

Historical Mechanisms: An Approach to Transfer Scientific Categories to History

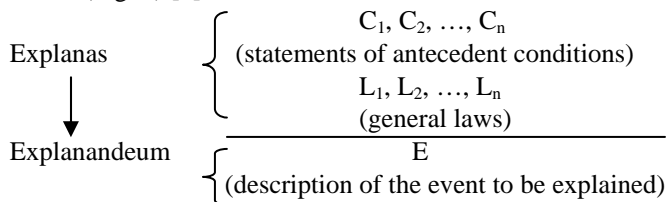
A. Boldt, *NUI Maynooth, Ireland*

Abstract—Historical Mechanisms allow rational analysis of world history under Unitarian views in its complexities and dialectical differences especially power structures and their conflicts. Apparent specialties relate themselves, after modifications of space and time without losing anything of their fascination. Following Goethe, the general exists out of many peculiarities but within peculiarities is always the general. Exceptions can be explained easier. Historical Mechanisms represent the unity of world historical processes which usually would fall apart with the enormous chaos of details. Naturally a Unitarian and absolute formula for world history still cannot be found. But the categories and metaphors from the natural sciences allow a better overview of historical processes. Detailed research is important as well, however, it needs to be located within world historical lines, and otherwise specific events cannot be understood in their full extent. In the article several metaphors and pictures will be presented which only serve for a better understanding of such processes and simplify them.

Index Terms—Historical Mechanisms, patterns, history, natural sciences, metaphor.

I. INTRODUCTION

THE idea to integrate natural scientific methods into history was suggested several times in the past. Suggestions by Carl Gustav Hempel (1905-97) for example, to integrate pure mathematical methods into history, I believe did not work. Most historians cannot deal with pure mathematical formulas, as the following example of Hempel, how to describe an event shows (Fig. 1) [1]:



A different example of placing too much mathematics into history is following description [2]:

Agent A was in a situation of kind X.
 When in a situation of type X, the thing to do is B.
 Therefore A did B.

Manuscript received October 9, 2013.

A. Boldt is with the German and History Departments at the National University of Ireland (NUI) Maynooth, Maynooth, Co. Kildare, Ireland (00353-87-6177770; e-mail: Andreas.D.Boldt@nuim.ie).

A historian cannot describe the complexity of history with these formulas. Natural scientific categories, however, can be used in order to recognize and understand repeating patterns, structures and processes within history. With this approach the categories cannot be viewed from a pure mathematical perspective or mechanical one in the sense of classical mechanics. They are pictures and metaphors in order to explain complex systems within history much easier. It makes it possible to recognize historical processes and patterns; the historian may be able to analyze present events and place them into the appropriate context. It needs to be stressed that following the theory of chaos, exceptions are allowed and not everything can always be predicted. Even in the natural sciences the scholar always lives between the general laws and laboratory experiments. History cannot be squeezed into mathematical formulas. The historian cannot predict the future like everyone else; especially the historian cannot predict when what will happen where. Through the patterns though, he is able to see a vague tendency. Historians do not experiment but they can use their experiences of the past in regards of the sequence of action and reaction, requirements and results. The simplest way to illustrate Historical Mechanisms is the use of examples from classical physics and mechanics: Man as a mass behaves like a mass. Individually as well as collective they never can be at the same place. Where they collide usually the one or the other side has to move or leave. If the two unite temporarily and mix, something new can develop. The three major forms of existence of mankind can be compared with the three states of matter: gas ('wildness'), fluid ('barbarism') and strength ('civilization'). For all three forms quantitative factors (number of molecules per space unit) decide the movements of molecules and the coexistence of matter, but it is also dependent of another coefficient: temperature. Even the Law of Inertia can be used for history: Major historic formations such as fascism and communism do not disappear suddenly after their collapse, but they will after major after-effects for a while afterwards.

II. CHAOS IN HISTORY AND THE COURSE OF WORLD HISTORY

Everybody remembers the first experiments of school physics with small compass needles or iron filings and a magnet. Depending how one moves the magnet the direction

of the needles change accordingly. If the pole changed suddenly from the positive into negative the needles then turn around and show in the opposite direction. Nevertheless in between there is a short moment of chaos, a short moment of new orientation.

Historians should not excuse themselves in front of modern chaos theorists for their different understanding of chaos because within history there was always a state of chaos. For history a primary and secondary chaos can be defined: All civilizations – with the exception of India which entails with their many Gods already chaos – described the world before their time and outside of their own culture as chaos and barbarism. ‘Primary chaos’ is the social-political state before and after a civilization with many similar factors that for members of a civilization everything from the outside remained not understandable, in particular the language of the ‘barbarians’, divided in uncountable tribes and ethnical units with their own language; so it seemed impossible even to learn even one single language of these ‘barbarians’. The ‘primary chaos’ is comparable with the natural state of Hobbes describing the moment before the development of a state. ‘Secondary chaos’ – often described as ‘feudal’ fragmentation – develops from the collapse of centralized power structures such as empires with new resulting states which fight against each other for their identity, definition and borders. All major power and civilization centers have gone through such phases of ‘secondary chaos’ usually known as times of anarchy or ‘Intermediate Periods’ (Egypt). The shortest and therefore giving the name to the concept can be found within Russian history with its ‘*Smuta*’ – ‘Times of Disorder’ – between the Rurikide and Romanov dynasties (1598-1613).

Structures of power are in world history horizontally (in exchange of expansion and collapse) as well as vertically (with the classical pyramid of hierarchy with social, political and military structures) everywhere and to all times the same, even though there are several varieties existing, because in every case at least one ‘specific’ factor can be found. The chaos theory presents the according metaphor of the ‘Butterfly Effect’: In theory the use of a wing of a butterfly in Brasilia can be the cause with several interacting events for a tornado on a different continent. The butterfly effect has its historical counterpart as the famous last spark which causes an explosion such as the events of Sarajevo on 28 June 1914 or those well-known famous ‘coincidences’ at the beginning of revolutions. In reality, however, there are no ‘coincidences’ in history. The most beloved sigh ‘If this or that would have happened differently then world history would have taken a different turn’ becomes pure speculation. It is something different if one asks for alternatives for the moments of decisions in order to find out why one decision succeeded and another one not. This can make the functioning of historical processes clearer. Very often we have the historical dialectic: victories become eventually the beginning for defeats, and defeats become the beginning for victories. The subjugated alternative from yesterday may succeed tomorrow or the day

after and may be more modified then. The history of power structures (for examples states and empires) and social-political collective-identities (for example parties) are full with examples – such as the German-Prussian history from 1806 to 1871, 1918/19, 1933/38, 1945, 1990, and on the other side Russian history from 1815, when it was after the defeat of France under Napoleon I the real victor on the continent, to 1856, 1917, 1945 and 1991.

As a starting point for an in depth analysis of political powers, an analogical picture from the optics, the spectral analysis, seems to be appropriate. A historical spectral analysis protects one of simplifying a fundamental dualism of good and bad. Instead of the reduction of complex realities with the picturing of black and white morality with according friend and foe thinking the spectral offers room for principally endless positions between the two extreme poles: During revolutionary times it is possible that political spectra widen towards the ‘left’, during counter revolutions towards the ‘right’. During the Russian Revolution 1917 the once left winged Bolsheviks (‘Cadets’, Mensheviks, social revolutionaries) moved suddenly to the right or towards the centre. Something similar happened during the Weimar Republic when the German People’s party (*Deutschnationale Volkspartei*) moved under the pressure of the NSDAP from the extreme right towards the centre.

Even a simple mathematical formula can serve as a metaphor: central parameters of quantity and quality – such as population and productivity, knowledge and discoveries, intensity of communication and the strength of weapon power – grew and grow exponentially depending on fluctuations of space and time:

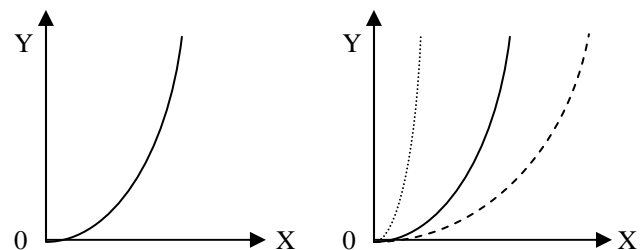


Fig. 2: Application of the formula $y=x^2$, on the right the increase to more exponentially: $y=e^x$.

Such a growth was regarded until recently as a sign of progress, nevertheless we realize today that such exponential curves as a formula for self destruction will run into infinity. Phases of increased growth usually mark long-lasting transitions of the pro-agrarian ‘wildness’ to the extensive agrarian ‘barbarism’ from around 8000 BC, and from there towards civilization. The more recent growth since the Industrial Revolution in 1760 is quicker (and more self destructing) than ever before. Due to the fact that human development went through highs and lows, within the last 10,000 years, marked more with the rise and fall of empires, financial crises or technical developments, it is possible to crystallize a rough development line. It is amazing to notice

that after the fall of highly civilized empires such as Rome, chaos seems to become greater and deeper. The higher the development of a civilization, the lower this can fall again. In today's sense this would have fatal results when coal and oil, as the major engines of our economy and society would diminish, we would fall back from an evolutionary point of view by several centuries of human history until a new development factor has been found. In mathematics this could be represented with differential, but not continuous differential function:

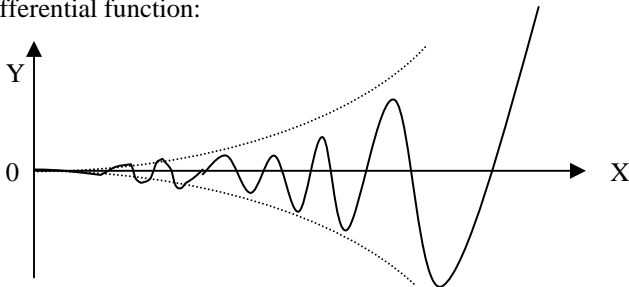


Fig. 3: Curve of human development in history shown simplified.

Contrary to the opinion of many historians who deal with Modern History, several hot spots of modern history cannot be explained just like that. The connections of events are much more complex. The Balkan states are the best example, whose problems today do not result from the nineteenth and twentieth centuries but reach back to the Roman Empire. Only with this approach it is possible to explain 'chaotic' events of modern times.

With the influences of events it is similar to probability calculation:

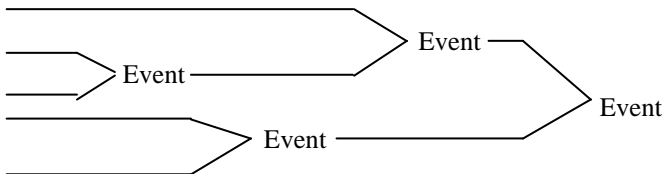


Fig. 4: Influences of events behave like the probability calculation. One event influences another one or several further ones. For simpler use I have only used two possible lines leading to an event, but it may have many more.

The turn of historical events is built on this system. So it is possible for some events in the past which we thought to be closed to have still their 'after pains' and influence even on events today. One example is the Balkans: the border of the Roman Empire after its split into East- and West-Rome in 395 went right through the middle of the Balkans. This border developed into a structural border which affects the Balkans until today.

III. THE RELATIONSHIP OF HORIZONTAL AND VERTICAL POWER

Power built itself up in concentric circles horizontally and thins up from the centre to the periphery, except an empire built fortified borders such as the Chinese Wall or the Roman

Limes in Germany. But even China and Rome had their vassal and clientele states behind the borders. Due to the horizontal structure of the power system a general rule can be found: The influences of power and civilization on land become less with increasing distance, roughly it can be said it decreased by square with the distance which can be best illustrated with a positive dot load. If geographical obstacles or classical peripheral regions (mountains, forests, wetlands, and deserts) are included the influence of power and civilization decreases more symbolically expressed with the third square. Just this factor of closeness or distance of civilization controls the history of every region.

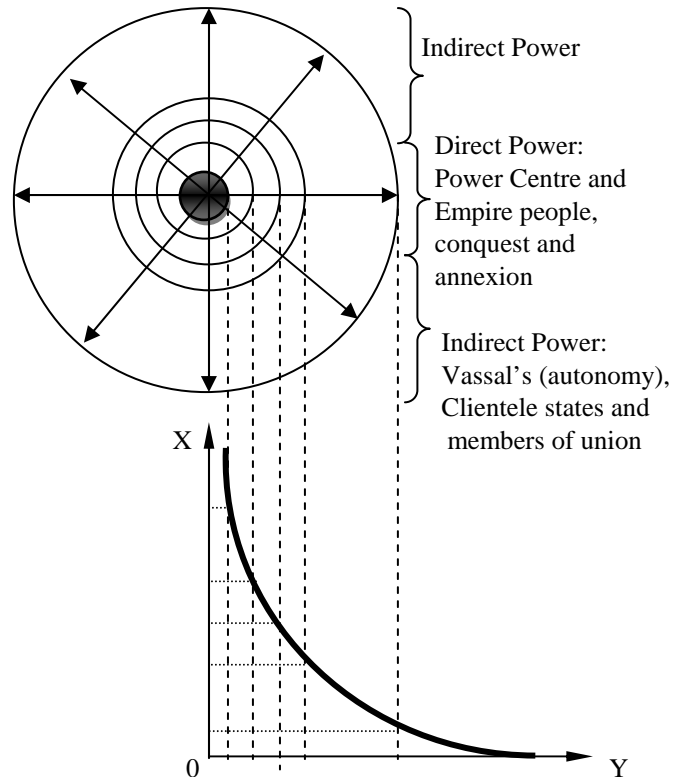


Fig. 5: The influence of a power centre can be illustrated best through a positive dot load from physical science. The power of the centre falls exponentially.

The logic of the sudden decrease of power in space comes from two areas of different power execution: direct and indirect reign. Direct reign of unshared sovereignty comes from the centre of the power centre and reaches to the region of the states people and their immediate neighbors and then to conquered and annexed provinces. Typical for direct and sovereign reign are taxes. Tributes on the other hand can be found in the indirect reign of vassal and clientele states – typically presented in concentric circles. On the other hand the strength of peripheral power spheres, which are further away from the power centre, continue to grow and they have themselves a direct reign over their own power region. All larger and smaller reign systems reaching from the Mongol Empire to African tribal kingdoms have a similar structure: hierarchical ordered governing districts of direct and indirect reign – for example on levels of provinces or with vassal and

clientele states – and it is a universal phenomena.

IV. RELATIONSHIP OF POWER CENTRE AND POWER VACUUM

A new power centre usually develops at first from a 'primary power vacuum' – tribes in a chaotic fragmentation of the Hobbes 'natural condition' at which there was always war at seasonal and appropriate times of the year. For the formation of a new power centre there are a number of possibilities: The strongest tribe reaches the hegemony and conquers all other tribes of the surrounding region. Another possibility is the partnership of several tribes in order to defend themselves and remain together afterwards – usually under the leadership of the strongest union partner, the *hegemon*. This is usually the name in the history of the Greek polis and usually it is the strongest partner who also gets the military supreme command. The third possibility happens when tribes become tired to fight for elementary goods (water, ground or resources) and come to an agreement to bundle their energies and fight against common enemies outside. At a later stage new power centers can develop from previous ones – usually they are located at the periphery of the old one.

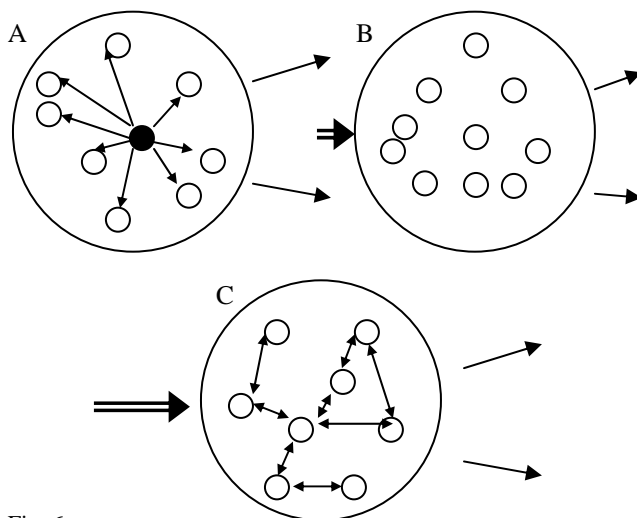


Fig. 6:

- A: A tribe conquers the other ones and becomes the new power centre. At a later stage follows the expansion.
- B: In order to defend themselves from an outside attack several tribes or cities amalgamate; at a later stage follows the expansion.
- C: Due to economic reasons several tribes amalgamate in order to demonstrate power to the outside.

Usually after one or two generations follows the expansion through to conquest. The people of the empire – also including closely related people – conquer foreign neighboring regions and annex them as provinces. Further more to the periphery follow vassal peoples which usually except the higher imperial reign after a defeat but they can keep their inner autonomy if they pay tributes and offer armies in case of war. Further on to the periphery the imperial reign ends with clientele states which remain independent. Sometimes a country is divided between two rival power

centers, such as Armenia between Rome and Persia in Ancient History or later between Persia, the Ottoman Empire and Russia (see also the Machiavellian dictum: 'The neighbor is the enemy. Therefore the neighbor of the neighbor is the natural ally.' Universal history functions after this mechanism – from Ancient History until today). Even though there is a general tendency of power influence becoming less towards the periphery military power of the centre can still be present there in the form of military fortresses.

As long as wars were lucrative due to tributes the blessing of the Gods or of Heaven protected the king; he possessed 'charisma' (Europe) or the 'mandate of the heavens' (China) and religious prestige: success is always right. Due to the fact that everything in history will come to an end the opposite of expansion – contraction and collapse – will hit every power structure sooner or later. Usually this starts with a military defeat at the periphery caused by large distances to the main centre and the overstretching of transport of reserves. After this the development turns around: With the charisma of success once gone and the banner of no defeats broken it will lead to less loots and tributes to keep followers happy. The search of faults escalates to inner conflicts, succession and civil wars split the ruling people and annexed provinces will rise to revolts against the ruling power. Vassal and clientele states will leave the bond and either become more independent developing an own power centre or they try to bond with a new and dynamic power centre.

New power centers were usually once previous minor cultures and located at the periphery, however had elements of civilization, such as the Celts and Germans. Succeeding states had to 'find' – to define – their borders. For the industrialized civilization the definition of borders is very problematic. One should not forget the fact that the climax of one power centre is always the low point of the other.

Older power centers decrease to power vacuums, new power centers usually develop around former peripheral vassals or soldier groups which try to take the power of failing power centers. The alternative to the conquest through a younger power centre in its full expansion is the decay into several after-states. The memory of the perished glorious empire lives on, until it will rise restored again after decades or even centuries – even if it is more modified from the ethical, social, political, religious or territorial levels. The 'Restoration' and 'Renaissance' of empires – in modern times even republics – indicate a circle in the historical process, on the change of unity and expansion, defeat and fragmentation. Therefore there is a correlation between expansion and defeat, crisis and agony: A power structure cannot win if it is split. Inner unity is the requirement for victories at the outside and defeats on the outside turn into crisis to the inside. The worse the defeat was the bigger the crisis will be.

Even industrialization could not switch off historical mechanisms – maybe modify it more – due to the fact that farmers are not the main contributing tax payers and therefore they lost their political as well as military influence. In modern power structures it happens more often that important

defeats at the periphery develop to major crisis – since 1789 also as civil wars or revolutions as the developments clearly demonstrate in France 1789, in Russia 1917 and in Germany and Austria-Hungary in 1918. In the same manner the downfall of the Second and Third German Reich, the Tsar and Soviet empire were similar: Battle of the Marne and Stalingrad on the one hand, Russian-Japanese War 1904/05, defeats during the First World War and the Afghan War on the other hand.

V. FORMS OF EXPANSION

Formulas of Classical Mechanics come into mind when dealing with processes of power policies. Power expands on the path of the smallest resistance – the same way as water which runs downwards. This can be illustrated by Russia – the largest continental empire in world history – which expanded into all directions with its permanent expansion. In general a slower and controlled expansion seems more promising than a fast one. Major empires, such as the Roman or the British Empires, could maintain their power status therefore much longer whereas a fast expansion leads to a quicker collapse. When expanding a power centre has not only to build up their power influence but construct also sufficient connection and reserve roads for armies. A too fast expansion cannot build up a sufficient safety net to maintain the control. Best examples are Alexander the Great, Napoleon and Hitler whose major empires collapsed within a short time period. The vector calculation can give the best metaphor:

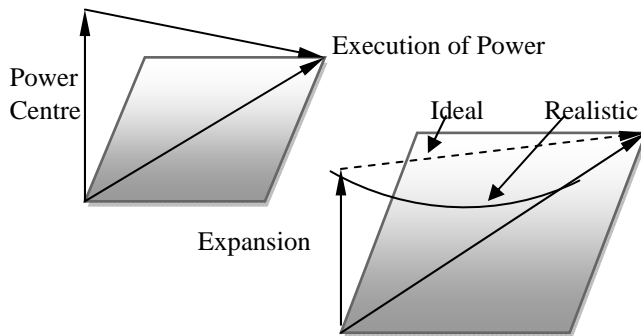


Fig. 7: Expansion illustrated by vector calculation and analytical geometry. On the left hand expansion with sufficient power influence and resource roads, on the right overstretching of the resource roads and insufficient power influence.

History shows that even ‘stable’ major empires will be inflated too much and the power centre with its population will not be in a position anymore to control the empire. Old and encrusted structures lead to a moment when the power centre cannot react to dangers accordingly anymore. This happened to the Roman Empire; the same happened to the British Empire because its main efforts were placed in overseas and the European continent, whereas the breakaway of the oldest colony, Ireland, started the development of the end of the empire.

VI. THE IMPORTANCE OF QUANTITY AND QUALITY

A nearly forgotten factor of differentiating states was given by Aristotle which is helpful in the analysis of complex historical and contemporary power systems. It affects the difference between quantity and quality to describe states: ‘One has to view the factors of each state on its quality and quantity. For quality I count freedom, wealth, education and nobility; under quantity I understand the superiority in numbers.’ So it can be understood that quantity is representing the population size and one can add also the territorial state; quality in modern understanding would represent freedom, economy (‘wealth’) and functional elite (‘nobility’) of a state or power. In connection with Einstein ($E = mc^2$) this situation can be formulated into a new formula rule:

Aristotle: *Quantity*: Population size; including today the territorial size of a state.

Quality: Functional elite, economy, education, social infrastructure, political and military structure of a state and what this one makes with it.

$$Power = Quantity * Quality^2$$

As a rough guide this formula covers wide areas of world history. Major empires are usually strong in quantity and quality – including Germany in the centre of Europe, when it was politically united with a central government no matter how structured (911, 1871, 1938, 1990). A major exception is Russia: It was several times strong in quantity, but every time when they tried, under strong efforts to reach the strength in quality of the usually so hated ideological west, it ended in catastrophes. On the other hand the effect of the square quality was able to raise the world position of small factors – city states, small territorial states in their ‘Golden Age’ (such as Portugal and the Netherlands) or small groups such as the Jews who had to deal, for the most part of their history without a state so literally without any aspect of quantity.

VII. BORDERS AND THE CENTRE

The general weakening of power and its execution at its edges highlights the role of border and periphery in history. We are so fixed centrally that the important role of the border always fades away. The border of each living organism is the skin. But borders are also always transitional and do not function through hermetical closure but through sensitively regulated transitions. The collapse of the Soviet Union is the most recent known example of self-destructive closure. Borders are never as rigid as we believe with our modern fixation of borders as lines in landscapes and maps. They are dynamical in space and time and they are often leaky: materials, people, goods and ideas diffuse. Borders may serve as linear and confronting fences, but they are also zones of transitions, mixture and exchange. The fate of all power structures from victorious expansion towards contraction and collapse through a deciding defeat was always decided at the periphery.

The difference between border line and border region becomes clear: the modern linear meaning is rigid, static and

often related to states. The older reality is looser, open, and vague and towards the periphery it becomes blurred without any precision of space and time. A better understanding can be provided from etymology. 'Border' ('*Grenze*') is one of the few German words having Slavic origins. As Tacitus reported of the Germans, '*Granica*' was purposely left inhabited space between tribes; it was 'wilderness', 'no-mans-land', natural isolation between usually neighbors fighting each other. Due to population increase and general demographic pressure these isolation areas disappeared slowly. The last remains of such a '*Granica*' between Poland and Russia is the wild forest region of Bielowize.

A very rough differentiation can be tried for orientation: The more civilized, structured and hierarchical a society is the more borders tend to become lines and marked with border stones. On the other hand borders became blurry between older societies.

Universal expansion grows through moving borders. The American historian Frederick W. Turner explained peculiarities out of *Democracy in America* written by Alexis de Tocqueville as the 'moving frontier'. Even being skeptical of some details the principle of the 'moving border' can be universalized: there are many 'moving borders' with structural self similarities – expansion of mankind anyway, but also the agrarian production, civilization, great religions, empires, industrialization and ideologies. 'Moving borders' as a universal phenomenon can also be described as 'edge cultures' which are located at the periphery of civilization. Peoples are directly influenced by civilization and recipe diffusing elements either through trade and religion at peace times or through war – Scythes, Thraces, Celts, Germans and Armenians formed edge cultures during Greek-Roman ancient times in the transition to evolve into civilizations.

Decreases in power centre 'edge cultures' can rise to new power and civilization centers and take over their predecessors: Persia, Hellas, Macedonia, Rome, America (as a New-Europe an edge culture of Old-Europe), Japan, the German Eastern border countries (Austria, Brandenburg-Prussia) and Moscow. Out of the 'moving borders' of the, at first extensive agrarian production grew the first civilizations at Nile, Euphrates and Tigris, later at the Indus. Once as marginal viewed peoples – barbarians – mutated through 'edge cultures' to own civilization and power centers and gave themselves in the 'cultural death' their civilization to the succeeding one: Egypt, Babylonia, Phoenicia, Crete, Hellas, Rome, Latin Europe, America, East- and Southeast-Asia. Something similar started with the Industrial Revolution when the economical centre of Western Europe moved from Italy-Tuscany to Flanders and Holland to England.

Where the expansion stopped for a longer time period and civilization differentiated deeply, a so-called 'Structural border' developed in Europe from West to East: the Roman *Limes*, the borders of the Carolingian Empire at around 800, the schism between Western Latinity and Eastern Orthodoxy in 395/1054 and the borders of Reformation and Counter Reformation 1517/1663. Out of this developed two

civilization, wealth, power and prestige gradients: the older one from South (Hellas, Rome) to North, the younger one since Caesar even, from West to East.

The classical South-North-gradient changed in modern history, certainly since the Industrial Revolution into a North-South-Gradient, which continued towards the South in Africa. The West-East-gradient on the other hand – increased with the French Revolution and Industrial Revolution – remained over the last two thousand years the same.

ACKNOWLEDGMENT

Encouraged through discussions with my previous professor for history at the University of Bremen, Germany, Prof. Dr. Imanuel Geiss (1031-2012) [3, 4, 5], my PhD-thesis on the German historian Leopold von Ranke [6] and several controversial discussions with history students in Bremen and Maynooth, Ireland, I considered the possibility to include natural scientific categories in order to explain historical processes. Especially the lengthy discussions with Prof. Geiss who suggested describing this method as 'Historical Mechanisms' were very fruitful and will never be forgotten.

REFERENCES

- [1] M. Hughes-Warrington, *Fifty key thinkers on history*, London, 2001, p. 151.
- [2] M. Hughes-Warrington, *Fifty key thinkers on history*, London, 2001, p. 154.
- [3] I. Geiss, *Europa – Vielfalt und Einheit*, Mannheim, 1993.
- [4] I. Geiss, *Geschichte griffbereit*, Dortmund, 1993.
- [5] I. Geiss, *Zukunft als Geschichte*, Stuttgart, 1998.
- [6] A. Boldt, *The role of Ireland in the life of Leopold von Ranke (1795-1886): The historian and historical truth*, Lampeter, 2007.

A. Boldt (Bremen, 28 September 1974) was educated in Germany and Ireland where he visited the University of Bremen and the National University of Ireland (NUI), Maynooth. He completed his PhD at NUI Maynooth in 2005 entitled 'Leopold von Ranke and Ireland'. The author's major field of study is history, modern history and historiography.

He worked for the last 15 years in the German and History Departments of NUI Maynooth, Ireland. He published *The role of Ireland in the life of Leopold von Ranke (1795-1886): The historian and historical truth* (Lampeter, England, Edwin Mellen Press, 2007; *Leopold von Ranke und Irland* (Stuttgart, Germany, Steiner Verlag, 2012; *The Clarissa von Ranke letters and the Ranke-Graves correspondence 1843-1886* (Lampeter, England, Edwin Mellen Press, 2012). His research interests lie in the area of general history, modern European history, historiography and environmental history.

Dr. Boldt is a member of the *Ranke-Gesellschaft* in Germany.