between 1405 and 1433, which reached as far as Africa. After the death of the Xuande Emperor in 1435, the court gradually abandoned this policy and put restrictions on private maritime trade.¹⁴⁰

There was also an increased suspicion of foreign contacts and tighter state supervision of religion, though China remained more tolerant than many European states.¹⁴¹ Neo-Confucian orthodoxy became increasingly rigid in the late fifteenth century. The standardization of the eight-legged essay in the civil service examinations set a clear range of acceptable ideas for men who wished to join the civil service.¹⁴²

The central government gradually weakened during the sixteenth and early seventeenth centuries, with increased factionalism, corruption, and financial pressures, though with serious efforts to reform by Grand Secretary Zhang Juzheng between 1572 and 1582. After 1630, widespread peasant rebellions swept north China and the government struggled to control the provinces or pay troops, given declining tax revenues. In 1644 a Chinese rebel, Li Zicheng, captured Beijing and the last Ming emperor committed suicide.¹⁴³

Qing Dynasty

In 1664 the Manchus, a rising power on the north-eastern frontier, seized Beijing, and by 1661 had united China. After suppressing a serious rebellion in 1673-1681, the dynasty reached a peak of power between 1683 and 1770,¹⁴⁴ the mid-point of which suggests a V year of 1720. This puts the previous V-90 year at 1630, which fits the chaos and rebellions of that time.

The White Lotus Rebellion of 1790 showed military weakness, corruption in the army, and increasing reliance on provincial militias. By the mid-nineteenth century China was weak, humiliated by unequal treaties and a war in which British gunboats forced the Chinese government to allow the import of opium. China was forced to open treaty ports, cede Hong Kong to Britain, and grant privileges to foreign powers.¹⁴⁵

At the same time, the Taiping rebellion—a massive political and religious civil war in the Yangtze valley—cost tens of millions of lives. The court survived only by relying on provincial armies raised by powerful local leaders such as Zeng Guofan. After this, the regime became even more dependent on provincial military leaders. Despite reform efforts, the dynasty continued to decline until overthrown in 1911.¹⁴⁶

Attitudes to new ideas shows the familiar lemming cycle pattern. Between 1680 and 1720, the Kangxi emperor encouraged scholarship, welcomed Jesuit scientists, and promoted cartography, astronomy, mathematics, and exchanges with Europe. Between 1720 and 1760, intellectual patronage continued but the regime became more suspicious of Christianity and various sects.¹⁴⁷

By the V+60 year of 1780, censorship intensified, Christianity was increasingly restricted, and Neo-Confucian orthodoxy strengthened. These trends became even more intense in the early nineteenth century, before China again became more open to new ideas later in the century as the V-90 year approached.¹⁴⁸

8. The rise of Communism

The Warlord era

The absolute nadir of central power in China in recent times, came in the Warlord era of the 1920s. This is a perfect example of a V-90 period when local loyalties are strongest. China collapsed into compete chaos, with shifting coalitions of warlords fighting for power and no vestige of central government.¹⁴⁹

A study of Chinese warlord armies in the 1920s shows how the political instability stemmed from psychological attitudes. There has been no hereditary landed nobility in China for well over a thousand years, but warlord armies showed the same intensely local loyalties as the people of fifteenth-century England did to their nobles. Soldiers were loyal to their own commanders and cases of individual treachery and wilful desertion were rare, except when an entire unit changed sides under direct orders of its commander.¹⁵⁰ This is exactly what happened in England during the Wars of the Roses when the Earl of Warwick and other notables changed sides.

It was this that made the politics of the time so confused. Common soldiers owed allegiance to their own local leader, not to the warlord himself. The local commander had a personal tie with his own superior, the warlord, who might in turn support one of the most prominent national figures. Because of this, a defeated warlord might be quickly abandoned by his followers.¹⁵¹

China in this period had the peculiar misfortune of a lemming cycle sharply at odds with its Japanese neighbour. The Japanese reached a V year in 1910, leading to a surge of militarism in the 1930s when the peak generation came of age. This was only 15 years after the Chinese V-90 year, when China would have been weakest and most vulnerable.

This was almost exactly the same point in the previous cycle, when China had fallen under the control of the Manchus. Even though the Manchus were far weaker in terms of population and resources.

Changing ideology reflects changing character

What makes the Warlord Era in China especially interesting is that, for the first and only time in history, we can actually trace the attitudes that supported local leaders in these chaotic times. We can also see how these attitudes changed as the Nationalists and then the Communists gained power. This is done by examining the propaganda of the different parties.

Warlord propaganda reflected the personal loyalties of the era in that much of its focus was personal. It praised the warlord or attacked his enemies. Other themes tended to be bland statements calculated to have universal appeal such as the need for moral virtues, sound money and credit, and sympathy for the people.

The power of the warlords also depended at least in part on personal support from the broader community. A 1923 poll of students and businessmen, about the least likely groups to be supportive of warlords, found that no fewer than five of the most admired twelve living Chinese were from this group. Even people who deplored the chaos of the country often spoke of individual warlords with a great deal of respect.¹⁵²

Nationalist and especially Communist propaganda put far more emphasis on concrete policies such as anti-imperialism and the revision of unequal treaties.¹⁵³ Focus on policy rather than individuals is a sign of more impersonal attitudes.

Of course, by Western standards even Communist propaganda is relatively personal, as shown by the Mao cult and the demonization of his enemies in later times. Chinese loyalties today are still more personal than in the West, which is why Xi Jinping remains in effective control.

But, and this is crucial, they are considerably *less* personal than they were a century ago. A simple way to understand the rise of strong government over the past century is that the Nationalists and then the Communists gained power because people's character changed in ways that made Nationalist and then Communist propaganda more appealing.

Therefore, just as a shift of the younger generation towards personal loyalties and attitudes explains the collapse of central authority in the 1920s, so a gradual increase in impersonal attitudes explains the steady shift back towards central control. The Nationalist regime of the 1930s and early 1940s can be considered as intermediate between the Warlord and Communist eras. This applies not only to its control over the country, which was improved but far from complete, but to the level of personal versus impersonal attitudes expressed in its propaganda. These were midway between the appeals of the Warlords, and those of the Communists.

Thus as the generation that came of age in the 1930s was more impersonal in its orientation, so the balance of power shifted from warlords to Nationalists. By the late 1940s the balance was shifting still further, with the younger generation now more attuned to the Communist ideology. Thus, a political movement that had very little support in the 1920s became strong enough to take over the country by 1949.

This is how we can understand the political changes of the era. Following the Warlord Era, China went through the classic lemming cycle pattern of a swift rise to national unity and power from chaos at V-90 (1925) to national unity and strength at the V year (2015). The Nationalist government of the 1930s regained some authority, though they were never able to fully subdue the entire country.

And then, in 1949, a new and powerful Communist government took control. By 1951 it had regained surrounding areas such as Tibet as their Qing predecessors had done centuries earlier.¹⁵⁴ This is a typical lemming cycle pattern, with a swift rise in unity following the extended decline under the Qing. By studying the propaganda of each party, we can trace the change in attitudes that make this happen.

Acceptance of New Ideas

We can use the same source to trace how people opened up to new ideas. Warlord propaganda was actually less conservative than that of the late Qing. For example, it advocated the end of the Imperial system. But there was still a focus on government by good men, a mainstay of the traditional Confucian system, and a sense of caution about Western education. The Nationalists and especially the Communists were far more committed to a radical remake of Chinese society.¹⁵⁵

In the lemming cycle, acceptance of change is most characteristic of the G-60 period, which in Chinese terms came around 1955. In this sense all the dominant systems of twentieth century China—Imperial, Warlord, Nationalist, and Communist—represent a steadily more positive attitude to social change. This means that as the broader society became more accepting of radical change, so the movement best expressing that attitude did best in the struggle for supremacy.

The triumph of Communist ideology was the biggest single change in Chinese thought since the adoption of Buddhism nearly two-thousand years earlier. In many ways, it was a rejection of three thousand years of Chinese culture.

Communists

Though in one area, Communist actions hark back to a much earlier time. In the seventh century CE, the imperial regime redistributed much of the land of China to peasants, in what was known as the "equal field system". This was most fully applied after the Sui Dynasty came to power in 589 CE, 61 years before the Tang V year.¹⁵⁶ In effect, this reform curbed the power of great landowners and strengthened government authority by increasing tax revenues

The Communists came to power in 1949, which was also 61 years before the 2015 V year, and they also confiscated lands owned by landlords, and gave it to poor peasants. Then from 1958, they pushed these same farmers into Communes. This drastic reform was made possible because fast rising V in the lemming cycle made people more accepting of central government authority and more accepting of change.

Evidence of this is that the setting up of Communes was quite popular in some areas, with some even established voluntarily after intense 'encouragement'. But complaints soon became widespread as people lost control of their land, labor and food, especially during the famine of 1959-61. After this, the system was gradually relaxed.¹⁵⁷

Governments in both eras had similar incentives. Mao aimed to eliminate the landlord class, and mobilize labor and grain for rapid industrialization.¹⁵⁸ The Sui and Tang rulers also aimed to increase revenues and prop up government power.¹⁵⁹ Indeed, the breakdown of the equal field system from the eighth century allowed landowners to amass large estates. This cost the Tang government tax revenue, labor services and military recruits, contributing to the decline of its authority.¹⁶⁰

China in the early twenty-first century has all the vigor, confidence and unity of a typical V period centered on 2015, even though population growth is relatively low as a result of the

one-child policy. A classic lemming cycle pattern would show a rising level of orthodox in the decades ahead, possibly expressed as a revival of Confucianism. But as with other countries where C and V are in rapid decline, there is no certainty this will happen.

The Dynastic Pattern

Chinese history shows lemming cycle patterns more clearly than any other culture. This is partly because Chinese history is so detailed over such a long period of time, but also because Chinese historians focused so much on character. The key difference is that Chinese historians focus on the character of the rulers, while biohistory is more focused on the character of the people who followed them.

The pattern is of a rapid establishment of power, with a vibrant sense of unit and military strength around the V year. By V+60, the dynasty remains strong but has become more authoritarian. Military success may then require money and compulsion, such as under the Han Emperor Wu ti, whose armies were largely composed of criminals and conscripts and suffered great losses.

After this comes a gradual decline of central authority, with local leaders gaining strength and court factions fighting each other. Once again, we explain this in terms of the motivations of followers rather than those of the power seekers themselves. Consider changes in the character of the population.

At peak V, people have a strong sense of unity and confidence, and rally around the regime.

At V+60, when child V is highest, they obey the strongest and most powerful known figure, in this case the emperor.

After this, as child V drops, loyalties turn to people with personal ties, such as the heads of court factions or provincial military leaders.

When child V is at a minimum, at V-90, loyalties are intensely local, leading to periods of disorder.

Before the V year, around V=45, people are innovative and accepting of different ideas. After the V year, and leading up to the V+105 year, they become more traditional and less tolerant of dissent. Though in longer cycles, such as those of the Tang and Song, we should expect this to peak a few decades later.

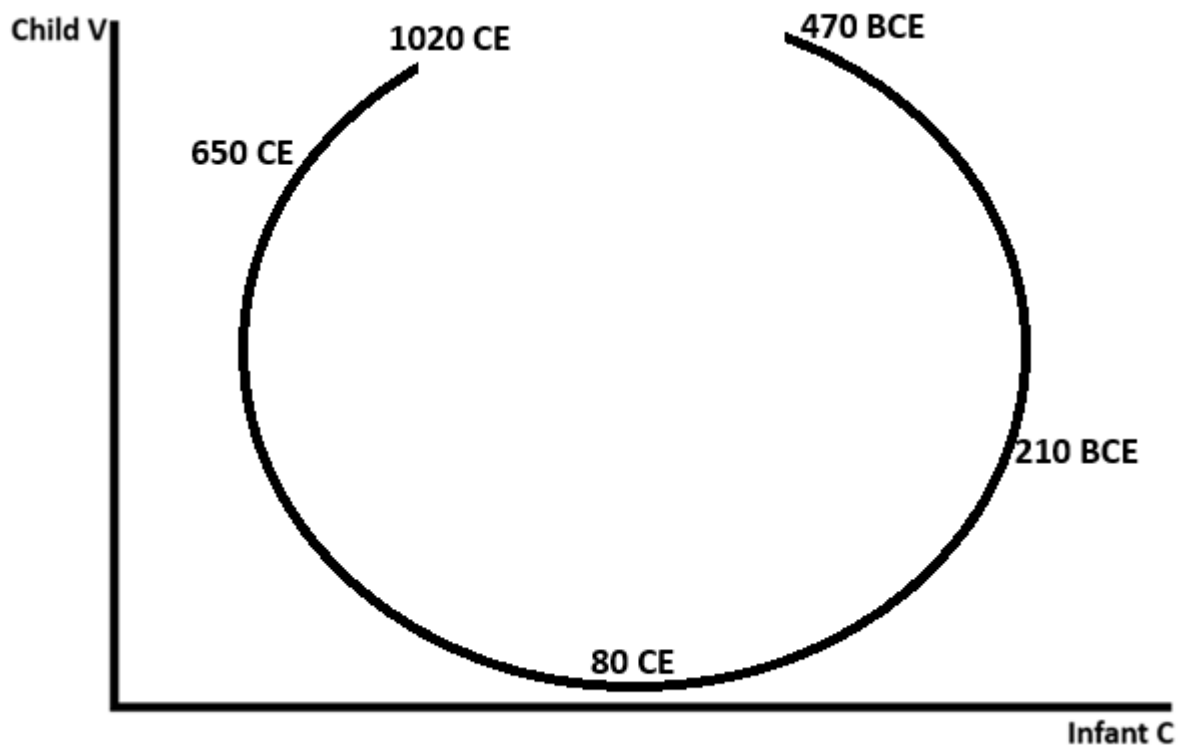
In summary, Chinese lemming cycles are laid out in Table 7.1 and Fig 7.1 Below.

Table 8.1. Lemming Cycles in China

V-90 year	V year	Length in years
560 BCE	470 BCE	
300 BCE	210 BCE	260

10 BCE	80 CE	310
560	650	570
930	1020	370
1340	1430	410
1630	1720	290
1920	2015	290

Fig 8.1 Lemming Cycles in China plotted against the civilization cycle



After the post-Han collapse, China follows a path not easily plotted on a civilization cycle graph, showing a continued rise in adult C but a decline in infant C, with child V rising but then relatively stable. See Biohistory 2106, chapter 21.

Changing Lengths of Lemming Cycles

Chinese lemming cycles the same pattern as in England, France and Japan. Cycles are shorter when child V is stable or falling, and longer when it is rising. This can be related to the finding from animal studies that cycles become longer when a population is under stress.¹⁶¹ Rising child V, with its associated stress, seems to lengthen lemming cycles in humans.

In China, for the first time, we can plot lemming cycles against a more complete civilization cycle, showing what happens when infant C falls in a civilization collapse, and then starts to

rise. Part of this process is that child V falls to a low level during the collapse, and then rises again, eventually bringing about a rise in C.

Thus, in China we see a change from shorter to longer to shorter cycles. Note that even in the longest cycle, that of 80 to 650 CE, the gap between maximum disunity and peak dynastic morale remains at around 90 years. Extending it by 70 years, in proportion to the rest of the cycle, would place the peak of the Tang dynasty in the early eighth century, when it was well into decline. This is the same pattern we found in the French Charlemagne cycle.

It is consistent with the finding from animal studies, that cycles lengthen in the decline phase, not the growth phase. V-90 to V is mainly in the growth phase.

This progress from shorter to longer to shorter is quite smooth, with one exception. If the 1020-1430 cycle followed the same pattern it should be around 340 years, mid-way between the previous and following cycles. Instead, it takes 410 years. But this one exception helps to confirm the underlying principle.

The Mongol conquest of north China must have been extraordinarily stressful, beyond any other event in Chinese history. It may have caused the death of up to a third of the population from starvation, disease and slaughter. Irrigation systems were ruined, farmland abandoned, and entire districts depopulated. Entire cities were annihilated.¹⁶²

To put this in perspective, the brutal Japanese occupation of much of China between 1937 and 1945 may have killed between three and four percent of the Chinese population, an order of magnitude less.¹⁶³ Thus, the stress resulting from the Mongol invasion is the kind that might well extend the lemming cycle, if our model is correct.

Another possibility is that the Song lemming cycle remained the same, but the occupation of China by a powerful Mongol army could have overridden V-90 chaos and delayed the outbreak of revolts that would otherwise have taken place 70 years earlier. But the gap between these revolts and the peak of Ming power in the early fifteenth century is much the same 90 years as in any other cycle. This suggests that the previous cycle was extended around 70 years by the sheer brutality of the Mongol conquest.

It is also significant that the Mongol invasions, and the previous conquest of north China by the Jurcheds, both took place in the 'decline' phase of the cycle, which started around 1110 (90 years after the V year). They would have been far less likely to succeed during the preceding 'growth' phase, when V was higher and contributing to military strength.

Demography

We would like to check whether Chinese V periods contributed to population growth, but this is not as obvious as for other countries. Chinese population did tend to grow faster in V periods and more slowly or even declining in the troughs, but this may not be meaningful because population growth in China depended so much on the success of government in keeping order.

For example, growth slowed towards the end of the later Han dynasty and population fell in the centuries that followed. These were 'trough periods' in the lemming cycle, but also times of widespread disorder. Similarly, population rose rapidly in the early Tang before the An Lu Shan rebellion of 755, which was a growth phase but also a time of order and prosperity.¹⁶⁴

Population also grew rapidly in the eighteenth century, in the period surrounding the 1720 V year, slowed in the nineteenth century, and reached another peak of growth in the 1950s, before being halted by the one child policy and growing prosperity.¹⁶⁵ Thus, demography is consistent with lemming cycle patterns but can be explained just as well by other factors.

This is not the case for periods we have previously considered such as fifteenth century England, where lemming cycles provide the best explanation for population decline. English wages were actually higher in the fifteenth centuries than in the twelfth or sixteenth centuries, but people were far *more* likely to die from disease. The same can be said of England around 1700.

Next will turn to China's neighbours in East Asia, Korea and Japan.

9. Japan And Korea

In this chapter we will apply the lemming cycle model to Japan. In the absence of good demographic evidence before 1600, we will use the political patterns seen in English and French history. One striking effect of lemming cycles in Japan is that in the decades before V periods, the Japanese were strikingly open to ideas from abroad. After the first three V periods, they reduced borrowing and swung back to native traditions.

This is in contrast to the European pattern in which openness before the V period changed into orthodoxy afterwards, with a tendency to stifle dissent and pursue people seen as heretics.

In the early sixth century CE, the Japanese Emperors did not even fully rule their local Yamato region, depending on alliances with local clans. From 545 until the end of the century, they gradually established control of this province.¹⁶⁶ Then under Emperor Suiko (592-628) they began to establish authority over neighbouring areas, especially with the Taiko Reform of 646 which declared land and people subject to the Emperor.¹⁶⁷

Most historians identify the late seventh and early eighth centuries as the time when the central administration was strongest. It appointed provincial governors, administered taxation, and organized military conscription and corvee labour. Then after about 740, increasing grants of tax-free estates began to erode the tax base, and local families and temples began to accumulate private power.¹⁶⁸ All of this would indicate a V year around 660, with a V+60 year in 720.

The problem is that the growth of central control began at least 115 years before our presumed V year of 660, instead of 90 years. This is a similar though less extreme version of the pattern we have seen in France and China, and will see in early Korea. When C is low and rising in the civilization cycle, the normal 90-year gap between feudal chaos and strong central control does not appear, as seen in later periods of history. The likely reason, in all these cases, is that the centralising effect of rising C swamps the standard lemming cycle pattern.

Chinese Ideas: From Adopting to Adapting

In terms of openness versus orthodoxy, this cycle shows the standard pattern. The consolidation of power in the late seventh and early eighth centuries was closely associated with the wholesale adoption of Chinese administration and ideas, including Confucian ethics and Buddhism, with the most enthusiastic borrowing taking place in the late seventh century, around the V year.¹⁶⁹

This is later than might be expected from a V-45 year of 615, but understandable in that much of the borrowing was done in the service of a rising central power that consciously sought Chinese ideas to create a more effective state.¹⁷⁰

Then, in the late eighth century and passing the V+60 year of 720, the Japanese moved from simply adopting Chinese ideas, to adapting them to Japanese conditions. This went hand in hand with increased confidence in a developing Japanese culture.¹⁷¹

We have spoken of societies as being most 'closed' 105 years after the V year, which in this case would be 765. But based on animal studies, longer cycles tend to stretch in the trough period.

Strictly speaking, the peak of nativist sentiment Such a change fits a V+105 year of 765, though in this case we might expect the peak of nativist sentiment to be several decades later. This is because, as we will see, the next V year came 540 years after 660, and in an extended cycle the decline phase is longer.

From the late eighth century and for the next 300 years, the central government lost power, an extended decline typical of this phase of the lemming cycle. By 1050 the local military houses had become the dominant force in the provinces, though formally subject to the imperial court.¹⁷²

After 1080, provincial warrior families increasingly gathered under the leadership of the Taira and Minamoto houses. Their networks of retainers and allies expanded steadily, until by 1160 they had emerged as rival military coalitions centred on western and eastern Japan respectively.¹⁷³ After 1160, political rivalry between the Taira and Minamoto intensified. Taira domination was followed, from 1180, by a violent struggle for power, with armies fighting in the capital and over much of the country until the Minamoto triumphed in 1185.¹⁷⁴

The Kamakura Shogunate

The new regime, which the Hojo came to dominate, reached a peak of stability between 1246 and 1274, after which it was weakened by Mongol invasions and a declining financial position.¹⁷⁵ A plausible V year could be placed around 1200, giving a V-90 year of 1110. This was before the period of greatest political disturbance, but the growth of coalitions after 1110 suggests a decline in purely local loyalties. Regardless of the exact date, a slow decline of central power followed by a swift recover shows the standard lemming cycle pattern.

Intellectual and religious changes follow the familiar swing between open and closed, though at a milder level. The twelfth century saw the development of new religious sects. Chinese learning continued to enter Japan through trade and pilgrimages, while aristocrats and monks readily adopted new literary, artistic, and religious ideas.¹⁷⁶

The thirteenth century remained a time of innovation in thought, with new religious sects founded by leaders such as Nichiren. But while Japan remained more tolerant than in Europe or than in later centuries, it was less so than before. Nichiren was exiled twice and almost executed. One new movement, that of Honen, was officially suppressed in 1207. The authorities also began intervening in religious disputes that were seen to threaten public order.¹⁷⁷

For a century or so the new military government was in effective control. But again, after this came a steady decline, barely affected by the passing of the role of shogun (military ruler) to the Ashikaga family in 1338. Local lords or Daimyos took more and more authority, until central authority completely collapsed after the start of the Onin War in 1467. Though ostensibly a succession dispute over the shogunate, the Onin War became a trigger for local power struggles all over the country.¹⁷⁸

This is exactly the same pattern as we saw in England during the Wars of the Roses, and the war of King Stephen's reign, with the royal struggle no more than an excuse for local conflicts. The underlying reason in all such cases is the strength of local loyalties, which give local leaders the power to act as they wished.

During the Onin war, most of the great daimyos were overthrown by smaller-scale leaders with closer ties to their own people, a reflection of extreme local loyalties.¹⁷⁹ There are many other signs of localism at the time. Large-scale peasant rebellions were often able to overawe governments and force the cancellation of debts. And in 1485 the peasants of southern Yamashiro rose under local samurai and expelled two contending armies from the region as undesirable "foreigners."¹⁸⁰ All this is consistent with a V-90 year around 1500.

Unity, and rejecting the outside world

As always when approaching the V year, central power was restored much faster than it had declined. Tight central authority was first established by the daimyos in their own realms, and then by Nobunaga, Hideyoshi and Tokugawa Ieyasu over all of Japan by the end of the century.¹⁸¹

These signs point to a V year around 1590. There is the establishment of central authority, following the chaos at the start of the century. Wars were fought by mass citizen armies, rather than the warrior elites of earlier times, such as the armies sent to conquer Korea in 1592-98,¹⁸² typical of the warlike fervour following V years. Note that the Koreans were on a different cycle and did not show any weakening of local loyalties, so they were able to fight off the Japanese invaders.

This period also shows an extreme example of the swing between open-ness to new ideas leading up to the 1590 V year, followed by reaction to it afterwards. From the 1540s, Japanese rapidly adopted new European technologies such as firearms, and millions converted to Christianity. Borrowing continued but with growing reaction between 1580 and 1610, followed by formal closure and strict control by the 1630s. Christianity was formally banned in 1614.¹⁸³

Tokugawa rule remained strong for more than 200 years. But by the early nineteenth century, some of the daimyo gained a greater degree of independence, with policies such as encouraging industry and strengthening military forces.¹⁸⁴ This is consistent with a V-90 year around 1820, though because of much higher C there was no breakdown of order.

This is similar to what happened in eighteenth century England, with powerful landowners largely controlling government. Or in France at the same time, when noble privileges were supported by an absolutist government. Nations with high infant C do not collapse into disorder.

Opening To the West

This was the situation when Commodore Perry arrived in 1853, with central authority at its lowest ebb but openness to change increasing. Fifteen years later, in 1868, the forces of Choshu and Satsuma overthrew the shogun and quickly established a powerful central government that opened to the West.

Again, this is the same pattern as seen in other lemming cycles, with a slow decline of central authority to a low point, and then a rapid restoration of central power.

In the period leading up to the next V year of 1910, the Japanese, who had been so adamant about rejecting all foreign influences for two and half centuries, became enamoured of Western technology, science, political institutions and even clothing, as they had been in the sixteenth century.¹⁸⁵ Then, as aggression increased following the V year of 1920, Japan launched on yet another campaign of overseas conquest by invading first China and then South-East Asia. This time, though, as C reached a peak and began collapsing in the civilization cycle, there was no conservative reaction.

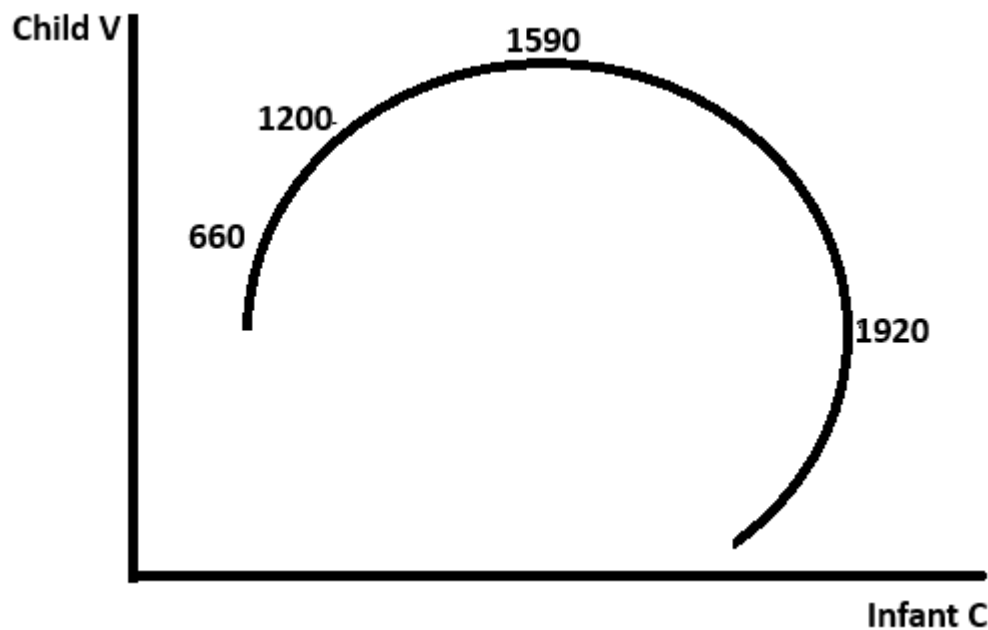
This analysis places Japanese V years in:

Table 9.1. Lemming Cycles in Japan

V-90 year	V year	Length in years
	660	
1110	1200	540
1500	1590	390
1820	1910	320

As in England and France, Japanese cycles became shorter as child V reached a peak in the sixteenth century and then started to decline.

Fig 9.1: lemming cycles in Japan



Demography

Lemming cycles have an impact on population growth, through their effects on birth rate and resistance to disease. Population can grow or decline for other reasons including the availability of land and levels of civil disturbance or famine. Japanese demography shows more of these 'other' factors than England, but we can still see some effects of lemming cycles.

What we might expect to see is a positive effect on population in the 150 years around a V year, and a negative effect in other periods. The negative effect periods should be longer, because (from animal studies) it is the decline phase that extends when cycles extend. Alongside this we will see a long-term trend to faster growth as the civilization cycle moves to peak C in the early twentieth century.

The growth and decline phases, when we might expect a positive or negative effect on population growth, are as follows:

Growth phase	Decline phase
585-735	735-1125
1125-1275	1275-1515
1515-1665	1665-1845
1845-1995	

This analysis is based on the best scholarly information about population trends, though we recognize that such estimates are uncertain.

The Japanese population was growing in the sixth century but increased faster between 600 and 735, with its most rapid expansion in the late seventh century.¹⁸⁶ These dates fit very well into our proposed 585-735 growth phase, with the most rapid increase around the 660 V year.

As the first 'decline' phase started in 735, Japan suffered the worst outbreak of disease in its history, in the form of a smallpox epidemic may have killed up to 30% of the population. The rest of the century saw a sharp decline as the result of further epidemics, and stagnation or a slight decline until the mid-tenth century.¹⁸⁷ This is consistent with our proposed 'decline' phase following 735, when people will be less resistant to disease.

Between 950 and 1050 moderate growth returned, with a rapid rise of population between 1050 and 1150. After population losses relating to the political turmoil, famine and disease between 1150 and 1230, moderate growth returned for the balance of the thirteenth century.¹⁸⁸ This is consistent with the 1125-1275 growth phase, but starting a century or so earlier than we might expect, the biggest discrepancy between political and demographic effects of the cycle in Japan.

Population growth was slow in the fourteenth century, speeded up somewhat in 1400-1470, and then stagnated again in the turmoil of the Onin War and the conflicts leading up to the unification of Japan around 1550.¹⁸⁹ This is a reasonable reflection of the 1275-1515 decline phase, extended somewhat by the political turmoil of the early sixteenth century,

Growth began again in the late sixteenth century, with rapid expansion in the seventeenth century, before stagnation set in during the eighteenth century.¹⁹⁰ This is consistent with our proposed 1515-1665 growth period, allowing for the beneficial effect of the Tokugawa peace after 1600.

The Japanese population began to grow again in the early nineteenth century, reaching a peak of growth between 1870 and 1920, consistent with a growth phase starting in 1845 and peaking around the 1910 V year.¹⁹¹ Collapsing birth rates after 1950 are related to declining C in the civilization cycle, which completely dwarfs lemming cycle effects on demography.

With the single exception of unexpectedly rapid growth between 1050 and 1150, lemming cycles explain much of the variation in Japanese rates of population growth, especially when considered in conjunction with the effects of political turmoil or peace.

Having brought Japan up to the twentieth century, we will briefly consider the history of Korea.

Early Korea: The Rise of Silla

The early history of Korea shows the same pattern as Japan in the sixth and early seventh centuries, and France in the eleventh and twelfth centuries, where growing centralisation

took far longer than in a normal lemming cycle. All of these exceptions took place when C was lowest in the civilization cycle.

The States that controlled the Korean peninsula began increasing central control at different times. First Goguryeo in the fifth century CE and later Silla in the early sixth century. By the early seventh century, three powerful and centralized States fought for control, being united under Silla between 660 and 676.¹⁹² This was similar to the situation in twelfth century France where administrative control developed first in the Provinces before being united in by Philip Augustus at the end of the century.

Central control of Korea in this early period reached a peak in the reign of Seongdeok (702-737), with factionalism increasing later in the century.¹⁹³ A plausible V year could be placed around 650, leading up to a V+60 year in 710 when local loyalties were weakest.

This is also consistent with a period of intensive borrowing of Chinese ideas between 500 and 650, with the culture increasingly adapted to Korean needs between 750 and 900.¹⁹⁴

From then on, the Silla regime weakened, with local elites and military leaders becoming increasingly autonomous. Between 889 and 900, tax revolts and rebellion caused effective authority to collapse. From 900 and 936, Korea was divided among competing regional regimes supported by powerful local magnates and military leaders, though Wang Geon began rebuilding unity between 918 and 936.¹⁹⁵ This indicates a V-90 year around 910.

Goreyeo Dynasty

As usual with lemming cycles, the revival of central authority was much faster than its decay. Seongjong (981-997) strengthened administrative control, with officials increasingly being sent into the provinces. The Goreyeo regime remained strong throughout the eleventh century, though heavily impacted by Khitan Liao invasions early in the century.¹⁹⁶ This is consistent with a V year around 1000, with a V+60 year in 1060.

In the twelfth century, Korea became increasingly unstable, with military leaders vying for power and popular rebellions. In 1196 the regime of Ch'oe Ch'ung-hon partially restored central authority, but was severely impacted by Mongol invasions from 1231. For the next century, Korea retained native rulers but was largely subordinate to the Yuan dynasty.¹⁹⁷

Korea remained highly receptive to foreign ideas throughout this period, but with strong borrowing in the tenth and eleventh centuries giving way to greater cultural self-confidence in the twelfth and early thirteenth centuries.¹⁹⁸ This is consistent with a V-45 year in 960 and V+105 year in 1105.

Returning to the political situation, a more stable government functioned under Yuan hegemony between 1273 and 1328 but weakened thereafter. Kings could be deposed, restored or summoned to the Yuan court, while powerful aristocratic families took control of land and dependents, weakening the monarchy and its tax base.¹⁹⁹

King Gongmin came to the throne in 1351 and attempted to restore national independence and royal authority, but was weakened by the Red Turban invasions in 1359 and 1361 and raids by Japanese pirates. He was assassinated in 1374, leading to a further period of disorder.

Joseon Dynasty

Then in 1388 Yi Seong-gye seized power and in 1392 founded the Joseon dynasty, which reached a peak of administrative strength and stability between 1418 and 1450, and retained strong institutions until the Japanese invasions of 1592-98, though with increased factional struggles and purges in the late fifteenth and sixteenth centuries.²⁰⁰

This suggests a V year around 1420, with V-90 at 1330 or a bit later, though foreign invasions and Yuan overlordship makes lemming cycles less obvious in this period.

Attitudes to new ideas follow the typical lemming cycle pattern. A 1420 V year suggests a V-45 year in 1375 and a V+105 year in 1525, and we see the common swing from openness to orthodoxy. Korea was especially open to new ideas under Yuan hegemony from the 1270s, and this openness continued into the early Joseon period (1392-1420). After 1420, Koreans became more confident in adapting these ideas for local conditions. From 1450 and into the sixteenth century, they became increasingly rigid in their orthodoxy.²⁰¹

The early seventeenth century was an unstable period in Korean history. Gwanghaegun was overthrown by a coup in 1623, followed by internal rebellions and Manchu invasions in 1627 and 1636. The monarchy survived but bitter factional disputes continued for the next century, until Yeongjo (1724-1776) and Jeongjo (1776-1800) stabilized the central government, followed by a return of factionalism.²⁰² A consistent lemming cycle pattern would place a V-90 year in 1630 and a V year in 1720.

Patterns of thought show the familiar swing from open to orthodox, but later than in any other cycle. Koreans reacted to the Manchu invasions with an intense focus on Confucian orthodoxy, seeing the Manchus as culturally inferior barbarians. They became more open in the eighteenth century and especially later in the century, accepting not only new ideas from China but showing an interest in Western ideas including science and Christianity, though keeping these within a Confucian framework. This openness ebbed after 1800, with persecution of Catholics and attacks on heterodox ideas.²⁰³

But both these trends happened several decades *later* than we might expect from a V-45 year in 1675 and a V+105 year in 1825. Biohistory currently has no way to explain this delay.

Japanese Rule

The Korean state continued to weaken in the nineteenth century, with domination by powerful in-families, growing corruption, and decline in local administration. There were

serious rural rebellions in 1811-12 and especially in 1862. The Donghak Peasant rebellion of 1894 was so challenging that the government was forced to call on Chinese military help. Japanese control increased after 1894, with Korea being formally annexed in 1910.²⁰⁴

This suggests that in 1890 Korea was either in or heading towards a V-90 year, which is the time when any nation will be most vulnerable to take over. Demography confirms that population growth was especially rapid in the early eighteenth century, around the 1720 V year. It slowed later in the century, reaching near stagnation in the early nineteenth century but then rising to a new and higher peak in the 1950s.²⁰⁵

Growth then turned into decline, as prosperity undermined C in Korea, as it has done in the rest of East Asia. Given Japanese domination, it is difficult to assign a recent V year for Korea, except to say that it would likely be 2015.

The reason is that Korean V years in previous centuries closely follow China's, and do not show the steady shortening of cycles we have observed in England, France and Japan. This is perhaps not surprising, given the extent of Chinese cultural influence and—in some periods—outright hegemony.

Table 9.2. Lemming Cycles in Korea

V-90 year	V year	Length in years	Chinese V years
?	650		650
910	1000	350	1020
1330	1420	420	1430
1630	1720	300	1720
1925?	2015?		2015

This was not the case with Japan, which was heavily influenced by Chinese culture but far less dominated by China.

The result was that Korea, like China, was unfortunate in having lemming cycles sharply at odds with Japan's. Japan invaded Korea very close to its 1590 and 1910 V years, when Korea was only a few decades away from its V-90 years, the point of the cycle when a nation is most vulnerable.

Dominant societies seem to impose their cycles on other peoples. This is the same pattern we saw in chapter five on France, and will follow further in the next chapter. The provinces conquered by Rome seem to have adopted Roman lemming cycles wholesale, making a smooth transition from Italy to Gaul to France. And so it is to Rome that we will now turn.

Chapter 10. Rome

Our final march through history will follow the rise and later fall of Rome, tracing lemming cycles from the Republic to the fall of the Western Empire, and to the surviving Byzantine Empire in the west. This is especially useful because it gives us another example of what happens to lemming cycles when a civilization goes into decline.

At the start of the fourth century BCE, Rome was a relatively weak regional power. It controlled Latium but fought continual wars against the Etruscans, Volsci, Aequi, and Veii. The sack of Rome by the Gauls in 390 or 387 BCE marked a low point, damaging Rome's prestige and encouraging subject peoples to revolt.²⁰⁶

By 350, Rome had re-established its alliances and control of Latium, then began to grow. Scarcely more than a century later, by 264 BCE, it had united all Italy south of the Po and expanded into the Mediterranean.²⁰⁷ Though these dates are only approximate, a V year can be set around 260 BCE, with the preceding V-90 year at 370.

This case is very different from all the others we have studied, in that Italy had no history of unity. In this case, rising C in the civilization cycle can be seen as working to create a sense of unity where had none had existed. But the rapid timing of this process does suggest the influence of a lemming cycle.

The sense of Italian unity around the 260 V year was evident when Hannibal invaded Italy in 218 BCE, only 42 years later. Most of Rome's Italian allies remained loyal even after three catastrophic defeats in 218, 217 and 216 BCE. Hannibal clearly expected the Roman alliances to fall apart but, with certain exceptions they did not.²⁰⁸

Hannibal had the misfortune to invade Italy shortly after the V year. If had done so 130 years earlier, he would have been far more likely to succeed. Though, of course, it was Roman expansion and Carthaginian defeat in the First Punic War (264-241 BCE) that had caused Hannibal to invade.

If the invasion had happened 130 years later at the next V-90 period of 90 BCE, it might also have been more successful. At that time, Rome was at war with many of its subject Italian peoples in what is known as the Social War of 91-87 BCE, so an invader would have had more success in finding allies.

Demographic information is too poor to make any firm comparisons about growth in different periods, but the Roman population seems to have grown especially fast in the third century BCE, around the 260 V period. with numerous colonies planted across Italy. Rome seems also to have recovered remarkably quickly from the huge losses of the war against Hannibal, with colonization resuming soon after.²⁰⁹

The third century was also the likely peak of C in the civilization cycle, when hard working populations tend to grow unusually fast. This is the equivalent phase that Europe went through in the nineteenth century, or Japan in the early twentieth century.

But there was no reaction against new ideas following the V year. Instead, in the next two centuries, Romans became increasingly open to Greek culture.²¹⁰ This is a pattern we have already noted in the recent histories of England, France, Japan, and China. All were at peak C, with the beginnings of a rapid decline. Societies with high C tend to be very innovative, especially when C is starting to collapse.

The End of the Republic

The last century of the Republic was a turbulent one, with a series of civil wars ending only with the triumph of Augustus in 30 BCE. These reflect increase personal loyalties as a result of declining C, which would eventually lead to the end of the Republic. There were two periods of especially brutal warfare.

Though less well known than the civil wars that ended the Republic, the Social War of 91-88 BCE was far more of a threat to Roman power. In all the centuries that Rome ruled Italy, the Social War was the only time that subject Italians rose in mass revolt. This indicates an unusually strong level of local loyalties. The threat was so grave that many Italians were offered Roman citizenship to quell it, something the Senate had fiercely resisted until that time.²¹¹

Loyalty of soldiers to their commanders also made it possible for first Marius and then Sulla to take power in the 80s, a precedent for the civil wars that ended the Republic. The same applied to the conflicts between 49 and 33 BCE such as those between Caesar and Pompey, and between Antony and Octavian. These also resulted in hundreds of thousands of deaths, but in none of them did any region or province try to break from Roman control.²¹²

In looking for a V-90 period, when local loyalties are the strongest, the most reasonable date would thus be around 90 BCE. This then marks 0 CE as the next V year, which fits into the strength and stability of the early Principate. Note the rapid shift from anarchy to strong central government, entirely typical of lemming cycles.²¹³

Cultural innovation tends to be strongest in the years leading up to the V year, and Rome at this time was no exception. The greatest age of Roman literature is generally placed between 75 BCE and 20 CE. Major writers of the time include Cicero, Caesar, Virgil, Horace, Livy and Ovid.²¹⁴

However, there was no conservative reaction after the V year, as is normal in periods of fast declining V and C.

The Five Good Emperors

We have so far considered the lemming cycle as it applied to Italy alone, but what seems to have occurred is that the Italian lemming cycle became common to the empire as a whole. This is made clear by the common virulence of the plagues that swept the Roman world from 165 onwards, and the timing of the next V-90 period.

Having said this, if Rome had followed the same pattern as common to Chinese dynasties, the government would have gradually weakened past the V+60 year (60 CE), with growing factionalism and loss of central control.

Instead, Rome was ruled between 96 and 180 CE by a series of effective and capable rulers often called the 'five good emperors'. They ran stable and effective governments with peaceful successions through adopted heirs, and oversaw economic prosperity and extensive public buildings.²¹⁵

Biohistory tends to see government as reflecting the character of the population as a whole. Regimes decline because people's attitudes no longer support strong central authority. Traditional Chinese thought, by comparison, focused on the character of the ruler. If an emperor ceased to rule justly, morally and competently, the Mandate of Heaven could be withdrawn and rebellion was justified.²¹⁶

When it comes to Rome in this period, the Chinese view makes some sense, at least as it applied to the regime as a whole. Rome had the good fortune in that none of the first four emperors in this period – Nerva, Trajan, Hadrian and Antoninus Pius – had surviving legitimate sons. So each emperor chose a competent and honest successor.²¹⁷

And these men appointed leading administrators and officials on the basis of their ability and experience, rather than court intrigue or military coercion.²¹⁸ It is also notable that they increasingly often came not from Italy but from the provinces such as Hispania, Gaul, North Africa and the Danube provinces.²¹⁹ These were areas where C and V remained higher, judging by their economic growth relative to Italy.²²⁰

The Crisis of the Third Century

But the lemming cycle continued to operate, as indicated by the next V-90 period. This was the turbulent era known as the 'crisis of the third century'. The background to this crisis was declining C throughout the Empire, especially in the west. When C is high, such as in eighteenth century France or England, V-90 periods simply give power to aristocrats. When it is lower, which is the common historical pattern, chaos ensues.

After two centuries of stability, the Empire began to weaken after the assassination of Commodus in 193 CE. This triggered civil war, with five emperors being proclaimed in that year. Septimus Severus restored order, but his successors in 211-235 were subject to court intrigues and assassinations. The army gained increasing influence over politics.²²¹

Between 235 and 268 a series of soldier emperors took the throne, after being proclaimed by their own troops. Between 260 and 274 two sections of the Empire became effectively

independent. One was the Gallic Empire, which controlled Gaul, Britain, and much of Hispania (modern Spain). The other was the Palmyrene Empire which controlled at its height Syria, Palestine, Egypt, much of Asia Minor (modern Turkey), and parts of Arabia.²²²

This pattern of behavior where soldiers are loyal to their local leaders is typical of V-90 periods, such as those of Warlord Era China and England during the Wars of the Roses. Given such attitudes, it is much easier for ambitious generals to seize power. Sometimes, the troops themselves took the initiative, and the leader might initially be reluctant. This seems to have been the case for Maximus Thrax in 235, Decius in 249, and Aurelian in 253.²²³ In any case, a V-90 year around 260 seems the best fit, to within a decade or two.

Restoring the Empire

As always with lemming cycle, central power was restored more quickly than it had declined. In 274 Aurelian reunited the Empire. Diocletian (284-305) reorganized the bureaucracy, reformed taxation, and strengthened imperial authority. This reached a peak in the reign of Constantine (324-337), who further strengthened the administration and reformed the currency, which had been debased in the previous period.²²⁴

This is consistent with a new V period around 350. This pattern is what we saw in China in the first century CE, when a declining Empire was briefly restored by the Later Han dynasty. The Roman restoration was even briefer, in that Rome was sacked in 410, after only 60 years. By contrast, the Later Han dynasty survived its own V year by 140 years.

Incidence of disease also fits the lemming cycle pattern. The Antonine Plague of 165-180 may have killed 10-20% of the population, making it one of the deadliest epidemics in the ancient world. It occurred exactly half way between the 0 and 350 V years, when theory suggests that resistance to disease should be lowest. It is especially striking that it occurred at a time of relative peace and prosperity.²²⁵

The decades that followed were also disease prone, with the plague of Cyprian (249-270 CE) being especially deadly. In this case, the effects were made worse by the political turmoil of the time.²²⁶ No instances of empire-wide epidemic are recorded for the fourth century, consistent with greater disease resistance during V periods.

The Roman world was not to see a return to the mass epidemics of the second and third centuries until the sixth century, during the next lemming cycle trough.²²⁷

Byzantium

The fall of the Roman Empire is often dated to the sack of Rome in 410, but in fact the Eastern or Byzantine Empire survived it by more than a thousand years. Readers interested in why this happened may refer to our explanation in Biohistory 2016, chapter 17.

The Empire experienced many serious threats but there were two periods when internal instability was especially damaging, indicating likely V-90 periods.

Scholars consider the crisis of the seventh century as the second most damaging in Byzantine history. The death of Heraclius in 641 led to a series of succession disputes in which court factions, generals, and rival dynastic claimants vied for power. This situation was made worse by rapid Arab conquests.²²⁸

The worst of the chaos occurred between 695 and 717, which was marked by repeated coups, revolts, and a total of six emperors. The Empire nearly collapsed before Leo III seized power in 717.²²⁹

An even more damaging crisis occurred in 1185-1261. Between 1185 and 1203, central authority weakened and there were revolts in the provinces, corruption, and a decline in tax revenues. 1203-4 saw repeated palace coups, civil unrest, and a sack of Constantinople by the Crusaders. In the next two decades the empire fragmented into a number of successor states, before being largely reunited in 1261. Though it was never again to be as strong.²³⁰

Treating these epochs as V-90 periods suggests V years around 770 and 1275. This also fits the Plague of Justinian in 541-544, the most devastating of the era, close to the mid-point (560) between the 350 and 770 V years, when we would expect disease resistance to be lowest. This is similar to the timing of the Antonine Plague, exactly half way between the 0 and 350 V years. Also similar is that there were continuing outbreaks until 747, but nothing recorded thereafter as the V year approached.²³¹

In terms of strong central government, there is no clear lemming cycle pattern except that it was entirely absent during V-90 periods. In this, the Byzantine Empire followed the same pattern as Rome, quite unlike what we have seen in other countries.

For example, Justinian (527-565) oversaw the high point of the Empire's expansion after the fall of Rome, which was also one of its greatest periods of administration and legal reform.²³² Yet his reign was in a lemming cycle trough, the same period in the cycle as Marcus Aurelius in the second century.

Justinian came from a peasant family in the Balkans, one of the poorest provinces in the Empire, and one that had been repeatedly damaged by invasions during the fifth century.²³³ From these indications, he would have been relatively high V.

His leading officials were drawn from an even wider range of backgrounds than those of Marcus Aurelius and the other 'good' emperors. Many were from humble or peasant origins, chosen for their education, loyalty, and ability.²³⁴ This was a distinctly high V regime.

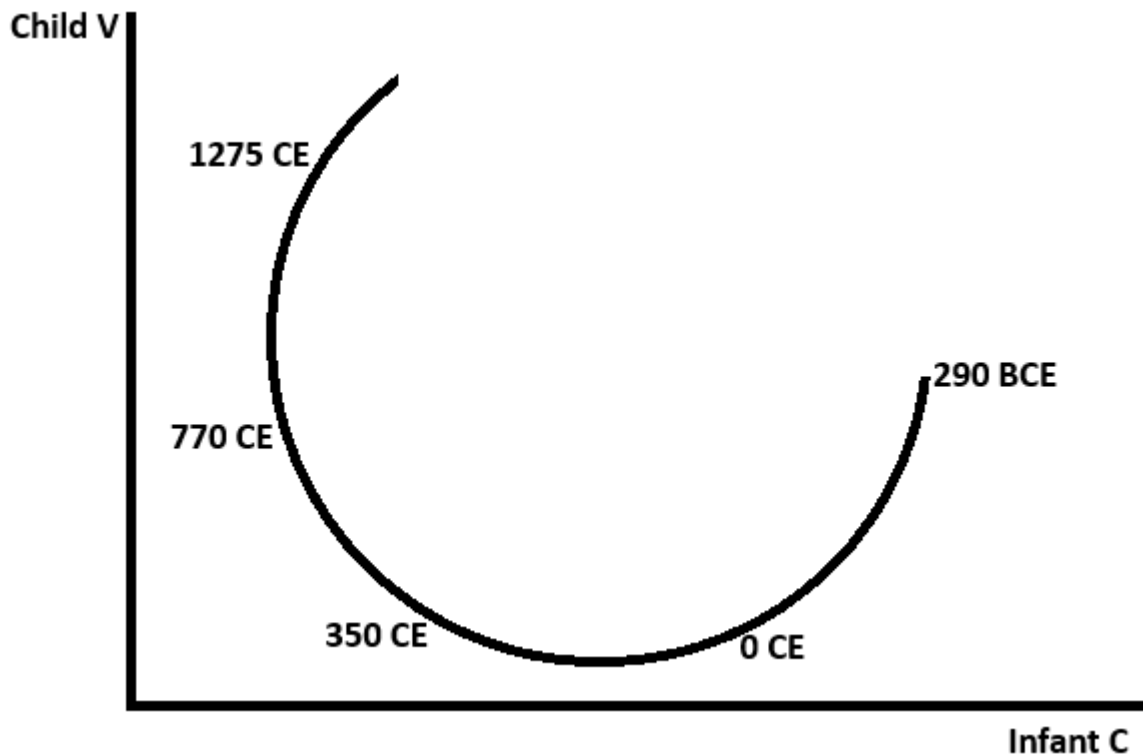
This is likely also where there is no swing from 'open' to 'orthodox' around V years. Levels of toleration versus religious orthodoxy seem to relate mainly to the attitude of the emperor.²³⁵

Putting these indications together, we can add these to earlier cycles and come up with a tentative outline for the Roman and Byzantine periods.

Table 10.1: Lemming cycles for Rome and Byzantium

V year	Gap in years
290 BCE	
0	290
350 CE	340
770 CE	420
1275 CE	505

Fig 10.1 Roman and Byzantine Lemming Cycles, plotted against the civilization cycle



As in all other cases we have studied, the cycles become longer after the collapse, when child V and stress rise. Though the 0-350 cycle is also longer than we might expect, considering that this was a period of very low child V. It could be that the Roman practice of assimilating provincials might have slowed the fall of V in the Empire as a whole. Higher V is suggested by the finding that the main source of army recruits shifted with time from Italy, to the provinces, to the frontier provinces and beyond.²³⁶ Willingness to fight is a strong indication of higher V.

11. Lemming Cycle Wars

We have seen that when lemming populations are growing rapidly, in what we now term their V periods, they become bolder and migrate in large numbers. The equivalent behavior in human societies would be an aggressive war of expansion.

Chinese dynasties show this pattern in and around their V years. These are the times when powerful new dynasties take control of neighboring areas such as much of Mongolia, central Asia and northern Vietnam under the Tang dynasty.²³⁷ Or Tibet and Inner Mongolia under the new Communist regime.²³⁸ Chinese forces tend to be unusually effective at such times.

In this chapter we will consider major wars of the nineteenth and twentieth centuries, which illustrate this pattern. One difference from earlier conflicts was the ability to mobilize far larger armies.

Europeans have been fighting wars for thousands of years, and the effect on ordinary people could be catastrophic. The Thirty Years War of 1618-48 may have killed 20% of the population of Europe. In some areas, as much as 60% died.²³⁹ The chaotic wars of V-90 periods also caused great loss of life.

But these wars were fought by a small fraction of the population. The armies that Edward I led to the conquest of Wales and Scotland were among the largest of the era. But they enrolled only 4-6% of the adult male population. England in 1918 mobilized some 50-60% of adult males.²⁴⁰

But there are times when what lemming cycles create wars of unusual ferocity. This is when V periods occur in societies with a high level of infant C, combining warlike vigor (V) with a powerful sense of national unity and ability to organize (infant C).

These are the wars of the nineteenth and twentieth centuries, fought with massive armies and great popular enthusiasm. Prime examples are the Napoleonic Wars of 1803-1815 and the First and Second World Wars. Employing mass citizen armies, they roused whole nations to supreme effort. So great was this enthusiasm and the martial vigor of the population, that some countries took on enemies with far greater resources. And even, for a time, enjoyed remarkable success.

By considering who launched these wars, and when, we can understand much about the causes of human conflict. In the case of Europe, lemming cycles are a powerful driving force. One common finding, as discussed earlier, is that wars tend to break out not at the V year, but around 25 years later when the peak generation comes of age.

The Napoleonic Wars

We have already discussed the Napoleonic Wars as a consequence of our proposed French V year of 1775. Twenty-five years later, when this peak generation came of age, the fighting spirit of the French armies was remarkable. In the 1790s the French were at war with Austria, Prussia, England and Spain, while also facing internal revolt and with an army deprived of almost all its experienced officers. Yet they drove back the invaders.²⁴¹ It was this victory which was celebrated with the song that later became known as the Marseillaise, now the French national anthem.²⁴²

When Napoleon first took over the army of northern Italy in 1796, he found a force made up of misfits and rejects from the armies in the north, ragged, ill-paid and often barefoot. That such an unpromising force could seize control of northern Italy is testament to his skill as a commander, but also to the troops he led. The swiftness of his movements, in particular, reflected the extraordinary toughness of his men.²⁴³

The French appetite for war and conquest at that time was almost insatiable. In twenty years, France likely lost well over a million men in action and from disease, especially in the invasion of Russia, out of an adult male population of around 6-7 million.²⁴⁴ Yet Napoleon's escape from Elba in 1815 was greeted with widespread enthusiasm and a resurgent volunteer army, which came close to defeating the allies at Waterloo.²⁴⁵

Britain

The next European power to reach a V year was Britain, around 1850. Britain showed all of the other features we have associated with high V, but little of warlike aggression.

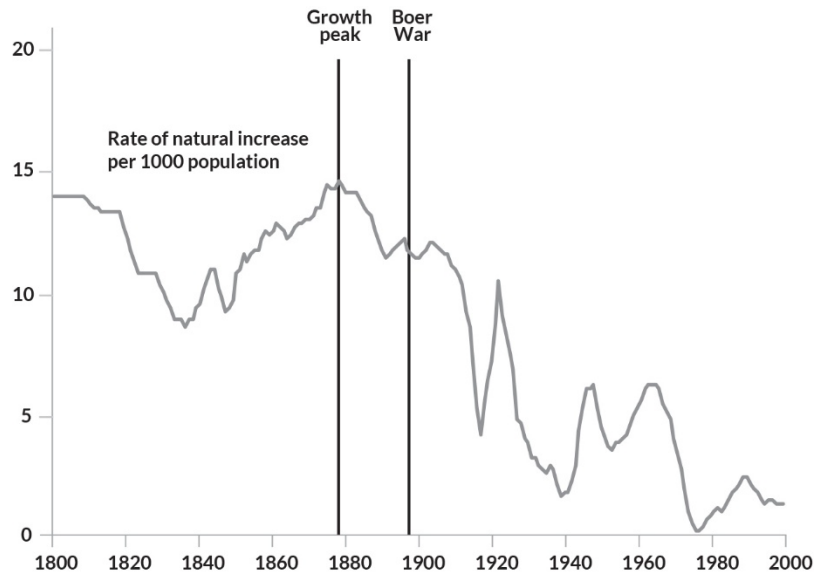
English people in the 1850s were proud of their country and its institutions, including the monarchy. Nationalism was generally moderate and confident. It didn't need to be fought for.²⁴⁶ Interest in its colonies was mainly commercial and practical. Britain's Far Eastern possessions were owned by the East India Company, which provided its own armies and was only loosely regulated by the British parliament. Most Britons saw new overseas colonies as administrative and moral headaches.²⁴⁷

But there was no fervour for war at this time. We propose that this was because the rate of natural increase was relatively low in the 1850s, as a result of what we term a 'recession cycle'. See Biohistory 2016, chapter 7. Warlike enthusiasm seems to depend on a high level of V, plus being born in a peak generation.

The key factor seems to be family size, which is supported by the finding that people from larger families are more likely to join the military. This applies historically and to the present day.²⁴⁸ Thus, the more children in the family, or perhaps the more brothers, or perhaps the sheer size of the peer group, the greater the taste for fighting.

Attitudes began to change in Britain in the 1870s, as the rate of natural increase surged to a new peak. See Fig 9.1 below.

Fig. 9.1. Rate of natural increase per 1,000 (five-year rolling average); England and Wales: 1800–2000.²⁴⁹



From that time onwards, British politicians such as Benjamin Disraeli gained popularity by appealing to the sentiments of empire. The aggressive ambition of men like Cecil Rhodes boosted the British Empire's dominance in southern Africa, an expansion which drained national income and made very little commercial sense.²⁵⁰ In his autobiography of the decades before the Great War, Esmé Wingfield-Stratford commented on the rampant militarism among the young, highlighting the mood of the time:

[T]he whole atmosphere of the time seemed to be faintly redolent of gunpowder; ... among those who professed and called themselves gentlefolk in the fin de siècle—and I think this would apply to an even wider circle—everybody seemed to be talking about those two linked attractions of war and empire.²⁵¹

The strongest expression of this new mood was the Boer Wars of 1899–1902, which caused immense suffering and loss of life, and not only among the soldiers. Tens of thousands of Boer women and children died from hunger and disease in British concentration camps.²⁵² South Africa gained its independence a few years later, so Britain gained little benefit. It was perhaps the most irrational war in modern British history, and it came just twenty-five years after the peak of population growth, when a generation with maximum V came of age.

By 1914 the fervour for war was still strong. This was only fourteen years after the absolute peak of V, and combined with the early twentieth century decline in C to make Britons eager to take on Germany.

The First World War

A more serious danger arose at the beginning of the twentieth century. The German population had been increasing rapidly in the late nineteenth century, reaching peak growth between the 1870s and 1890s.²⁵³ This suggests a V year around 1885. Austria-Hungary reached its own peak of growth a decade or so earlier, suggesting a V year around 1875.²⁵⁴

Russian population growth also peaked in the 1890s, suggesting a V year around 1895. Even the Ottoman population seems to have been growing most rapidly between 1890 and 1910, suggesting an Ottoman V year around 1900.²⁵⁵ Finally, the Serbian population was also growing especially fast in the 1870s and 1880s, suggesting a V year of 1880.²⁵⁶

These estimates are all very approximate, but putting them together with the English data and going forward 25 years, we could expect warlike fervor to peak for each country at the following dates.

Nation	V+25 year
England	1900
Austria-Hungary	1900
Serbia	1905
Germany	1910
Russia	1920

In 1914, all these peaks were less than 15 years away. Germany just four years. Just as the French had displayed massive enthusiasm for war in the 1790s, so did the Germans in 1914. The declaration of war in August 1914 was greeted by a display of jubilation in all social classes. In Berlin, crowds poured onto the streets to cheer their leaders. The war was an exciting adventure, and young men rushed to enlist for fear that it would be over too soon and they would miss out.²⁵⁷ This is how one young German viewed the outbreak of war:

A gigantic wave of fiery hot feeling passed through our country flaming up like a beautiful sacrificial pyre. It was no longer a duty to offer one's self and one's life—it was supreme bliss. That might easily sound like a hollow phrase. But there is a proof, which is more genuine than words, than songs, and cheers. That is the expression in the faces of the people, their uncontrolled spontaneous movements. I saw the eyes light up of an old woman who had sent four sons into battle and exclaimed: "It is glorious to be allowed to give the Fatherland so much!"²⁵⁸

Ernst Junger, who was to be seriously wounded seven times and fought throughout the entire war, expressed the incredible fighting spirit of the Germans:

We had grown up in a material age, and in each one of us there was the yearning for great experience, such as we had never known. The war had entered into us like wine. We had set out in a rain of flowers to seek the death of heroes. The war was our dream

of greatness, power, and glory. It was a man's work, a duel on fields whose flowers would be stained with blood. There is no lovelier death in the world ... anything rather than stay at home, anything to make one with the rest.²⁵⁹

Response in other countries

Russian reaction to the outbreak of war was equally enthusiastic. There were huge public demonstrations in St Petersburg and other cities, with crowds singing the national anthem. Even many critics of the Tsar supported the war, though public enthusiasm faded more quickly than in other countries.²⁶⁰

The British people also reacted with expressions of national unity and patriotic determination, and around a million men volunteered between August and December 1914. But compared with Germany, the public celebrations were less widespread and confidence in victory not quite as high.²⁶¹ The same can be said of Austria-Hungary; widespread support but not as strong as in Germany.²⁶²

French reaction was also one of strong patriotic unity, though generally more sober and less exuberant than in Germany, with less confidence in a quick victory.²⁶³ In short, patriotic support for the war was strong in all countries, but enthusiasm and confidence were strongest in the countries, Germany and Russia, which were closest to their V years.

Italy followed a different pattern. Population growth was reduced by high levels of emigration, but rate of natural increase seems to have peaked between 1890 and 1920, suggesting a V year around 1905.²⁶⁴ There was little support for the war in 1914, with most Italians preferring to remain neutral.²⁶⁵

A 1905 V year suggests a peak level of support for war might be expected in 1930. Which may explain why the invasion of Ethiopia in 1935-36 was met with much greater public enthusiasm and national support than the outbreak of war in 1914.²⁶⁶

In short, the First World War can be plausibly explained by several European countries reaching their V+25 year within 15 years of 1914. The most enthusiastic, Russia and Germany, were just six years and one year away, respectively.

The only exception was France, which in 1914 was a more than a century past its own V+25 year of 1800. In 1940 it was 140 years past it, at what may be considered the absolute low point of its own lemming cycle. This time, defeat took only 46 days.

But such wars have not been confined to Europe.

12. Japan and the United States

One country that took little part in the 1914-18 war was Japan. In 1917 it sent a naval squadron to the Mediterranean, and it took advantage of the war to seize Japanese possessions in China and the Pacific. Total casualties were around 4-500 deaths, with 900-1,000 wounded.²⁶⁷

This became explicable when we note that Japan was unlike Europe in that birth rates remained high into the 1920s, with population increasing rapidly between 1890 and 1930.²⁶⁸ As noted previously in the section on Japan, this would place the latest Japanese V year around 1910, with the V+25 year being 1935.

And it was just at this time that the Japanese developed a passion for conquest, which began with the occupation of Manchuria in 1931, before moving into China in 1937. Japanese attitudes in the late 1930s were strikingly similar to those of Germans in 1914. There was growing acceptance and enthusiasm for the war, especially after early successes, and confidence in victory. Political assassinations and attempted coups silenced opponents.²⁶⁹

As common in nations around the V+25 year, the Japanese at this time were formidable soldiers. They excelled in training, discipline, night fighting, and the willingness to sustain casualties. They achieved repeated victories against Chinese, British, Dutch and American forces in 1941-42, even though often outnumbered. A dramatic expression of this spirit was the more than 3,800 kamikaze pilots who deliberately crashed their planes into Allied ships.²⁷⁰

Japanese success was also made possible by the extreme weakness of China, which in the 1930s was only just emerging from its V-90 year. The Nationalist government had limited control of the country, with many areas still under control of warlords. It was also engaged in an ongoing war with Communist insurgents, temporarily paused in 1937 but with little co-ordination or mutual trust.²⁷¹

This was the same stage of the Chinese lemming cycle that had allowed the Manchus to gain control in the 1640s. In the end, Japan was only brought to defeat by enemies with vastly greater populations and industrial capacity, expressed by actions such as the fire-bombing of Tokyo and two nuclear weapons dropped on Hiroshima and Nagasaki.

The United State War of Independence

The American Revolution was not a lemming cycle war as such, but reflected very high V at the end of the eighteenth century. Precise population figures are not available for the eighteenth and most of the nineteenth centuries, but fertility was high.²⁷² Much of this was a result of immigration, but a large part was from natural increase.

The colonists were quite well off compared to people in Europe—land was freely available and food was cheap, and there were none of the famines common in Europe.²⁷³ The *average* annual rate of natural population increase between 1720 and 1800 seems to have been around 25 per 1,000. European Countries only achieved this briefly, at lemming cycle peaks.²⁷⁴

Such a fast-growing population suggests a very high level of V, supported by the extraordinary willingness of ordinary people to take up arms during the rebellion against the British. In September 1774, upon hearing a rumour that Boston had been bombarded, and fearing the seizure of powder stores, a vast gathering of New Englanders (estimates range from twenty to sixty thousand) left their homes and headed towards the action.²⁷⁵ According to one eyewitness:

For about fifty miles each way round there was an almost universal Ferment, Rising, seizing of Arms & actual March into Cambridge ... [T]hey scarcely left half a dozen Men in Town, unless Old and Decrepit.²⁷⁶

Supporting the war effort, Connecticut's committee of correspondence (the provisional state governments set up to coordinate the colonies' resistance to the British) declared: "The ardor of our people is as such, that they can't be kept back." Within a week, 3,716 men from Connecticut were marching to the aid of Massachusetts, and by early summer an estimated twenty thousand revolutionaries had surrounded Boston, trapping the British soldiers in the confines of the city.²⁷⁷

Manifest Destiny

An American lemming cycle war was not to come for several decades, and it took a different form from those of Europe and Japan.

The American rate of natural population increase remained strong through the first three decades of the nineteenth century, perhaps even rising slightly to the 1810s, but from the 1830s it began a steady fall.²⁷⁸ This suggests a V period around 1815.

The long-term effect was not, as in Europe, a war fought against other powers. It was a drive to expand into the sparsely populated west. In biological terms, this is very much what lemming cycles have evolved to do, to encourage mass migrations and colonize new lands.

In the 1820s and 1830s, expansion became a national ideal. The Indian Removal Act of 1830 aimed to displace Native Americans to make way for white settlement. By the late 1830s, many Americans believed continental expansion was both desirable and inevitable. This movement reached a peak in the 1840s and 1850s, under the phrase 'Manifest Destiny', coined by journalist John L. O'Sullivan in 1845.²⁷⁹

... that claim is the right of our manifest destiny to overspread and to possess the whole continent which providence has given us for the development of the great experiment of liberty and federated self-government entrusted to us.²⁸⁰

Even those who were opposed to the policy of expansion held a sort of fatalistic resignation that some higher power was directing the nation. In 1837 the Boston preacher William Channing wrote an open letter to Henry Clay, criticizing the motivation for expansion:

We are destined to overspread North America; and, intoxicated with the idea, it matters little to us how we accomplish our fate. The spread, to supplant others, to cover a boundless space, this seems our ambition, no matter what influence we spread with us. Why cannot we rise to noble conceptions of our destiny?²⁸¹

Many saw the expansionist zeal of this period as part of a universal plan in which Providence was working behind the scenes to lead the nation toward its intended destiny.²⁸²

This sentiment found its strongest expression 30 years after the V year, in the Mexican-American war of 1846–8. In it, America seized lands from Mexico equivalent in size to the whole of Western Europe.²⁸³

The Civil War

But this may not be the entire story. There is a tendency for neighboring (or otherwise related) countries to have similar lemming cycles, but with their peaks and troughs out of sync with each other, perhaps by several decades. The extreme case is the divergence between Germany and France, leading France from conquest in the Napoleonic era to shattering defeat in 1941. In the first period, France was at its lemming cycle peak of V. In 1941, near its trough.

Within an individual nation, local regions seem normally to share the same V year, but in the case of America this may not have happened. The South in the early nineteenth century was a distinct and separate culture in its rural demography, lower level of industrial development, and above all reliance on slavery.²⁸⁴

This had a demographic effect. While the rate of natural increase in the northern states and also in the Upper South (Virginia, North Carolina, Kentucky, Tennessee and Maryland) fell rapidly after the 1820s, that in the balance of the South did not. Here, rate of natural increase seems to have reached a peak in the 1830s.²⁸⁵ If this is correct, and the figures are only estimates, then we could plot a V year for that region of 1835. If so, then their passion for war would be expected to peak not in 1845 but in 1860. This might help explain the outbreak of the Civil War in 1861.

Although the South was primarily concerned with secession from the Union from the 1850s on, it was also expansionist. There was a powerful sentiment for spreading slavery and the South's version of Americanism into the western territories and the tropics, now reclassified as a paradise. One Southern congressman Commented on expansion:

With swelling hearts and suppressed impatience they await our coming, and with joyous shouts of "Welcome! Welcome!" they will receive us.²⁸⁶

What is not in doubt is that in the 1850s, the southern birth rate was significantly higher than in the north.²⁸⁷ This indicates a higher level of V.

And so it was that in 1861, a high V society at a peak of warlike fervour, the South launched its war for independence. Like the Napoleonic Wars and the First World War, it was characterized by mass citizen armies and extraordinary fighting spirit.

The first of the great wars of the modern era, the American Civil War carnage was made even worse by the new industrial technology created as a result of high infant C. It was the deadliest war in American history, costing as many casualties as all other wars combined, including 6% of Northern males and an incredible 18% of Southern white males between 13 and 43.²⁸⁸

The fighting spirit of the Confederate soldiers was extraordinary. Though far outnumbered and desperately short of food, ammunition and even clothing, they kept the struggle alive for four years, at times even invading the North.²⁸⁹ In battles such as First Manassas and Second Bull Run, outnumbered Southern armies achieved notable victories. This kind of martial spirit is characteristic of other nations at peaks of V, including the armies of Revolutionary France, and of Germany in 1914-18.

Decisions about war and peace are made at all levels of society and in all age groups, especially in a democracy. Political and military leaders on the whole tend to be much older men. And yet, historical evidence suggests that wars often break out when a generation born at a peak of population growth reaches peak military age, normally their early twenties. Surprising as it may seem, the warlike fervour of this generation somehow affects the entire society, or at least provides an unusual opportunity for aggressive and warlike leaders.

V years do not cause wars without rapid population growth

V years tend to be periods of high morale, national unity and self-confidence, and are frequently followed by fervour for war, especially in periods such as the nineteenth and early twentieth centuries when national unity is high, as a result of high infant C in the civilization cycle.

But, as discussed in the case of Britain, warlike fervour appears to be not so much the result of the V year itself, but of the rapid population growth that normally accompanies it.

Another example of this principle can be found in modern China, which enjoys the stable nationalism of a V period but with families are so small that the population is actually in decline. Modern Chinese, and especially the young, are nationalistic online and support assertive policies that make China strong, but see war as risky and undesirable.²⁹⁰

13. Echo Wars

We have seen that destructive wars tend to break out when societies with high infant C reach a point 25 years after their V year, or more generally when the peak birth generation comes of age. In such conflicts, nations that are close to their V year tend to prevail over those which are not. Around 1800, France had an advantage over Germany and most of Europe. 140 year later, the advantage was reversed.

But these wars can create wars of their own a generation later. Biohistory refers to these as 'echo wars'. The Second World War is a prime example.

In 1940, Germany was only 25 years after its own. Bearing in mind that a short lemming cycle is around 260-300 years, this means that France in 1940 was very close to its absolute lowest level of V, when we might expect martial vigor to be at an absolute low point. This may help to explain what happened.

In May 1940 the French army and the British expeditionary force was roughly similar in numbers and armament to that of Germany. The French tanks were even considered superior. Most generals, including the German high command, expected a prolonged war, similar to that of 1914-18.²⁹¹ Yet it took only 46 days for France to collapse.²⁹²

Historians typically explain the outcomes of campaigns such as those of 1805 and 1940 in terms of tactics, strategy, operational doctrine, logistics, and the skill of individual commanders.²⁹³ Though all of these matter, biohistory suggests that the character of ordinary people may actually provide a more fundamental explanation for the balance of power and success among nations.

Why A Second War?

This leaves open the question of why this second war broke out at all, only 21 years after the end of the First. By this time Germany, Austria, Britain and France were 25 years further away from their respective V years, so we might expect warlike aggression to subside.

Historians give a number of reasons for the outbreak of war in 1939. These include German resentment at the Treaty of Versailles, the rise of Hitler and Nazi ideology, and the Great Depression. They also reference the weak response of Britain and France to German re-armament and resurgence, including the occupation of the Rhineland and the annexation of Austria.²⁹⁴

Biohistory suggests there may also have been another reason, based on human biology and confirmed by a pattern we have observed across thousands of years of history. This is that violent wars and rebellions often take place a generation after the end of a previous one, following an era of peace.

This is a commonplace of Chinese history. Typically, the first war unites the Empire, to be followed a generation later by a massive rebellion that either destroys the new dynasty or

brings it to the verge of collapse. After that comes an era of peace and stability lasting a century or more before gradual decline sets in.

For example, the Qin dynasty unified China in 221 BCE., but collapsed in a sea of rebellions by 206, allowing the rise of the Han.²⁹⁵ China was again unified by the Sui dynasty in 589 CE., but the new dynasty was destroyed by a massive rebellion which broke out in 611 to be succeeded by the Tang.²⁹⁶ The Ming dynasty came to power in 1368 and faced a massive rebellion in 1399, which it barely survived.²⁹⁷ The Qing dynasty established control of China in 1651, and was almost destroyed by the “Revolt of the Three Feudatories” which broke out in 1673.²⁹⁸

A more recent example is the Cultural Revolution, which began in 1966, just seventeen years after the end of the Civil War that brought the Communists to power. Though instigated by Mao himself, it unleashed widespread violence across the country. Scholars estimate a death toll at between one and two million people. As the movement descended into chaos, the People's Liberation Army was brought in to restore order, which it had achieved by 1968.²⁹⁹

Even the Cultural Revolution had an echo in the Tiananmen student protests that broke out in 1989. Though with very different aims, including calls for freedom of expression, it involved enormous demonstrations and a weakening of State control. In the end, the regime imposed martial law and sent in the army to crush the protests.³⁰⁰

Something similar happened twenty-one years after the end of the Second World War in Europe. 1965-72 saw political violence in the U.S. at a post-war high. This included urban riots, Black Power militancy, anti-war violence, Weather Underground bombings, assassinations such as those of Robert Kennedy and Martin Luther King, and National Guard Deployments.³⁰¹

The Effect of Maternal Anxiety on Infants

Biohistory provides an explanation, based on our understanding of V. A key driver for V is an affectionate but relatively anxious mother, whose sons grow up to be less anxious. The most common way to achieve this is through patriarchy, which gives men more status and power than women. This is why patriarchal societies tend to be more warlike.³⁰²

But the same effect occurs when children born at the end of a major war, grow up in time of peace. A full-scale war is a hugely stressful event for most people. Families are subject to violent intimidation by occupying soldiers, or flee their homes in terror. In many cases, famine and privation follow as resources are diverted to the war effort or fighting blocks off supplies. On top of these stresses, mothers with infants are likely to have husbands involved in the conflict, and are in a state of persistent anxiety about them.

Then the war ends, usually quite suddenly when one side or the other surrenders. The fighting stops, people celebrate, the men return home and, even for the defeated, life usually begins to return to normal.

On theoretical grounds alone, we might expect that people born towards the end of the previous war would have unusually high V. The more stressful the war and the more absolute the peace, the more aggressive could be the rising generation of young men. When they reach adulthood, we might well anticipate another war.

Bearing in mind some doubt as to when most areas experienced the end of the earlier conflict, the gap between war's end and rebellion in China averages 20-25 years. This is similar to the gap between the ending of the First World War, in 1918, and the beginning of the Second, in 1939. The one notable exception is the Cultural Revolution in China, which was launched only 17 years after the end of the Civil War in 1949.

Normally, men are most prone to violence between the ages of 20 and 24,³⁰³ which is why this is the space we most commonly see between war's end and rebellion. But one key peculiarity of the Cultural Revolution is that the largest and most militant groups were teenagers, aged 16-18.³⁰⁴ In 1966, students of this age would have been born between 1948 and 1950.

The German experience

We can apply this lesson to twentieth century Germany. The 1914-18 war had been traumatic for all the parties involved. There was a powerful sense of "never again," and the League of Nations was set up to help make sure of it. The anti-war culture that followed the war—in literature, films and politics—was powerful and widespread. And yet, only twenty-one years after the Armistice, and with the memory of the slaughter still fresh, Germany once more embarked on a war of conquest, taking on nations and populations many times its size.

Thus it is that a propensity for war can be seen as a direct product of the previous war. Boys born between about 1916 and 1918 would have felt the full effects of this anxiety in infancy, transmitted through their mothers, while experiencing lower anxiety in the post-war years. This more aggressive generation reached their early twenties between 1936 and 1939, superseding the less warlike generation that preceded it.

We would also expect the greatest boost to V to be on the side that lost, in this case Germany and Austria. Germans had experienced severe shortages of food, fuel and basic goods, such as in the "turnip winter" of 1916-17. They bitterly resented what were felt to be the unfair and unjust terms of the Treaty of Versailles, including loss of territory and reparations. After the war, inflation and unemployment added to the misery.³⁰⁵

Even with all these factors, German enthusiasm for war in 1939 was weaker than it had been in 1914, but any increase could have a significant impact. Hitler was not indifferent to public opinion, and the union with Austria in 1938 was met with celebrations, parades and mass rallies. This was felt by observers to be genuine enthusiasm, not simply propaganda. Reaction to the occupation of Czechoslovakia was more mixed, but Hitler still retained a high level of support.³⁰⁶

The invasion and occupation of France in 1940 was met with enthusiasm and pride, with public celebrations and renewed confidence in Hitler.³⁰⁷ Relatively few Germans refused to enlist or deserted at this time, though this became more common from 1943 as the war went badly.³⁰⁸

A similar shift in opinion can be seen in Britain. In 1933 the Oxford Union debated a motion “This House will under no circumstances fight for King and country”. It was passed by 275 to 153. Three weeks later, Winston Churchill was met at Oxford with hisses and stink bombs, and had to be escorted back to his hotel.³⁰⁹ But by 1939, British attitudes to war were broadly supportive, though far more sober and anxious than in 1914.³¹⁰

Another driving force behind the World Wars is that even by the standards of the time, Germans in the early twentieth century were intensely patriarchal. Women were seen as housewives and as the bearers and nurturers of children, something hardly challenged by even the most liberal reformers. The German Civil Code of 1900 gave husbands the final say in all matters of married and family life. Women were even denied admission to university³¹¹

A degree of liberalization during the Weimar period was met with fear and resentment. Working women were commonly blamed for economic problems such as unemployment. When the Nazis came to power in 1933, there were 100,000 female teachers and 3,000 female doctors. Most were sacked or forced to resign, and from 1936, women were barred from acting as judges, lawyers, principals, and other high-ranking positions.³¹²

A key difference between biohistory and standard historical explanations is that historians tend to study the attitudes and decisions of leaders, because that is what most of history records. Biohistory, by contrast, focuses on the likely attitude of followers. It is the same understanding that we brought to the study of turbulent times such as the Wars of the Roses. The key is not to understand why nobles such as the Earl of Warwick switched sides, but why their followers switched sides with them.

The First World War was justified as the “war to end all wars,”³¹³ a claim which became one of the twentieth century’s great ironic jokes. In fact, seen through the viewpoint of biohistory, its effect was not merely that it failed to end wars. To a great extent, it may actually have caused the next one.

Extreme as this claim may seem, it would not be that difficult to test. Once we have a better understanding of the effects of maternal anxiety on character, which could be gained from animal studies, we can test for the same physiological and epigenetic markers in humans. People born at the end of major wars should show a significantly higher levels than those born in the cohorts before or after.

Fading Echoes

The key original driving force behind all these wars was lemming cycle V years, that of France in 1775 and Germany and Austria around 1890. Echo effects are always weaker. Thus is it that enthusiasm for war in 1939 was less marked than it had been in 1914. The Cultural

Revolution was less violent than the Civil War that ended in 1949, and the Tienanmen protests milder still. The same can be said of the protest movements that shook the U.S. and Western Europe between 1968 and 1972.

Also, the level of V has been falling rapidly in developed nations over the past century. One sign is the rise of feminism and the movement of women into work, especially after 1960. This by itself will decrease the taste for war.

It is also worth noting that all the combatants in the World Wars were patriarchal by modern standards. Women generally could not vote, had restricted legal rights when married, and men dominated politics, the military, higher education, and most professions. But on these measures, some countries were more patriarchal than others.

Table 13.1 Strength of Patriarchal values in combatant nations³¹⁴

Country	Patriarchal values (10 = strongest)
Japan	10
Russia	9.5
Austria-Hungary	8.5-9
Germany	8.5
France	8
United States	7.5-8
Britain	7.5-8

The nations that launched these wars, especially Germany, Austria-Hungary and Japan, rate as somewhat more patriarchal than France, Britain, and the United States. This is an indication that, at least by this time, they had a higher level of V.

But just as overly high levels of V can ignite wars, so can a sharp loss of it can have devastating effects on a society. This is the explanation Biohistory gives for culture shock.

14. Culture shock

Lemming cycles can explain many historical events, including such matters as the timing of the outbreak of war in 1914, and of the Black Death in 1348. In all of these, *V* is treated as a trait that surges in a semi-regular fashion and by its level (high or low) causes events to happen.

But *V* is also influenced by the environment. One example, already given, is that the Mongol conquest of China in the twelfth and thirteenth centuries seems to have delayed the following *V* year by several decades, presumably because of the stress caused by the invasion. This is consistent with animal studies that show longer decline phases when the population is under severe predator stress.

But *V* can also be undermined directly when people suffer a dramatic loss of confidence. This is what commonly happens when a society is overrun by a powerful and alien civilization, such as when Europeans overran Mexico in the sixteenth century, or Pacific islands in the nineteenth century. Historians refer to this as 'culture shock'.³¹⁵

The effect is commonly made worse by the introduction of new diseases to which the locals have little immunity. Smallpox was likely the biggest killer in the Americas, while measles, influenza, typhus and other diseases also had a major effect.³¹⁶ Similar diseases affected Pacific islanders, with measles especially deadly, and dysentery also causing many deaths.³¹⁷

Culture shock can be explained as the result of a massive fall in *V*. It will be recalled that *V* is associated with energy, confidence, cohesive social relations, resistance to disease, and an interest in having children. It is reinforced by high adult status. All of these are inverted when *V* is lost. People lose energy, confidence and social cohesion, and become less interested in having children. They also have less resistance to newly introduced diseases.

Some societies more affected than others

Understanding *V* helps to explain why some populations were more affected than others. The islanders of the Marquesas in the Pacific, contacted by Europeans at the close of the eighteenth century, provide an extreme example. Marquesan population may have fallen by as much as 98% in a little over a century, and observers noted widespread ill health, alcoholism, social disorganization and demoralization.³¹⁸

By contrast, European diseases and other ill effects were much less deadly on other islands. For example, Tikopia suffered introduced epidemics but suffered much less of a decline. When Raymond Firth studied the island in 1928–29 and again in 1952, he found a vigorous society whose population threatened to outstrip the resources of the island. There was no evidence of the profound social demoralization seen in the Marquesas.³¹⁹

Tikopia's relative isolation may have helped to reduce exposure to repeated epidemics.³²⁰ But another reason is that Tikopia may have had higher *V* prior to contact. It had experienced violent conflict in the past, but had evolved into a cohesive society with political and religious authority helping to co-ordinate the entire island. This included measures to prevent overpopulation. The Marquesas were divided into warring communities with no island-wide

integration and no coordinated system to control population. Men were in political control on both islands, but Tikopian households were more strongly male-headed, and had more control of female sexuality. Marquesan society had more flexible household and sexual arrangements.³²¹

Central Mexico

The same applies to indigenous populations in Central and South America after the Spanish conquest in the early 1500s. Tlaxcala experienced a drastic decline in population, but likely somewhat less than that of the neighboring Valley of Mexico, the heart of Aztec power. Also, this decline was somewhat delayed, with an initial decline but relative stability for several decades until about 1575.³²²

Tlaxcala may have had higher V to begin with. It was a cohesive, mountainous state that had kept its independence against the much larger Aztec Empire which almost surrounded it.³²³ Also, as an ally of the Spaniards in defeating the Aztecs, it was able to maintain a greater degree of cultural continuity and self-government, which would have cushioned it to some extent from the demoralizing effect of conquest.

Further evidence for psychological factors comes from Tlaxcalan colonists who migrated to northern New Spain. Beginning in 1591, several hundred Tlaxcalan families established privileged, substantially self-governing communities on the northern frontier. Some of these communities increased rather than declined in population while much of indigenous central Mexico was in free fall.³²⁴ None of these populations were immune to European disease, but a higher level of V could make them more able to fight it.

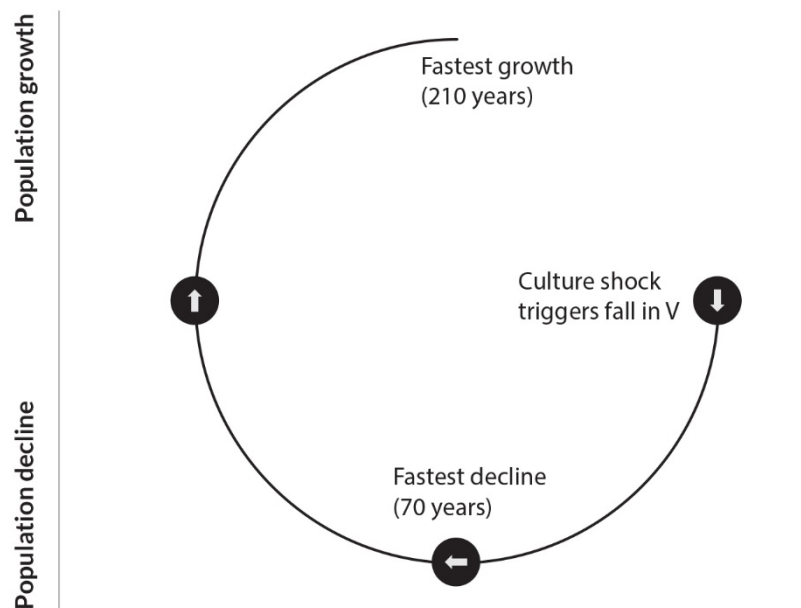
To the inhabitants of Pacific islands, or those of the New World, the arrival of Europeans left them feeling helpless and unable to control events. The certainties and beliefs of their own cultures were swept away, resulting in a drastic fall of V. This would clearly be more of a problem when V was already low. Societies with high V, such as Arabs and Indians, suffered no obvious culture shock when taken over by Europeans. And, of course, they were fully adapted to European diseases.

Culture Shock Launches a Lemming Cycle

Further evidence for the importance of V in understanding culture shock is the timing of the maximum impact. To the extent that disease is a factor, then the highest death rate should be felt very quickly. Those who survive will be relatively resistant, which they will pass to their children.

But if V is behind it, the greatest effect will be felt some decades later. This is because culture shock will have the effect of launching a lemming cycle at the point where V is falling fastest. Based on the analysis from previous chapters, in which longer cycles occur when V is rising, collapsing V should result in a shorter cycle, around 300 years. Thus, we might expect lowest V some 75 years after impact of culture shock. See Fig 12.1 below.

Fig. 14.1. Lemming cycle triggered by culture shock.



We have seen that lemming cycles lengthen when V is rising, so a society with falling V should have a shorter lemming cycle, around 280 years. What this means is the biggest effect on the population, leaving aside the effects of disease, should be seventy years after the impact.

This may be the reason for the Tlaxcalan figures, cited earlier. There was an initial drastic decline as a result of disease, relative stability until about 1575, and then a further steep decline. Seventy years from 1520 is 1595.

We can see this pattern in the Marquesas Islands, first visited by Europeans in 1791 but conquered by the French in 1842. The birth rate plunged after the conquest, then started a slow recovery after 1890. This is 50 years from impact, a little early for our model. But the death rate rose to an all-time peak of 65-70 per 1,000 population in 1911-23, significantly higher than in earlier decades.³²⁵ This is almost exactly 70 years after the impact.

Tahiti shows a roughly similar pattern, though its decline was less drastic and recovery started earlier. The birth rate began to recover in 1880-1900, some fifty years after the conquest. The death rate from disease was exceptionally high after first contact in the 1770s, slightly lower after the French occupation in 1842. And then rose to a further peak around 1920.³²⁶ Again, 80 years after the occupation.

These cases are useful because the French occupation gives a clear date for the onset of culture shock. Hawaii also experienced a lower birth rate and higher death rate after European contact, but there was no longer-term spike in the death rate.³²⁷ Hawaii remained effectively independent until the 1890s, by which time native Hawaiians were a minority in their own country.³²⁸

Recovery from culture shock

Another implication of this theory is that if culture shock launches a lemming cycle, a new V period might be expected after 210 years, which is three quarters the length of a standard cycle. There has not been enough time to observe this in the Pacific, and collapsing V across the world may well prevent this from happening. But Mexico shows evidence of such a pattern.

The onset of culture shock can be dated precisely for Mexico in the year 1520 when Hernan Cortes took Tenochtitlan and overthrew the mighty Aztec Empire. If this launched a lemming cycle, we should expect a new V year in 1730, and this is what we find. Demography alone, though very approximate for this period, shows a surge around 1750.

The Mexican population plunged in the century after the conquest, only beginning to recover after about 1650. Between 1700 and 1800 the rate of natural increase was between 5 and 15 per 1,000 population, leading to steady growth. This plunged in the early nineteenth century to between 0 and 10 per 1,000, before beginning to rise again.³²⁹

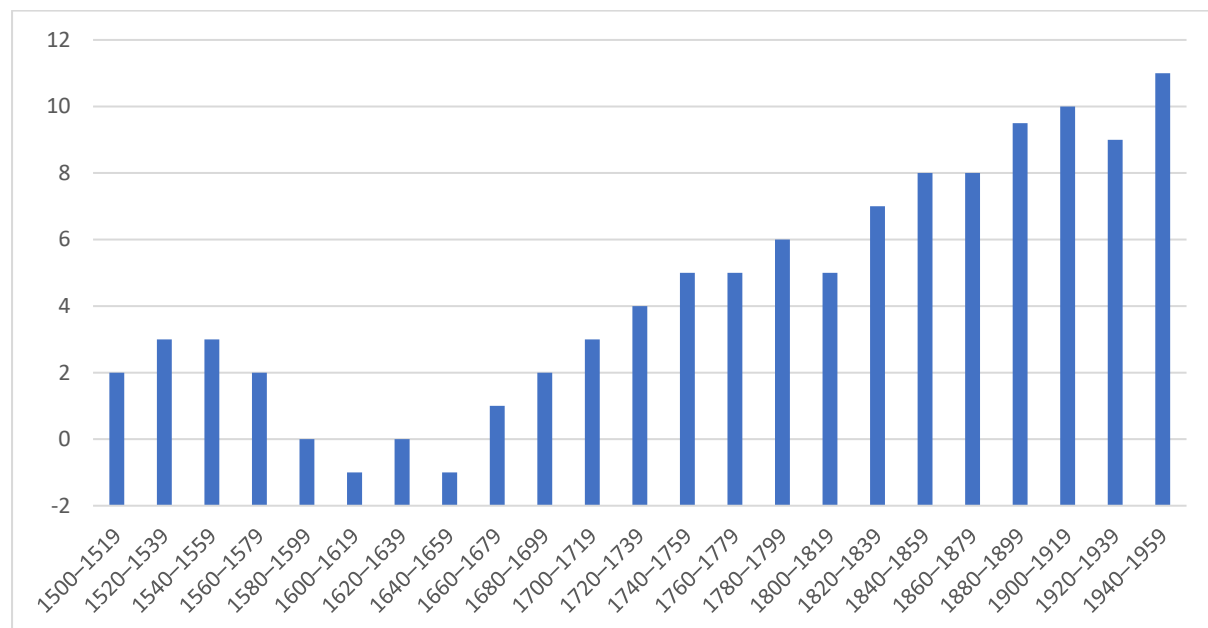
Even more interesting, in a 280-year cycle, 190 years from a V year we might expect a new V-90 year in 1920. The Mexican Revolution of 1910-20 is exactly the sort of conflict we typically find in V-90 periods, with shifting alliances rather than two discreet sides. Successive leaders including Francisco Madero, Venustiano Carranza, Alvaro Obregon, and Pancho Villa took power, only to see the coalition that supported them fall apart.³³⁰

Peru also shows a similar demographic pattern, with initial population decline changing to a short-term peak of natural increase of roughly 4 to 8 per 1,000 in the mid eighteenth century, a level that would not be reached again for almost a century.³³¹

Peru also went through a period of chaos in 1930-33 involving a coup, military juntas, rebellion, and the assassination of the President. The only comparable crisis was that of 1880-1895, after defeat by Chile and the occupation of Lima.³³²

By comparison, more accurate figures for Spain show peak rates of natural increase in the sixteenth and early twentieth centuries, with no evidence of a short-term peak in the eighteenth century.

Fig 14.2 Rate of natural increase 1500-1960: Spain³³³



In all three countries there is a long-term trend to faster population growth, but the patterns of fluctuation are different. Unlike what happened in the Roman Empire, Spanish lemming cycles do not seem to have been exported to Central and South America.

Further Research, and implications

We are currently attempting to duplicate lemming cycles in captive animals, using intermittent stressors such as cold and food restriction. Our initial experiments involve mice in relatively small cages, checking for epigenetic changes every two generations to look for an epigenetic cascade effect.

If this does not produce the desired effect, we will use a system of interconnected cages to create a more naturalistic setup, so that an entire community can interact. At present, we are not clear whether social interaction is necessary for lemming cycles to appear. It is possible, for example, that the tendency of animals in growth periods to form smaller territories has a long-term effect in increasing stress.

Mice are well suited to such experiments, as mice can breed as early as 6-8 weeks.³³⁴ An eleven-generation cycle might be completed in as little as two years.

We have also set about collecting samples from cycling lemmings in Canada, though this will take 3-4 years to carry through to all stages of the cycle. Researchers have been studying cycling populations intensively for decades, though they rarely take samples.

There would be considerable value in working out the physiology and epigenetics of V or V-90 periods, and attempting to create treatments to duplicate these effects. Among the

benefits would be increased resistance to disease, higher morale and confidence, and greater creativity. This project could run alongside other biohistory research efforts into the treatments that mimic the beneficial effects of mild food restriction of intermittent stresses.

Researchers interested in working on any of these projects may contact me through our website www.biohistory.org. Funding may be available for approved projects.

Jim Penman

October 2026

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