

The Rise of Modern, Industrial Society

The cognitive-developmental approach as a new key to solve the most fascinating riddle in world history

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The question about the emergence of modern, industrial society and the rise of the Western world remains unanswered. It is said to be the most fascinating research question across all social sciences. However, most theories lack the theoretical thoroughness to explain the decisive phenomena. The essay shows that the cognitive-developmental approach, as developed in my structure-genetic sociology, has the tools to explain why the Western World and not Asia developed the modern, industrial society and why the Western culture elaborated in the same period of time industrialism, sciences, enlightenment, democracy, and humanism. Three of these five dimensions of modernity are purely intellectual phenomena, even expressing cognitive-evolutionary trends. Industrialism and democracy appear to be expressions of institutional and intellectual phenomena. The essay demonstrates that the rise of formal operations, the cognitive maturation of people, is the decisive phenomenon, whereas the evolutions of the five elements are only the five fingers of this hand. The new approach can explain all relevant aspects equally. It is in the heritage of the classical theories of Comte, Weber, Elias, Habermas and some others, and breathes their spirit.

Key Words: Cognitive development; Formal operational stage; Industrialization; Modernization; Piaget; Cultural evolution; Cross-cultural psychology.

Introduction

In the preface of his new book *Civilization. The West and the Rest*, Niall Ferguson (2011) identifies the question into the causes of the rise of modern society in Western Europe as the most important question a historian could ever raise. There are social scientists who have stated that this is the 100-million-dollar question of the social sciences. This issue was the impetus behind my decision to start the study of sociology.

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The subject stood in the center of the life work of Auguste Comte, Herbert Spencer, Karl Marx, Max Weber, and some other classical authors. Besides, sociology started as a discipline in an attempt at explaining the rise of modern society (Comte, 1840).

Today and also in past generations, only a few authors have dedicated greater parts of their lives to this topic and have delivered deep-rooted and flamboyant approaches (Jacob, 1997; Jones, 1987, 1988; Macfarlane, 2000; Marks, 2002; Mitterauer, 2003; North, 1990; Oesterdiekhoff, 2005, 2007a,b, 2010, 2011a, 2012a, 2013; Pomeranz, 2001; Sanderson, 1999). Of course, there are not hundreds but thousands of books that have dealt with the subject. However, most authors only described the processes of modernization and industrialization, presupposing the descriptions would already entail the decisive explanations. Approaches on a more explanatory level, based on an interdisciplinary approach resulting in a comprehensive theory, are not only rare. They are missing to the present day. There has been no encompassing breakthrough with regard to this prime question of social sciences in the past generations.

Many social scientists seem to believe, at least implicitly, that the classical authors already explained the decisive phenomena, thus leaving no room or no reason for further research. But the classical theories are by no means systematic approaches. In fact, they can only be drops of wisdom in an ocean of ignorance. Others surmise this problem might be too difficult to allow any complete solution ever. They seem to be content with minitheories, based on a few facts, taken from earlier writings or their own work, facts of which they believe they would suffice to explain the entire phenomenon.

One can distinguish the approaches into two branches: those which emphasize the uniqueness of the rise of industrial society, and those which focus on its self-evident or quasi-automatic character. Many of the latter theories conclude

that the rise of industrial society is the “logical” or automatic result of a cumulative process consisting of an accumulation of capital, technologies, inventions and/or institutions over millennia. The rise of industrial society is seen as the inevitable outcome of the chain of agricultural revolution, population growth, the emergence of cities, states, and empires, the development of trades, commerce and division of labor, the accumulation of knowledge and inventions, and the continuous improvement of technologies. It could appear that at some point in this evolutionary process, extending over roughly 10,000 years, modern industrial society originates nearly automatically. Thus, one could conclude that there is no riddle and no extraordinary question behind the subject because the entire process is quite obvious and self-evident (see discussions in Oesterdiekhoff, 2005: 33-80; Sanderson, 1999). This idea is plausible and certainly contains an element of truth, but it is by no means a sufficient explanation.

The idea is too general to explain why solely Europe in the 18th century transgressed the demarcation line, and why not already Greek-Roman antiquity, Europe in the 17th century, or Asia in the 18th century. The theory of “cumulative progress” cannot answer these questions. This does not imply its complete falsehood, but it shows its limitations. The ancient Mediterranean, ancient China, and ancient India seem to have been the first civilizations that had either all or many prerequisites for industrial revolutions. They had empires, bureaucracies, world markets, huge population agglomerations, trades, commerce, technologies, banks, entrepreneurs, inventors, engineers, that is, nearly all the things industrial civilizations also have. The question is by no means answered why they did not complete the list of preconditions to originate the industrial society. Around 1600 or 1650, China, Japan, India, and Europe had more or less the same level of civilization and knowledge, technologies

and further preconditions (Landes, 1998; Pomeranz, 2001; Seitz, 1999; Spence, 1990). Joel Mokyr (1990: 213) maintained that since the 13th century China already had all preconditions for an industrial revolution. However, although Greek-Roman antiquity, and again China, Japan, and India around 1600, fulfilled several preconditions, something was missing that prevented their take-off. Why did only European nations succeed in starting the Industrial Revolution after 1750, whereas all other nations remained agrarian civilizations?

There is another useful criterion to distinguish the relevant theories. Social scientists have produced both theories that emphasize or contend the monopoly or the central importance of materialistic, economic, and institutional factors only, and theories that combine psychological and materialistic factors. I designate the first group of theories materialistic, and the second group socio-psychological (Oesterdiekhoff, 1993: 31-56, 1997: 9-45, 2005: 17-32). To the first group clearly belong Marxist, institutional, and economic approaches (as represented by Diamond, 1998; Elvin, 1973; Jones, 1987; Marks, 2002; Marx, 1967, 1970; North, 1990; North & Thomas, 1973; Pomeranz, 2001; Sanderson, 1999; Wallerstein, 1974; Wittfogel, 1957). The second group houses all those theories which emphasize the role of mentality changes and psychological factors, and try to combine them with institutional and economic factors (as represented by Comte, 1840; Elias, 1982; Habermas, 1976; Jacob, 1997; Landes, 1998; Lerner, 1958; Oesterdiekhoff, 2005, 2007a, 2010, 2011a, 2012a,b, 2013; Weber, 1987).

The first group isolates factors such as trade markets, capital formation, property rights, political system, colonialism, and class conflicts as decisive factors, the second group regards the growth of mind and the maturation of psyche as relevant or even prime factor, combining it with institutional processes. The first group usually treats

psychological phenomena or factors only as epiphenomena arising from material conditions of life, rather than as prime movers in history, as is most evident in Marxism. The important difference between the two types of theory lies in the causal significance that they attribute to changes in cognitive or ideational factors as opposed to physical or social factors such as poverty and class conflict.

1. Classical socio-psychological theories of modern society

Max Weber's (1987) theory of disenchantment of the world and of Protestant ethic belongs to the second group, being its most famous representative (though perhaps not its best one). Weber maintains that a rise of self-discipline, economic rationality, and readiness to accumulate capital preconditioned the rise of Western capitalism. The traditional or medieval mentality had favored low self-discipline, low foresight, and low rationality. According to Weber, the replacement of magic by scientific explanations was necessary to establish Western capitalism. Conversely, the enduring adherence of the Chinese to magic hindered their way to modern capitalism. The mentality of all Asian nations remained "traditional," expressing lower self-discipline and rationality, thereby preventing their capitalist transformation. Weber's theory implicitly uses a developmental approach with regard to psyche and cognition, whether he was aware of it or not (Habermas, 1976; Oesterdiekhoff, 1993: 265-302, 2011a: 25-39).

Weber's theory influenced Norbert Elias (1982) in formulating his theory of civilization. Elias worked out that social evolution consists of causal interrelationships between psycho- and socio-genesis. Psychogenesis means a maturation of psyche, a growing distance between children and adults in the course of history. Medieval humans stayed on childlike anthropological stages, whereas since early modern times Europeans surmounted these lower stages, attained adult stages, or became "civilized humans." Elias regarded the

psychogenesis of humankind, the attainment of psychological adulthood, as the decisive factor with regard to the rise of modern society. Elias' theory of psychogenesis actually bases on developmental psychology (Oesterdiekhoff, 2000, 2011b). This statement sheds light on the hidden kernel of Weber's theory, too. Elias relied not only on Weber but also on Comte, designating him as the only sociologist he really appreciates.

The assumption that the psycho-structural maturation of humankind is central to the rise of modern society is rooted in the ideas of the Enlightenment. Already Comte, in his *Cours de philosophie positive* (1840), regarded pre-modern man as staying on childlike stages and discovered in the psychological maturation of modern man the decisive cause (and "the organizing principle") to the rise of industrial society. James Mark Baldwin, Leonard Hobhouse, Karl Lamprecht, John Lubbock, and many other scholars shared this view and contributed similar approaches.

One of today's worldwide leading sociologists and philosophers, Jürgen Habermas (1976), took up these ideas. He elaborated developmental psychology, based on the writings of Jean Piaget, as micro-sociology in order to describe macro-sociological changes. He determined that pre-modern peoples persist on more child-like stages, whereas only modern peoples attained the higher stages. He regarded the lower stages of cognitive development as key to an understanding of pre-modern worldviews, physics, morals and law, whereas the higher stages account for the rise of modern sciences, ideas of the Enlightenment, modern law, and modern society. At the conference "Habermas and historical materialism" at the University of Wuppertal in March 2012, Habermas confirmed that today he still completely agrees with his ideas published in 1976 (personal communication). He said to agree fully with my consideration that the rise of modern society is not explainable without Piagetian theory,

that is, without developmental psychology. This is remarkable because none of the scholars who published in the last 50 years on the link between developmental psychology and social sciences mentioned or worked out the central role of psychological maturation in the rise of modern society. These include Charles Radding (1985), Christopher Hallpike (1979, 2004), Laura Ibarra (2007), and Donald LePan (1989). It seems that Habermas and myself are those who share this idea, thus being those authors who follow, improve, and enlarge the apparent or hidden developmental approach of Comte, Weber, Elias, Baldwin and others, emphasizing the role of developmental psychology to macro-sociology and to the explanation of the rise of modern society.

Next to Habermas, G. Dux (2000, 1989) imported Piagetian ideas to sociology. He carried out empirical research in developing countries, for example, regarding time experience, finding that peculiar forms of time experience are associated with the lower stages of cognition. Dux supported the combination of sociology and cognitive psychology by many projects and publications, emphasizing the change of worldview in early modern Europe. He views the breakdown of metaphysics as resulting from changing patterns of cognition. The new worldview, basing modern sciences and world understanding, could only arise as a result of a cognitive transformation. Thus, he understands the triumph of the modern worldview in terms of cognitive psychology. Besides, he focuses on the development of causality. Whereas ancient metaphysics emphasizes a form of causality whereby the origin entails already all elements that come into being, modern sciences understand causality as a network of interrelationships, whereby the result is not already a part of the origin but something new. Thus, Dux has done a lot in interpreting the transformation from metaphysics to modern views. He also analyzed the evolution of morals, based on developmental notions (Dux, 2004).

There are some remarks in the writings of Piaget himself (1950a, vol. 3), which express the role of the higher stages of cognitive development in the rise of modern society. This is by no means accidental because Piaget (1950a, with Garcia 1989) strongly worked out, in at least four books, that the highest stage, the stage of formal operations, directly accounts for the rise of modern sciences. Whoever considers the connection between childhood cognitive development and the child's growth of scientific thinking is not far from recognizing also the connection between cognitive development and the historical rise of science. Also Jean Ziégler (1968) regarded the rise of the higher cognitive stages as precondition for modernization. He viewed the persistence of lower cognitive developmental stages as main obstacle to the modernization of the developing countries.

My differences from Piaget and Habermas concern several points. One is recognition of the results of Piagetian cross-cultural psychology (PCCP). Both authors overlooked that these empirical results, collected since roughly 1932, have fully evidenced the fact of the child-like psychological status of pre-modern populations. These studies alone provide a sufficient empiric foundation to support a cognitive-developmental theory of the rise of modern society. PCCP and my structure-genetic sociology are the heirs of the classical socio-psychological theories of modernization. This is something that most sociologists have overlooked completely. Before starting this analysis and outlining a comprehensive cognitive-developmental theory of modern society, I close here the discussion of the classical socio-psychological theories and begin with the exposition of the materialistic approaches. By showing their limits and deficiencies, I will demonstrate the need for a cognitive-developmental approach as the prime theory of modernization and industrialization.

2. Materialistic theories of modernization and industrialization

Economic theories of both liberal and Marxian traditions tend to regard the rise of modern society as a simple result of capital formation. Classical economic theory views the Industrial Revolution as a result of investments in industrial technologies, made possible by savings from whatever sources. A poor society simply does not have the means to invest in industrial technologies, whereas societies surpassing certain levels of incomes and savings are going to become industrial societies (Oesterdiekhoff, 1993: 83-98, 202-229, 2005: 81-122).

This theory proposes that early modern Europe gained a sufficient surplus, but the Asian nations did not. They remained too poor to be able to finance an industrial revolution. Karl Marx (1967) saw in the trade capitalism 1500-1800 the mechanism to generate the profits that enabled European entrepreneurs to invest in new industrial technologies. The idea was that the Europeans dominated the world markets, absorbed the profits, exploited their colonies worldwide, and damned the other world regions to poverty by military force and economic exploitation. Immanuel Wallerstein (1974) maintained that Europe succeeded in dominating the world economy, becoming its center, and keeping the rest of the world at the periphery as suppliers of raw materials to the center. Thus, the capital flows between center and periphery caused further capital formation and wealth of the center, and poverty of the periphery. The consequence is the industrialization of the Western world and the non-industrialization of the rest.

The influence of these ideas on social sciences, politicians, and public opinion can hardly be overestimated. However, these ideas do not withstand critical analysis. First of all, trade capitalism is by no means a European invention in the period between 1500 and 1800. Trade capitalism in Asia and the Mediterranean is more than 2000 years old, but did not lead

to industrial capitalism there. In the 1500-1800 period Arabia, the Ottoman Empire, India, China, Japan and Europe all participated in trade capitalism. In this period the amount of Pacific trade capitalism exceeded the Atlantic trade capitalism considerably. But the Europeans dominated only the Atlantic routes, not the Asian ones. They took part in the Asian trades but did not dominate them. The Asians gained greater profits than the Europeans not only in the Asian trade, but with regard to global or total amounts. Around 1700, Europe was by no means richer than China, Japan, or India. China absorbed gold and silver from the European conquest of South America in exchange for silk and porcelain and grew potatoes earlier than the Europeans, thus fostering population growth (Chaudhuri, 1978; Frank & Gills, 1993; Landes, 1998; Maddison, 2001; Pomeranz, 2001). Although Asian entrepreneurs collected greater profits than their Western counterparts they did not succeed in financing any form of industrial technologies. The idea of the role of trade capitalism as precondition of industrial capitalism leads astray. The theory of world system, elaborated by Wallerstein and adherents, does not entail a true theory of the rise of industrial society (Oesterdiekhoff, 2005: 81-123; Pomeranz, 2001).

The GNP of China, Japan and India was not lower than that of Europe around 1700. According to some computations China alone had a higher GNP than the whole of Europe up to 1840 due to its larger population with similar per capita income (Maddison, 2001). Asia housed rich entrepreneurs, banks, and fortunes, which exceeded the European means at that time. Thus, the theory of savings and investments, capital formation and trade capitalism, whether originating from liberal or Marxian traditions, cannot be correct.

The theory of property rights is a child of liberal economic theory. Especially North and Thomas (1973)

elaborated this theory as an explanation for the rise of industrial society. They maintained that insecure and attenuated property rights do not allow the accumulation of fortunes. Wherever kings and dictators, robbers and warriors have the opportunity to absorb any riches, societies are damned to enduring poverty. They surmised that this had been the case with Asia, thus following ideas of Adam Smith (1776), Karl August Wittfogel (1957), and others. Kings of an absolutistic character, as the Son of Heaven in China and the Sultan in the Ottoman Empire, prevented the middle classes from becoming rich entrepreneurs. Moreover, the collectivist character of these societies, manifested by clans and village societies, blocked any possibility to accumulate private fortunes. North and Thomas proposed the establishment of secure private property rights in the Western world as the decisive cause for the rise of industrial society. Political control of king and government by parliament and society is part of the process of securing the property rights of entrepreneurs (North, 1990; North & Thomas, 1973).

The origins of the property rights theory in the classical theory of savings and investments are obvious. It presupposes a direct link between property rights, capital accumulation, and the Industrial Revolution. Only the Western nations had safe private property rights. Therefore only they allowed the accumulation of capital and thereby the Industrial Revolution. This theory assumes a direct link between a certain threshold of wealth and the start of industrial society. Only safe private property rights make attainment of this threshold possible. Conversely, the theory maintains a direct connection between restricted or insecure property rights, poverty, and non-industrialization. It regards Asia as the empirical proof of this idea. Thus, North and Thomas elaborate on the same idea that had already been at the center of Wittfogel's theory.

However, China, Japan and India were not poorer than Europe, neither in the Middle Ages nor in early modern

times. Therefore the non-industrialization of Asia around 1800 cannot be blamed on poverty. Asia failed to industrialize although it provided the same amount of capital as Europe did, or even more. This implies that capital formation in Europe was not the decisive cause of its industrialization.

The whole idea that property rights had been safer in Europe than in China is wrong. In early modern times, China had individual property rights, free markets, and free enterprises to a high degree. China had free markets for land, labor and capital. Farmers could enlarge their holdings by purchase of land and employ additional workers, if they had the means to invest. Workers, peasants and land had probably been more restricted in France and Germany than in China. China housed enterprises with a 1000-year history, large banks, and huge private fortunes (Oesterdiekhoff, 1993: 180-219, 2001, 2005: 81-123, 2007a, 2007b: 278-303; Pomeranz, 2001: 81, 106f, 167, 170, 288).

Another widespread idea is that Europe's political system favored inventions, whereas Asia's systems prevented them. European inventors could migrate to other countries to find supporters and to work independently. Political and religious authorities could not hinder inventors systematically because inventors could choose among hundreds of territories and patrons to work. In China, however, the absolutistic monarchy controlled all inventions and inventors, thus lowering frequency and quality of inventions. This theory envisions a direct link between political systems, rate of inventions, and industrialization (Jones, 1987, chapter three; Landes, 1998, chapter four; North, 1990; North & Thomas, 1973). But China, Japan and India had at least the same amount of inventions as Europe had. China was probably the most powerful inventor since antiquity up to 1600. Thus, the whole theory is in the wrong. The technological differences between Asia and Europe appeared mainly after 1640. Only Europe but not Asia was successful in the invention of

industrial technologies, but this difference did not result from a long history of differences in invention rates (Mokyr, 1990; Needham, 1969; Oesterdiekhoff, 2005: 81-147; Pomeranz, 2001). The difference stems mainly from the rise of the physical sciences, which was confined to the West. This difference appeared for the first time after about 1640.

Thus, the economic and sociological theories fail to explain the industrialization of the West and the non-industrialization of Asia and antiquity. They do not focus on the real differences. What, then, are the truly important differences that distinguish the industrial Europe of 1840 from the non-industrial Europe of 1700, the ancient Mediterranean, and Asia from antiquity to 1840? They all had huge population agglomerations, large cities, bureaucracies, traffic systems, international trade, division of labor, elaborate technologies, banks, companies, inventors and entrepreneurs almost all things nations need to establish an industrial society. But only Europe in 1840 had functioning steam engines and railways, which drove the first industrial breakthrough from its start up to 1870.

These are the differences at first sight. They mark the watershed between agrarian and industrial civilizations. The origin of these first industrial key technologies has nothing to do with extraordinary problems regarding savings and investments, labor costs or shortcomings, property rights and political systems, class conflicts and other economic or social phenomena. There was no Son of Heaven, Emperor, or Sultan who would have hindered the development of such technologies in Asia or ancient Rome. Emperor Frederic the Second or Charles the 5th would not have stopped such technologies. All pre-industrial civilizations had the property rights, savings, political systems, and all other social and economic prerequisites to develop such industrial technologies (Snooks, 1994). This consideration finally leads to the real causes behind the apparent differences: These

societies simply did not have the knowledge to create steam engines of the quality of Thomas Newcomen or James Watt. The steam engine is not the result of craftsmanship and practical knowledge. It is a direct result of the new physical sciences. James Watt was a leading scientist of his time with a profound knowledge of physics, chemistry, mathematics, and metallurgy. He corresponded with leading chemists of his time. Without this knowledge he would not have been able to create such a machine (Jacob, 1997: 117-121). His steam engine was far beyond the scientific capabilities and technological achievements of all other cultures and regions mentioned. Moreover, the physical sciences originated in Europe especially after 1700, whereas China, Japan, and India did not develop them, according to the researches of Joseph Needham (1969), Joel Mokyr (1990) and many others. This implies that the origination of the physical sciences, restricted entirely to modern Europe, made the difference between non-industrial civilizations and industrial Europe. Margaret Jacob (1997) detailed this wonderfully in her book about this subject. But I will demonstrate that the rise of the physical sciences is only a manifestation of the psychogenetic maturation of Europe's intellectual elite during the 17th century and later.

3. Socio-psychological and materialistic theories in comparison

Some economic historians insinuated that economy and sociology cannot explain the start of modern, industrial society (Snooks, 1994). Perhaps the rise of industrial society has neither social nor economic causes. W. W. Rostow saw the scientific revolution as the main cause of Europe's Industrial Revolution (Mokyr, 1990: 167), also Joseph Needham (1969). David S. Landes (1969) regarded the replacement of the primitive mentality (as described by Lucien Lévy-Bruhl) by rational modes of thought as the main cause of the Industrial Revolution. More recently Landes (1998, chapters 14 and 24)

pointed to cultural factors and Europe's scientific revolution as the main causes of the divergence between Europe and Asia. This idea of one of the best-known economic historians is already close to my cognitive-developmental approach, especially when considering that Lévy-Bruhl's theory is a main part of it. In short, the Industrial Revolution originated in industrial technologies, these again stem from the new physical sciences, and the new sciences emanate from cognitive evolutions that emerged in the intellectual elite of early modern Europe for the first time in history, as I am going to describe. Thus economic history, and specifically the history of the rise of modern industrial society, requires a theory that describes both the cognitive evolution that gave rise to the emergence of formal operations, and its main product, the rise of the physical sciences after 1640.

This does not mean that the steam engine is the decisive cause for the rise of industrial society. If this were the case, the south of the planet would have joined into the Industrial Revolution and modern society already in the 19th century. Karl Marx, for example, believed this was happening in India in consequence of the import of railways there. But modern society consists not only of technological advancements. These are not its foundation and engine. Modern society is the outcome of several evolutions, mainly *industrialism*, *sciences*, *enlightenment*, *democracy*, and *humanism*. Any theory of modern society must be able to explain their nature and their interrelationships. All these five evolutions appeared at roughly the same time in the same world region, namely in Europe and North America after 1700. Their co-evolution at the same place during the same time cannot be regarded as accidental. It appears unlikely that they originated in consequence of one of these factors, for example, in consequence of industrialization. It would also be hard to contend that some of these five elements originated as secondary or ancillary phenomena only. None of them is an

epiphenomenon of any other. They are not separable into some that are unimportant or secondary and others that are the prime movers. They are not divisible in *base* and *superstructure*, as Marx called them. The first indication of their shared relevance is their common origin in the same time and place. This would be unlikely unless the five phenomena are deeply interconnected. They stem from the same source. Whoever finds this common source has found the real roots of modern, industrial society.

Thus, we need to analyze these five phenomena more closely. *Sciences*, *enlightenment* and *humanism* are purely cognitive and intellectual phenomena. As intellectual phenomena, all three express evolutionary trends toward more rationality, more intelligence, more humanity, and more morals. The surpassing of superstition and ignorance by sciences and enlightenment, and of barbarian practices, slavery, and disgraceful social living conditions by humanism match to cognitive transformations from lower to higher stages, as described for childhood cognitive development by Jean Piaget (1932, 1950a,b, 1959). *Democracy* and *industrialism*, however, include both institutional and intellectual phenomena. If the physical sciences made the introduction of the first industrial technologies possible, as demonstrated, then the dependence of industrialism on intellectual factors is sufficiently evidenced. Moreover, industrialism constitutes an enduring endeavor to improve economy, wealth, and living conditions. This requires increased professional abilities, thereby not only expressing, but driving cognitive-evolutionary trends. The authors of Enlightenment, John Locke, Charles de Montesquieu and Jean-Jacques Rousseau, based democratic principles and institutions on the idea that they express greater rationality, morals, and humanism. The invention and introduction of democracy then does not stem from an accidental coincidence of class relations and class conflicts, of any economic or sociological balance of powers

or constellations, as some authors surmised at least implicitly (Moore, 1969). Democracy embodies higher levels of social interactions, self-awareness, moral demands, responsibility, dignity, claims to communicate on higher social levels, that is, it manifests higher stages of social relations and moral development. Democracy requires and further promotes a moral and intellectual maturation of humankind. That is what the Enlightenment authors said and what politicians, especially in the USA, announce and address at every opportunity. At a deeper level, the same conclusion has been reached by the cognitive-developmental approach. Democracy originated from “morals in evolution” (Hobhouse), not from class conflicts or accidental social constellations.

Thus, all five evolutions are mainly cognitive-intellectual evolutions. They all represent processes of cognitive maturation, the attainment of higher stages of physical, social, moral, and political reasoning. It would be strange to acknowledge the intellectual character of *sciences*, *enlightenment* and *humanism*, but to deny this with regard to *industrialism* and *democracy*. It is apparent that all five are manifestations of the same source. The common source can only be the cognitive maturation of humankind, the attainment of higher stages of cognition and intelligence, the transformation from childlike to adult stages of psyche and cognition. Thus, the cognitive growth in Europe after 1700 is the hand, and the five evolutions are the five fingers of this hand. Their common origination at the same place during the same period of time would be extremely unlikely without this coherence.

At this point of analysis, the greater explanatory power of socio-psychological theories in comparison to materialistic theories becomes obvious. Although the theory of Max Weber has not the means to deal with these coherences and phenomena, it is apparent that the “spirit” of his theory of

capitalism and rationality is close to the theory I am going to unfold here. At a first glance, the neighbourhood of my theory to the civilization theory of Norbert Elias is at hand. Elias (1982, 1984) regarded the rise of modern civilization, of the higher levels of communication and interaction, and of the modern sciences as the result of the psychogenetic maturation of the Europeans. He had no specific theory of the rise of industrial society, democracy, and enlightenment although his work entails a more or less explicit theory of the rise of sciences and humanism. My above expositions breathe the spirit of the civilization theory of Norbert Elias, although Elias never reflected about the entire set of phenomena and their deep coherences. I will show below that the cognitive-developmental approach is superior to Elias' theory in describing this cognitive maturation in general and in describing the five evolutions in detail.

The theoretical relationship to the theories of Comte, Hobhouse, Baldwin, Lamprecht, Habermas and others is obvious, but none of these authors knew about the empirical research conducted in the frame of Piagetian cross-cultural psychology (PCCP). Only based on its concepts and instruments is it possible to develop a fundamental theory of the rise of modern society in general and of the five evolutions that characterize modernity, in detail. Before I will illuminate the psychogenetic foundations of the five evolutions, I have to outline the main results of the developmental approach and PCCP.

4. The cognitive-developmental approach as successor of the classical sociological theory

Norbert Elias kept Jean Piaget and Lucien Lévy-Bruhl in high esteem (Weiler, 2011), and Jürgen Habermas reconstructed sociological theory based on the Piagetian approach. Classical sociologists such as Comte, Spencer, Hobhouse and Elias regarded the psychogenetic maturation from childlike to adult stages of humankind as prerequisite to

the rise of modern society. Scholars such as Karl Lamprecht, Hermann Schneider, Felix Krüger, Charles Blondel, John Lubbock and others shared this view. Nearly all (!) child psychologists of the first two generations of developmental psychology knew about the similarities between children and pre-modern man, so for example J. Sully, Henri Wallon, W.T. Preyer, Édouard Claparède, Pierre Janet, Stanley Hall, William Stern, E.R. Jaensch, James Mark Baldwin, Wolfgang Zeininger, Heinz Werner, and Jean Piaget (Wallon, 1928; Werner, 1948). Conversely, ethnologists relied on these approaches, thus appropriating a theory about the nature of pre-modern man (Allier, 1929; Blondel, 1926; Murphy, 1927). These ideas stood in the center of the pre-war social sciences and formed their spirit. Not ancillary scholars adhered to these ideas, but great men of these disciplines contributed to them. Especially the Twenties and the Thirties of the past century knew dozens of great scholars, still famous today, who delivered decisive data on the correspondences between ontogeny and history (see references in Jüttemann, 1991). “The topos of the childlike nature of ‘savages’ runs as a constant thread through 19th-century literature and continues well into the 20th century. Numerous writers held to this assumption, among them early writers on child psychology such as Preyer, Sully, and Stern, who often made comparisons between savages and children.” (Jahoda, 2000: 229)

After 1945 authors such as Christopher Hallpike (1979, 2004), Laura Ibarra (2007), Charles Radding (1985), Jean Ziégler (1968), Günter Dux (2000), Jürgen Habermas (1976), Georg W. Oesterdiekhoff (1997-2013), Donald LePan (1989) and some others followed these traditions. But these contributions no longer belong to the center of attention and research interests. Most social scientists have never heard about these researches or have only a very scanty knowledge of them. In pre-war sciences, however, these considerations had often been held as the foundations of all social sciences

and all humanities, especially by the leading scholars in these fields. The theory of psychogenesis was at the center of humanities and social sciences from the Age of Enlightenment up to 1945, to a lesser degree up to 1975. Due to anti-colonialism, student revolt, and damaged self-esteem of the West in consequence of the World Wars this theory as the mainstream spirit of Western sciences and public opinion declined gradually. Several waves of ideological clearances removed this theory from the public scene. The strongest wave of ideological attacks came after 1975/1980, carried by a generation change during the spread of the mass universities. The new ideologies *cultural relativism* and *universality of rationality* conquered sciences and public opinion so thoroughly that today's scientists and intellectuals no longer know about the dominant role of the theory of psychogenesis in earlier times and are unaware of the empiric results supporting it. The ideological purge had a total and sometimes totalitarian character.

In my opinion the theory of psychogenesis, influential or prevailing from 1780 to 1945/1975, is in the right, whereas today's leading ideologies are in the wrong. The prevailing spirit of our time and of present-day social sciences is based on false assumptions. The current situation is comparable to the situation of the social sciences in the Soviet Union 1917-1990 or of the Hellenistic sciences in the Roman Empire. Roman intellectuals no longer understood the superior contributions of the Hellenistic scholars, and Russian sociologists could understand social issues only in the straitjacket of Marxian ideology. Who are the authors who empirically refuted the theory of psychogenesis? Critical analysis shows that the empirical refutation of the theory of psychogenesis has never taken place. In consequence, the current spirit of our social sciences and humanities relies on errors.

The empirical research, conducted during the whole

dominance of the two ideologies, continued in delivering empirical evidence supporting the theory of psychogenesis. This research falsified the theories of *cultural relativism* and *universality of rationality*. Social sciences and humanities have developed two procedures to examine the cognitive and psychological levels of humans, namely psychometric intelligence research and the cognitive-developmental approach. There are no other reliable and valid measurement instruments to decide about relativism, universalism, and psychogenesis. Their answers to the questions have been unambiguous from the beginning, that is, for the last three or four generations. Psychometric intelligence research discovered rising intelligence test scores in all industrializing and industrialized countries for more than 100 years. This phenomenon, known as Flynn effect, concerns all European and American nations for which test results are available. Today it is observable across all or nearly all modernizing nations for which test results are available. Hardly any nation is immune to the phenomenon of rising intelligence. Every pre-modern or early modern nation has or had average IQ scores below 75 according to present-day norms. Every European or North American nation before 1930 had scores below 75. These low levels characterize all pre-modern and traditional societies, whether they are peasant societies, agrarian civilizations, backward underdeveloped regions, or tribal societies. Japan, China, Southern and Eastern Europe 80 or 100 years ago scored more or less around 50 according to modern norms. Conversely, research never found a modern industrial nation with such low scores (Flynn, 2007, 2008; Irvine & Berry, 1988; Oesterdiekhoff, 2009a: 82-97; 2012a,b; Oesterdiekhoff & Rindermann, 2007, 2008).

Exposure to modern culture, especially to modern school systems, seems to be the most decisive cause of the IQ gains. Without considerable schooling humans never gain

abstractive and deductive reasoning abilities (Barber, 2005). Intelligence is by no means at the same level across cultures and history. It had been very low across all pre-modern cultures and has increased only during the recent process of modernization. Obviously, in every culture intelligence increases during childhood, too. Children and youths score lower than adults on adult intelligence tests. In contemporary modern culture, children aged 8 years score around 50, youths aged 13 around 75. Test psychologists found that people in various pre-modern cultures fail to attain intelligence test scores beyond those that are typical for children in the sixth, seventh, eighth or tenth year of life in fully modern societies. Their intelligence growth curve levels off in late childhood whereas in modern society, intelligence rises up to age 15 or 20. One frequent finding in countries with very low levels of “human development” is that IQ deficits relative to the advanced countries in which the tests have been normed (usually UK and USA) are small in young children but become greater with advancing age to at least age 17 or 18 (e.g., Khaleefa et al, 2010). These IQ declines with age are usually attributed to poor quality of schooling and additional cultural factors (Carothers, 1972).

For more than one hundred years, intelligence researchers found that the “mental age” or “developmental age” of pre-modern adults typically corresponds to that of children in the sixth to eighth year. Therefore they have always compared the mental achievements of pre-modern peoples with those of children. Philip Vernon (1969: 214) stated it this way: “... their reasoning capacities remain similar in many ways to those of younger children.” Whereas pre-modern humans usually attain a developmental age of six, eight or ten years by today’s standards, modern humans reach mental or developmental ages of 13, 15 or 20 years. The differences between pre-modern and modern humans usually amount to between 5 and 10 developmental years. In sum,

the whole psychometric intelligence approach of the last 100 years has evidenced the theory of the childlike mentality of pre-modern man and the cognitive maturation of humankind. Remarkably, the Flynn effect has become well known during the period in which the new ideologies conquered the sciences, displacing the theory which alone can explain the empirical data around the Flynn effect.

James Flynn backed his new book by a mass of Piagetian data, thus combining the psychometric and developmental approaches. "I want to say that Georg Oesterdiekhoff brought a Piagetian interpretation of the past to my attention." (Flynn, 2007: 82) The cognitive-developmental approach confirms, explains, enlarges and improves the cross-cultural intelligence results. The empirical facts described in the frame of Piagetian cross-cultural psychology (PCCP) have completely evidenced the psychometric results just mentioned. Jean Piaget developed the most elaborated theory of cognitive development from childhood to adulthood, but only detailing what other child psychologists also have said. The first stage, the sensory-motor stage, is replaced by the pre-operational stage with the 18th month of life. The second stage conveys the development of language and reasoning. The third stage, the stage of concrete operations, implying logical relationships between objects, unfolds between the sixth and the tenth year in modern culture. The fourth stage, the stage of formal operations, elaborates stepwise between the tenth and twentieth year, but only in modern cultures. The stage of formal operations manifests combinatorial, abstractive, deductive, experimental, and theoretical abilities. The adolescent stage replaces the mythical-magical worldview of childhood by the causal-empirical and rational view. Humans on different stages experience themselves, social affairs, logical relations, nature and morals in very different ways. The stages are cognitive cages that govern the material understanding of the world and regulate behavior and

practice. Humans on different stages differ not only by different reasoning abilities but by different ways to be humans. They are humans staying on different anthropological stages (Piaget, 1950b; Piaget & Inhelder, 1941, 1958, 1969).

Thousands of empirical surveys across all relevant social milieus, cultures, nations and continents have been conducted in the framework of PCCP since 1932 up to now. This research demonstrated the universality of the sensory-motor and pre-operational stages across all cultures. The concrete operations do not develop completely in pre-modern populations but only partially, both with regard to percentages and tasks, if they appear at all. The pre-operational stage seems to be the dominant stage in most primitive societies, as already Piaget maintained in his early writings. The stage of formal operations is restricted to modern, industrial society. This implies that the formal operations evolved only once in history. They evolved in the intellectual elite of early modern Europe and slowly spread to other milieus. 50-70% of adults in the most advanced cultures of today distribute on sub-stage A of formal operations, whereas 30-50% stay on sub-stage B (Mogdil & Mogdil, 1976, vol. III: 149; Schröder, 1989).

The prevalence of the lower stages among pre-modern humans concerns all forms of logic, self-understanding, social subjects, physical issues, and moral topics, according to all the data collected (Ashton, 1975; Dasen, 1974, 1977; Dasen & Berry, 1974; Eckensberger, 1979; Ember, 1977; Hallpike, 1979, 2004; Havighurst & Neugarten, 1955; Lurija, 1982; Oesterdiekhoff, 1997, 2000, 2006, 2009a, 2011a, 2012a,b; Poortinga, 1977). The most comprehensive collections of data and their most elaborated interpretations stem from Hallpike by two and from Oesterdiekhoff by ten books. The ethnologist Hallpike was the first to combine PCCP with ethnology, determining that Piagetian theory delivers the

tools for interpreting the ethnological data about thinking and worldview of pre-modern peoples. I developed the theoretical framework called “structure-genetic sociology” that aims to transfer the results of PCCP to the humanities and social sciences. All humanities and social sciences need to be reconstructed on this new theoretical basis and to re-interpret the history of societies, social change, evolution of modern society, history of religion, sciences, law, morals, politics, manners, and everyday practices. In my ten books about the subject I have completed a great deal of that work. Some authors such as Jürgen Habermas (1976), Laura Ibarra (2007), Günter Dux (2000), Donald LePan (1989), Jean Ziégler (1968), Charles Radding (1985) and others worked in the same direction.

With regard to anthropological conclusions, PCCP fully confirms the psychometric data. Modern humans staying on sub-stage A distribute on developmental ages between 10 and 15, on B between 15 and 20. Humans staying on half-developed concrete operations, without any formal operations, distribute on developmental ages between 6 and 12. Humans largely staying on the pre-operational stage are in developmental ages between 5 and 8. “In this respect the performance of traditional peoples is closely paralleled by that of young children in industrialized countries.” (Gellathy 1987: 37) PCCP discovered or isolated the same causes for the arrested development as psychometric intelligence research did with different methods.

This is what Jean Piaget himself had described since the beginning of his writing in 1922. In all his books are uncountable remarks on parallels between children and primitive peoples and ancient philosophers. He did not find any phenomenon among children without equivalent in pre-modern peoples. Thus, according to Piaget, all phenomena that characterize the psyche of children also characterize the psyche of pre-modern peoples. He himself explained

repeatedly the parallels by saying it would be quite normal that all humans have to go through the same stages. This remark is right but not sufficient.

The procedure of Piaget is by no means the only one. Heinz Werner (1948) described in a book, famous in Germany, the USA and elsewhere up to about 1970, the parallels between children and pre-modern humans with regard to all aspects of psyche and reason. He wrote the one comprehensive book on the subject that Piaget had never written. Thus, the empirical research of PCCP has confirmed what Piaget, Werner, and all other early developmental psychologists had maintained and described. Moreover, the PCCP of the last 80 years has delivered the empirical evidence for the theory of psychogenesis, formulated by the founders and classical authors of sociology, ethnology, developmental psychology, and by other representatives of the humanities and social sciences in the last 200 years. Furthermore, the PCCP and psychometric approaches have falsified a fundamental assumption of modern social sciences that had been mainstream since about 1980.

Only on this basis is it possible to erect a theory of the rise of modern society and to illuminate the five evolutions mentioned. Only on this foundation is it feasible to describe the core structures of the rise of sciences, industrialism, enlightenment, humanism, and democracy. Whoever has grasped the developmental approach and PCCP knows immediately that a theory of social evolution generally and a theory of the rise of modern society in particular must be built on these foundations. The pre-formal or childlike stage of pre-modern humankind is the source of the lack of sciences, industrialism, enlightenment, humanism and democracy across the entire pre-modern world. Conversely, the rise of formal operations in the Western world after 1700 is the *single* cause of the rise of sciences, industrialism, enlightenment,

Table 1. Overview on cognitive development and historical changes.

Typical age (in modern societies)	Piagetian stage of cognitive development	Culture	Some characteristics of reason and practice
From birth to 2 years	Sensory-motor	Mammal societies	Practical intelligence in space and time.
2-8	Pre-operational	Some pre-modern societies	<p>Belief in immanent justice (oracles, ordeals), objective responsibility (punishment of unintended consequences, of animals and objects), and eternal rules (non-differentiation between physical and social rules, which are taken as divine rules). Animism and personification of nature.</p> <p>Belief in metamorphosis of beings into each other. Belief in man-made magical power over things and beings. "Fairy tale worldview." Weak reasoning abilities and low sense for reality. Weak understanding of causality, chance, probability, necessity, and possibility.</p>

6-12	Concrete operations	Some pre-modern societies	Belief in man-made magic disappears gradually. Animistic schemes and other irrational belief systems such as immanent justice or realistic dream understandings persist in attenuated form. Religious worldview.
10-20	Formal operations	Modern, industrial societies	The preconditions to the scientific, mechanical, and empirical-causal worldview emerge. Disappearance of magical beliefs, animistic schemes, immanent justice, objective responsibility, and other forms of mysticism. Disenchantment of the worldview. Emergence of Enlightenment, sciences, humanism, democracy, and human rights.

humanism, and democracy. Therefore, the cognitive-developmental approach explains the rise of modern, industrial society, initially in the West, and the origin of the free society.

5. The five evolutions carrying modern society

5.1 Sciences

The modern sciences, the sciences *sensu stricto*, appeared during the 17th century and spread across Europe after 1700. Physical sciences and humanities are said to be the greatest human inventions in history. It is widely accepted that their origins are restricted to modern Europe and had no counterpart in Asia during early modern times 1600-1900. The main forerunners of the new physical sciences had been theology and philosophy. Alchemy preceded chemistry, astrology astronomy, and theological philosophy preceded physics, geology, geography, and biology. Theological philosophy was the forerunner of humanities and social sciences. The decisive transformation from the theological disciplines to the new physical sciences took place during the 18th century. Protagonists had been Galileo Galilei, Johannes Kepler, René Descartes, Isaac Newton, Robert Boyle, and others (Dijksterhuis, 1986).

The comparison of the pre-scientific disciplines with the new sciences leads to the following conclusions. The medieval approaches mainly are based on magical and animistic foundations. Alchemy considered the chemical elements as alive. The alchemist tried to transform them to higher levels of being, speaking magical charms to them, and treating them as living beings. However, the new chemistry regards the elements as dead matter, reacting only to external changes. The scientific breakthrough of the new chemistry was based on the replacement of magical-animistic schemes by the empirical-causal ones. But 100 years of developmental psychology have evidenced that children up to their tenth

year at the maximum apply magical-animistic concepts to nature, whereas modern adolescents after their tenth year apply empirical-causal ones. The rise of formal operations supersedes the mythical worldview and the magical-animistic explanations and establishes the mechanical worldview with its empirical-causal explanations, based on scientific reasoning abilities (Piaget, 1959, 1969; Piaget & Inhelder, 1958). This is apparent because combinatorial, experimental, abstractive, and theoretical abilities characterize the formal operations. In consequence, the pre-formal cognitions and the childlike psyche of medieval intellectuals directly account for the main features of alchemy, whereas the rise of the formal operations among 17th century scholars is the immediate and single cause both for the decline of alchemy and the rise of chemistry. Therefore, the huge success of the new chemistry from 1700 on is based directly on the rise of the stage of formal operations in the minds of the chemists. Stage theory alone explains the establishment of the new chemistry and its tremendous breakthroughs.

The same applies to all other disciplines. Astrology is based on the considerations that stars and planets are living beings with personalities, or gods. They move due to their volition, their duties, and/or the orders of the holy law, protected and ruled by God. Thus magic and animism, the elements of the childlike worldview, were the foundations of medieval cosmology. Astronomy as a science succeeded by replacing the magical-animistic view with the empirical-causal one, that is, by the establishment of the mechanical worldview. Isaac Newton played a key role in this transformation. The establishment of the new astronomy directly resulted from the replacement of the childlike view by the fourth stage, the stage of formal operations, in the brains of the 17th-century scholars. Again, the only reason for the rise of modern astronomy is psychogenetic maturation as described by Piagetian stage theory.

The same is true with regard to physics. Medieval philosophy, be it Platonic or Aristotelic, regarded nature and reality as living things, ruled by God and other spiritual forces. It had no concept of physical laws, dead matter, and physical reactions. René Descartes was the first philosopher who outlined the theoretical worldview of modern physics, surmounting magic and animism, and erecting the mechanical worldview in a radical way unknown before. The same is held with biology. God had created the animals and plants by magic, and this notion alone suffices as the foundation of biology. Replacement of the idea of magical creation by the idea of evolution since Buffon, Wallace and Darwin turned biology into a true science. It is nothing less than the transformation from magical to causal-empirical explanations that created the foundations and the success of biology. Similar developments with regard to geology, geography, humanities, and social sciences are obvious (Oesterdiekhoff, 2011a, 2012a, 2013).

Jean Piaget (1950a, with Garcia 1989) wrote four books about the development of sciences. He worked out that most ancient philosophy was a product of the concrete operations, whereas the rise of formal operations became a phenomenon of major importance as late as the 17th century. The origination of formal operations in the minds of the scholars in early modern Europe is the cause for the rise of the modern sciences. Thus, the cognitive-developmental approach alone explains one of the five eminent pillars of modern industrial society, that is, one of its *conditiones sine qua non*.

5.2 Industrialism

Margaret Jacob (1997) detailed precisely that the steam engine of Watt & Boulton directly stems from the new physical sciences. The British entrepreneurs of the 18th century learned the new sciences, the practical applications of the Newtonian mechanics, at school and were able to solve

difficult technical problems with the new tools (Jacob, 1997: 109, 115). James Watt's machine was a direct application of Newton's mechanics, the new chemistry, physics, and mathematics. Watt communicated with Lavoisier and Priestley about scientific problems, thus belonging to the group of leading scientists of his time (Gordon, 1988; Jacob, 1997: 121). It would have been impossible to build this machine only by traditional methods of trial and error, by procedures of craftsmanship only. Jacob shows that the Industrial Revolution is a direct outcome of the new scientific culture, the new mechanical philosophy, and its new practical applications.

But the steam engine was the motor of the Industrial Revolution. Of course, the formal operations originated the Industrial Revolution not only through the sciences. The cognitive maturation of humankind caused and perpetuated industrial growth through many mechanisms, ranging from higher professional abilities across many fields and greater entrepreneurial and management skills to greater self-discipline and more peaceful behavior. There is a direct link between formal operations, educational culture, professional abilities, labor productivity, and economic growth. Thus, the cognitive maturation of the population is the main reference point to explain the Industrial Revolution (Oesterdiekhoff, 1997, 2012a, 2013; Rindermann, 2008a; Rindermann & Thompson, 2011). This is what already Auguste Comte (1840) explicitly maintained, and Max Weber (1987) more implicitly.

There are no Europe-specific economic or institutional prerequisites or restraints that fostered or compelled industrial growth. If industrial growth had not taken place, Europe had developed similar to China or India during the 19th and 20th centuries (Snooks 1994). Conversely, Indians and Chinese had been unable to apply the new technologies and to start industrial enterprises, despite European examples

in their countries. The only modern enterprises in China during the entire 19th century had been in the hands of Americans and Europeans (Pomeranz 2001; Seitz 1999; Spence 1990). The Chinese would have had the same advantages of industrial growth the Europeans could enjoy, though. They could have spared their small forested areas, could have overcome their poverty, and could have surmounted their weakness in international relations, especially concerning the danger of being conquered. Only due to the protecting influence of the Americans could China escape from being colonized around 1900 and around 1945. China and India rejected modernization due to their unwillingness to abandon their mythical-magical cultures, rooted in ancestor worship, animism, magic, and other pre-formal structures of thought (DeGroot, 1910), comparable to the Islamic cultures in the past decades (Diner, 2009).

5.3 Enlightenment

It is not by chance that the Age of Enlightenment took place in the same period of time and in the same world region as the rise of sciences and industrial society. As the dominant intellectual movement of the Western world especially during the 18th century, Enlightenment implied the criticism of infamous social relations such as slavery, feudalism, serfdom, absolutistic monarchy, oppression of lower classes and denial of civil rights. It furthermore concerns the criticism of superstition, of beliefs in magic, witchcraft and irrational ideologies, and sometimes the questioning of religion in its entirety. The kernel of Enlightenment is the readiness and ability to abolish the childlike forms of thinking, worldview, and behavior and to establish the formal-operational forms. Its essence is the establishment of the fourth stage. Piagetian stage theory alone explains all core structures of the philosophy of Enlightenment.

Historians (Lévy-Bruhl, 1923, 1985; Thorndike, 1923-1946, 2003) say that the philosophers of Enlightenment caused the

abolishment of the prosecution of witches, of the belief in witchcraft, in sorcery and magic, in ordeals and torture as judicial instruments, etc. The ideas of Enlightenment convinced sick people to employ modern medicine and to avoid “cunning men,” the European equivalent of shamans and magical healers. The belief in man-made magical powers over storms and rainfall, sunshine and sickness, incidents and mishap, love and death originated in pre-operational cognitive structures, as described by developmental psychology (Piaget, 1959, 1969; Stern, 1924; Wooley, 1997; Zeiningner, 1929).

It is obvious that the first scholars on formal-operational levels, after surmounting the magical-animistic worldview, felt compelled to fight against the irrational practices. The comparison between the ontogenetic transformation of the child’s beliefs in magic to the adolescent’s forms of thinking in modern culture on the one side and from the medieval mythical-magical mentality to the new worldview of the Age of Enlightenment on the other side, reveals full correspondences. What is usual among modern adolescents, who all have surmounted the pre-operational stage and magical beliefs by the attainment of the twelfth developmental year, appeared for the first time in history among the educated classes of Europe during the 18th century. The kernel of Enlightenment philosophy is the surpassing of childlike mental states, of the world of fairy tales, magic, and superstition, as it prevailed in the pre-modern world. The child’s psycho-structural cognition and worldview carry the pre-modern and medieval mentality and worldview, whereas the modern adolescent’s mind and outlook represent the rise of Enlightenment (Oesterdiekhoff, 2009a,b, 2011a: 87-132, 2012 a,b, 2013; Oesterdiekhoff & Rindermann, 2007).

During the Age of Enlightenment the first atheists appeared; religion began to be regarded as childlike and irrational. In fact, the vividness and strength of religiousness

decreased throughout the 19th and 20th centuries. During the 18th century, only a few scientists became agnostic or atheistic, whereas the masses held their beliefs. The 19th century already knew many atheists across several social milieus. Religiousness declined through the 20th century from generation to generation. Only 7% of the members of the American Academy of Sciences and 3% of the members of the Royal Society of London are still religious, 79% of the latter “deny religion strongly” (Larson & Witham, 1998: 313). Roughly 50% of Europeans and 65% of Japanese deny both the existence of God and immortality of the soul. To my knowledge, Ludwig Feuerbach was in 1841 the first scholar to publish a veritable scientific theory of religion. He said the childlike psyche of pre-modern man caused religiousness, whereas industrial populations are destined to diminish religious life and to become atheists in the future. This process is labelled secularization (Feuerbach, 1985; Oesterdiekhoff, 2011a: 162-175, 2013: 215-240, 2014).

China, India and the rest of the non-Western world did not experience any form of Enlightenment during the 18th and 19th centuries. Its ideas reached the non-Western world only by importation from Europe and North America. China and other non-Western cultures remained bogged down in magical beliefs, beliefs in witchcraft and sorcerers, ordeals and other forms of irrationality. China’s ancestor worship survived into the 20th century, as it did in India, Africa, and other regions. China remained a fairyland-culture until at least 1911 (DeGroot, 1910; Evans-Pritchard, 1976; Fortune, 1963; Gernet, 1985; Lévy-Bruhl, 1923, 1931, 1985; Oesterdiekhoff, 2012a, 2014; Signer, 2004).

5.4 Humanism

The Enlightenment philosophers developed ideas regarding humanism and human rights. They demanded individual rights and liberties and fought against forms of maltreatment, slavery, and oppression. Pre-modern societies

around the globe manifested many inhumane practices and customs, which Europe started to abolish after 1700. Cruel executions and tortures of delinquents, common in tribal societies and all agrarian civilizations, were abolished in Europe during the Age of Enlightenment and the French Revolution. The denizens of the Roman Empire, ancient China, India, tropical Africa and medieval Europe all had enjoyed these barbarian practices in similar ways. They were abolished in Europe due to the new philosophy of humanism (Dülmen, 1988; Pinker, 2011; Rösen, 2012), that is due to the cognitive maturation of the Europeans (Oesterdiekhoff, 2009a,c, 2011a: 162-175, 2012a,b).

Slavery was abolished in several European nations between 1800 and 1830 in consequence of the ideas of humanism. Denmark and France were the first countries to forbid it, and England sent her navy to intercept the Atlantic slave trade. One of the first measures of the French Revolution 1789 was the freeing of the slaves in the colonies. In fact, modern Europe was the first continent in the world ever to ban slavery systematically. The new ideas of humanism, not economic opportunities, had been the reason for this transformation of morals.

Steven Pinker (2011) documents the rise of humanism in the past 300 years by a huge mass of convincing data. He bases his insights on the civilization theory of Norbert Elias, that is, on the idea of the psychogenesis of humans in recent times. Pinker's bestseller opens the way to revisit older theories of the moral and intellectual progress of humankind. It is a milestone in the development of social sciences because it refutes the widespread ideology that all cultures would stay on the same levels of morals, violence, and humanity forever. Pinker designates rightly the decline of violence within and between nations in the past centuries as a "humanitarian revolution." Jörn Rösen (2012), based on a cross-cultural research project, describes the rise of humanistic values

during the Age of Enlightenment and their global spread during recent times. He detects first traces in the "Axial Age" of the Eurasian empires and in Greek-Roman antiquity, but sees the decisive breakthrough of humanism and civil rights in the Age of Enlightenment in Europe. His compiled evidence matches completely to my structure-genetic sociology with regard to the evolution of social interactions, empathy and morals, and the corresponding decline of violence, sadism, and cruel customs. I evidenced the transformation from barbarian to humane practices by a cognitive-developmental analysis of the Roman arena games, the sadistic punishment law in pre-modern societies, and the decline of violence and wars in recent centuries. I demonstrated that a modern population would never accept any spectacle where humans were torn to pieces by wild beasts, women had to fight on death or life against dwarves, and delinquents were burnt as torches in front of a great audience. Humans must be capable to sustain the view of such cruelties and must be able to enjoy them. Modern humans, due to their psycho-cognitive structures, could neither endure nor enjoy such forms of public entertainment. The willingness of ancient peoples to enjoy such cruelties is the *single* cause of their existence. The higher anthropological stage of modern humans is the *single* cause why such forms of entertainment no longer exist. Whoever tried to re-establish them would be stopped immediately. The huge gap between pre-modern and modern psyche can be clearly visualized by the impossibility that a modern audience, including the elite of the state, might enjoy such scenes.

This demonstrates that pre-modern and modern humans are different forms of humans. As expected, ancient society did not know any political party or movement against the arena games. They were taken as self-evident. The arena games consisted largely of three elements: execution of delinquents, gladiator fights or duels, and killing of beasts.

These three elements existed in all pre-modern cultures, both tribal societies and civilizations. They prevailed across Asia and Europe until the beginning of modern industrial society (Oesterdiekhoff, 2000, 2009a: 310-332, 2009c, 2011a: 162-175, 2012a,b).

My structure-genetic sociology is today probably the most deep-rooted approach that refers the evolution of morals, empathy, and social interactions to the cognitive evolution from preoperational to formal stages. The huge gap between pre-modern and modern nations includes the huge gap between lower and higher stages of morals. Correspondingly, current pre-modern cultures stay mainly on Kohlberg's (1981) stages 1 and 2 of moral development, whereas only modern nations occupy stages 3, 4, and 5 (Hallpike, 2004; Oesterdiekhoff, 2009a: 404-409).

5.5 Democracy

Democracy and constitutional government originated in the same period of time and in the same culture as the other four elements industrialism, sciences, enlightenment, and humanism. Therefore, it is likely to stem from the same source. There must exist a common origin of all these five core structures that is causing, maintaining and characterizing modern industrial society. I have demonstrated that the four other elements express cognitive-evolutionary trends, in essence the transformation from pre-formal to formal-operational stages in the physical, social, moral and political domains. The cognitive maturation of humankind appears to be the decisive cause behind these four evolutions. It would be strange if the evolution of democracy were an exception. Most political scientists and historians never heard about the idea that developmental psychology can explain the rise of democracy. But do they have any serious and satisfactory theoretical alternative to offer?

Most social scientists are uncertain whether the origins of democracy and constitutional government should be sought

in the Enlightenment ideas or in class conflicts. The materialistic approaches, since Karl Marx, emphasize class conflicts as the cause of democracy. They maintain that democracy results from the successful conquest of political power by the middle classes and from the replacement of feudal elites by capitalists, academics, and other social forces. Thus, the rise of democracy is seen as the outcome of fortuitous social constellations (Moore, 1969). In this case the support of democracy as an indispensable institution to protect personal and civil liberties, embodying the spirit of Western culture, would have nothing to do with changed ways of thinking. Even at first glance, this implication of the materialist theory appears improbable. It seems not to fit the principle of the sufficient reason. Democracy implies the dominance or at least influence of the electorate, not only of a certain class. Democracy is not an instrument of the bourgeois only. For example, the French Revolution was supported by noblemen as well as by representatives of the middle and working classes. Versailles and the king's court themselves discussed the ideas of Enlightenment and to some extent approved of them.

In consequence, many or most historians reject the monopoly of materialistic explanations. They rather regard the ideas of Enlightenment as the moving force behind the emergence of democracy and constitutional government. John Locke, Charles de Montesquieu, and Jean-Jacques Rousseau had been the main protagonists of civil rights and democratic institutions, directly influencing the French and American revolutions, the *déclaration des droits de l'homme et du citoyen* and the *bill of rights*. The books of these three authors showed the deficiencies of monarchy and dictatorship thoroughly and described the functioning of democratic institutions in detail before their actual existence. In fact, their theories comprehensively anticipated a democratic political life before its real existence. Their theories had no

counterparts in Asia or elsewhere. They manifest a new philosophy of political institutions, of higher moral standards for social interactions, and of the dignity of the individual. They indicate that intellectual processes had caused the rise of democracy. Because they never developed the cognitive concepts of democracy, the non-European cultures could not develop democratic institutions.

I demonstrated that only the cognitive-developmental approach is able to explain the rise of democracy. I outlined the encompassing parallels between ontogenesis and history with regard to political thinking. Jean Piaget (1932) provided one of the most important pieces to this approach. He showed that modern children by their tenth year of life understand rules and laws as unchangeable and as set by God, elders, and other authorities. Children believe they must obey the laws, having no influence to change or modify them. Modern adolescents, however, deny the eternal and quasi-physical existence of laws. They rather assume that majorities have the right to enact and change them. PCCP demonstrated empirically that pre-modern peoples share the childlike beliefs in the eternal status of law. Historians know these judicial phenomena in the European Middle Ages as *the good, old law*, in the Islamic traditions as *the Shari'á*, and in other regions as customary laws. These customary laws imply the belief in their divine origin. To the present day, Islamic cultures reject democracy because God himself is believed to be the governor of the state. He makes or made the laws, not the people (Havighurst & Neugarten, 1955; Oesterdiekhoff, 2009a: 261-284, 336-444, 2013: 363-390; Radding, 1985).

As children do, most pre-modern populations regard democracy as chaos and adhere to strong autocratic leaders. It required several centuries for democracy to gain its dominant role in the political consciousness of the Europeans. Many Europeans backed authoritarian forms of government until 1945 or 1975. The Catholic Church made

its ideological peace with democracy only after World War II. Surveys in present Islamic cultures have shown the population's preference for undemocratic forms of government.

Developmental psychology described the evolution of tolerance and the understanding of individual rights in adolescence, whereas children have not yet a real understanding of them (Gallatin & Adelson, 1970; Rosenberg et al, 1988; Zellman & Sears, 1971). The Enlightenment philosophy with its discovery of democracy and civil rights fully corresponds to the political maturation of modern adolescents, who start to understand the meaning of civil rights, majority decisions, and tolerance for deviating ideas (Oesterdiekhoff, 2013: 391-494; Rindermann, 2008b). Thus, the political evolution from authoritarian forms to democracy stems from the psycho-cognitive evolution of humankind. The developmental approach explains the rise of democracy and constitutional government by the historical emergence of formal operations. It is therefore not by chance that the same culture that invented sciences, industrialism, humanism and enlightenment also originated democracy and constitutional government. The five elements are only five fingers of the same hand.

6. Conclusions

Materialistic theories could never offer convincing evidence for purely economic or institutional factors as causes of the divergence between Asia and Europe and the rise of the Western world. The critical examination of pre-existing political systems, social classes, property rights, trade capitalism, etc leads to the conclusion that none of them can explain the divergent developments. A theory conforming to the principle of sufficient reason (as well as the principle of parsimony) must be able to explain all important phenomena and not only one trait of modernity. Property rights theory, for example, can never explain the rise of sciences,

humanism, enlightenment, and democracy. It is impossible to reduce these decisive phenomena of modern society to features of property rights and economy. The contention that these phenomena might be only the “superstructure” of the economic basis cannot be an answer to the question why these five phenomena appeared for the first time in history at the same place and time, namely in the Western world after 1700. There is no internal link between economic growth and the phenomena mentioned that could be explained by economic or materialistic factors only.

A comprehensive theory according to the principle of sufficient reason has to explain all decisive phenomena against one background capable of illuminating each. The cognitive-developmental approach, as elaborated in my structure-genetic sociology, can explain all central dimensions of modern industrial society on the same basis, designating the roots from which the dimensions originated. The preoperational and concrete operational structures, which are the cognitive structures of pre-modern peoples, are not able to elaborate and understand sciences, industrialism, enlightenment, humanism, and democracy. Humans must have reached the stage of formal operations to be able to create these five phenomena. Developmental psychology of the last three generations demonstrated that these phenomena come into being only in the adolescent stage. Moreover, based on the researches of Piagetian cross-cultural psychology and its application to history we know that the rise of formal operations took place in the European elites during early modern times, spreading to broader milieus only in the 20th century. The transformation from childlike psychocognitive structures to formal operational structures is the decisive reference point to explain the most fascinating riddle in world history. The unique historical process can be reduced to a unique psychological phenomenon, that is, to the most fascinating psychological development at all.

Asia did not develop these five elements up to 1870, and much later in most countries. The lack of these five elements cannot be explained by economic factors only. Asia persisted longer than Europe in childlike cognitive structures. This fact explains Asia's (temporary) arrest, as already Jean Ziegler (1968) mentioned. The current wave of globalization and the emergence of rapidly developing "threshold countries" imply the worldwide victory of sciences, industrialism, democracy, humanism, and enlightenment.

The explanatory model, procured by my structure-genetic sociology, is close to some ideas of Jean Piaget, Jürgen Habermas, James Mark Baldwin, and Leonard Hobhouse. It breathes more or less the same spirit as the theories of Norbert Elias, Max Weber, and Auguste Comte. However, it is more elaborate than the ideas of these predecessors because the classical sociologists did not know that it is not only possible but necessary to explain the rise of democracy, enlightenment and humanism in terms of developmental psychology. Even those authors who knew about the childlike psyche of pre-modern humans had no notion about these coherencies. Notwithstanding, the program of structure-genetic sociology is in their heritage and shares their spirit.

References

- Allier, R.
1929. *The Mind of the Savage*. London: Bell.
- Ashton, Patricia Teague.
1975. Cross-cultural Piagetian research. An experimental perspective. *Harvard Educational Review* 45: 475-506.
- Barber, Nigel.
2005. Educational and ecological correlates of IQ: a cross-national investigation. *Intelligence* 33: 273-284.
- Blondel, Charles.
1926. *La mentalité primitive*. Paris: Stock.
- Carothers, J.C.
1972. *The Mind of Man in Africa*. London: Garden City Press.
- Chaudhuri, K.N.
1978. *The Trading World of Asia and the English East India Company 1660-1760*. Cambridge: Cambridge University Press.

- Comte, Auguste.
1840. *Cours de philosophie positive*. Paris.
- Dasen, Pierre.
1974. Cross-cultural Piagetian research: a summary. In Pierre Dasen & John Berry (eds): *Culture and Cognition. Readings in Cross-Cultural Psychology*, pp. 409-424. London: Methuen & Co.
- Dasen, Pierre.
1977. *Piagetian Cross-Cultural Psychology*. New York: Gardner Press.
- Dasen, Pierre & John W. Berry (eds.).
1974. *Culture and Cognition. Readings in Cross-Cultural Psychology*. London: Methuen & Co.
- De Groot, J.J.M.
1910. *The Religion of the Chinese*. New York.
- Diamond, Jared.
1998. *Guns, Germs, and Steel. A Short History of Everybody for the Last 13,000 Years*. New York: Vintage.
- Dijksterhuis, Eduard Jan.
1986. *The Mechanization of the World Picture*. Princeton: Princeton University Press.
- Diner, Dan.
2009. *Lost in the Sacred: Why the Muslim World Stood Still*. Princeton: Princeton University Press.
- Dülmen, Richard van.
1988. *Theater des Schreckens*. München.
- Dux, Günter.
1989. *Die Zeit*. Frankfurt a. M.: Suhrkamp.
- Dux, Günter.
2000. *Historisch-genetische Theorie der Kultur*. Weinheim: Weilerswist.
- Dux, Günter.
2004. *Die Moral in der prozessualen Logik der Moderne*. Weinheim: Weilerswist.
- Eckensberger, Lutz et al (eds).
1979. *Cross-Cultural Contributions to Psychology*. Amsterdam: Swets & Zeitlinger.
- Elias, Norbert.
1982. *Power and Civility*. New York: Pantheon.
- Elias, Norbert.
1984. *Engagement und Distanzierung*. Frankfurt am Main: Suhrkamp.
- Elvin, Mark.
1973. *The Pattern of the Chinese Past*. London.
- Ember, Carol R.
1977. Cross-cultural cognitive studies. *Annual Review of Anthropology* 6: 33-56.

- Evans-Pritchard, Edward E.
1976. *Witchcraft, Oracles, and Magic Among the Azande*. Oxford: Oxford University Press.
- Ferguson, Niall.
2011. *Civilization. The West and the Rest*. London: Penguin Books.
- Feuerbach, Ludwig.
1985. *The Essence of Christianity*. New York: Harper & Collins.
- Flynn, James R.
2007. *What is Intelligence?* Cambridge: Cambridge University Press.
- Flynn, James R.
2008. Lurija und das Paradox massiver IQ-Gewinne längs der Zeit. In Georg W. Oesterdiekhoff & Heiner Rindermann (eds): *Kultur und Kognition*, pp. 111-132. Hamburg, Münster: Lit-Verlag.
- Fortune, R.F.
1963. *Sorcerers of Dobu*. New York: Dutton.
- Frank, A.G. & B.K. Gills (eds.).
1993. *ReOrient. Global Economy in the Asian Age*. Berkeley, CA.
- Gallatin, J. & J. Adelson.
1970. Individual rights and the public good: a cross-national study of adolescence. *Comparative Political Studies* 2: 226-244.
- Gellathy, A.R.H.
1987. Acquisition of a concept of logical necessity. *Human Development* 30: 32-47.
- Gernet, Jacques.
1985. *A History of Chinese Civilization*. Cambridge: Cambridge University Press.
- Gordon, Robert B.
1988. Who turned the mechanical ideal into mechanical reality?" *Technology and Culture* 29: 744-778.
- Habermas, Jürgen.
1976. *Zur Rekonstruktion des Historischen Materialismus*. Frankfurt (M): Suhrkamp.
- Hallpike, Christopher.
1979. *Foundations of Primitive Thought*. Oxford: Clarendon Press.
- Hallpike, Christopher.
2004. *The Evolution of Moral Understanding*. London: Prometheus Research Group.
- Havighurst, Robert & Beatrice Neugarten.
1955. *American Indian and White Children*. Chicago: Chicago University Press.
- Ibarra, Laura.
2007. *Creencias, mitos y rituales en el mundo prehispánico. Una explicación desde la teoría histórico-genética*. Guadalajara: Universidad de Guadalajara.

- Irvine, S.H. & J.W. Berry (eds).
 1988. *Human Abilities and Cultural Context*, 2 vols. Cambridge: Cambridge University Press.
- Jacob, Margaret C.
 1997. *Scientific Culture and the Making of the Industrial West*. New York, London: Oxford University Press.
- Jahoda, Gustav.
 2000. Piaget and Lévy-Bruhl. *History of Psychology* 3(3): 218-238.
- Jones, Eric.
 1987. *The European Miracle*. Cambridge: Cambridge University Press.
- Jones, Eric.
 1988. *Growth Recurring. Economic Change in World History*. Oxford: Oxford University Press.
- Jüttemann, Gerd (Hrsg.).
 1991. *Die Seele*. Weinheim: Psychologie Verlags Union.
- Khaleefa, Omar, R. Lynn, A. Abulgasim, M. Dosa & F. Abdulradi.
 2010. Norms for the Standard Progressive Matrices for 9-18 year olds for Darfur. *Mankind Quarterly* 50: 311-317.
- Kohlberg, Lawrence.
 1981. *The Philosophy of Moral Development: Moral Stages and the Idea of Justice*. New York: Harper & Row.
- Landes, D.S.
 1969. *The Unbound Prometheus. Technological Change and Industrial Development in Western Europe from 1750 to the Present*. Cambridge.
- Landes, D.S.
 1998. *The Wealth and Poverty of Nations. Why Some are so Rich and Some so Poor*. New York: W.W. Norton & Company.
- Larson, E. & L. Witham.
 1998. Leading scientists still reject God. *Nature* 394: 313.
- LePan, Donald.
 1989. *The Cognitive Revolution in Western Culture*. London: Macmillan Press.
- Lerner, Daniel.
 1958. *The Passing of Traditional Society*. Glencoe, Ill.
- Lévy-Bruhl, Lucien.
 1923. *Primitive Mentality*. New York: The Macmillan Press.
- Lévy-Bruhl, Lucien.
 1931. *Le surnaturel et la nature dans la mentalité primitive*. Paris: Felix Alcan.
- Lévy-Bruhl, Lucien.
 1985. *How Natives Think*. Princeton: Princeton University Press.
- Lurija, Alexandr R.
 1982. *Cognitive Development. Its Cultural and Social Foundations*. Cambridge (MA): Harvard University Press.

- Macfarlane, Alan.
2000. *The Riddle of the Modern World*. London.
- Maddison, Angus.
2001. *The World Economy. A Millennial Perspective*. Paris.
- Marks, Robert B.
2002. *The Origins of the Modern World. A Global and Ecological Narrative*. Lanham (MD): Rowman & Littlefield.
- Marx, Karl.
1967. *Capital*. New York: International Publishers.
- Marx, Karl.
1970. *The German Ideology*. New York: International Publishers.
- Mitterauer, Michael.
2003. *Warum Europa? Mittelalterliche Grundlagen eines Sonderweges*. München: C.H. Beck.
- Mogdil, Sohan & Celia Mogdil.
1976. *Piagetian Research*, vol. 1-8. London.
- Mokyr, Joel.
1990. *The Lever of Riches*. Oxford: Oxford University Press.
- Moore, Barrington.
1969. *Social Origins of Democracy and Dictatorship. Lord and Peasant in the Making of the Modern World*. London, New York: Penguin Books.
- Murphy, J.
1927. *Primitive Man*. London: Oxford University Press.
- Needham, Joseph.
1969. *The Grand Titration: Science and Society in East and West*. Toronto: Toronto University Press.
- North, Douglass C.
1990. *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- North, Douglass & Robert Thomas.
1973. *The Rise of the Western World*. Cambridge: Cambridge University Press.
- Oesterdiekhoff, Georg W.
1993. *Unternehmerisches Handeln und gesellschaftliche Entwicklung*. Opladen: Westdeutscher Verlag.
- Oesterdiekhoff, Georg W.
1997. *Kulturelle Bedingungen kognitiver Entwicklung. Der strukturalistische Ansatz in der Soziologie*. Frankfurt (M.): Suhrkamp.
- Oesterdiekhoff, Georg W.
2000. *Zivilisation und Strukturgenese. Norbert Elias und Jean Piaget im Vergleich*. Frankfurt (M.): Suhrkamp.
- Oesterdiekhoff, Georg W.
2001. D.C. North, Theorie des institutionellen Wandels. In G.W. Oesterdiekhoff (ed): *Lexikon der soziologischen Werke*, pp. 508-509. Opladen: Westdeutscher Verlag.

- Oesterdiekhoff, Georg W.
2005. *Entwicklung der Weltgesellschaft. Von der Steinzeit zur Moderne.* Hamburg, Münster: Lit-Verlag.
- Oesterdiekhoff, Georg W.
2006. *Kulturelle Evolution des Geistes. Die historische Wechselwirkung von Psyche und Gesellschaft.* Hamburg, Münster, London: Lit-Verlag.
- Oesterdiekhoff, Georg W.
2007a. Die Entstehung der Industriemoderne in Europa. Der strukturgenetische Erklärungsansatz. *Sozialwissenschaftliches Journal* 2(1), April: 9-35.
- Oesterdiekhoff, Georg W.
2007b. Staat und Eigentumsrechte in der Entwicklung der europäischen Gesellschaft. Die Institutionentheorie von Douglass North. In G. Nollmann (ed): *Sozialstruktur und Gesellschaftsanalyse*, pp. 278-303. Wiesbaden: VS Verlag.
- Oesterdiekhoff, Georg W.
2009a. Mental Growth of Humankind in History. Norderstedt: Bod.
- Oesterdiekhoff, Georg W.
2009b. Trials against animals. A contribution to the developmental theory of mind and rationality. *Mankind Quarterly* 49: 346-380.
- Oesterdiekhoff, Georg W.
2009c. The arena games in the Roman Empire. A contribution to the explanation of the history of morals and humanity. *Croatian Journal of Ethnology (Nar. Umjet.)* 46(1): 177-202.
- Oesterdiekhoff, Georg W.
2010. Entwicklungspsychologie als historische Anthropologie. Das Verhältnis von Sein und Bewußtsein in der Weltgeschichte. In Gerd Jüttemann (ed): *Konkrete Psychologie*, pp. 253-266. Lengerich, Miami: Pabst Science Publishers.
- Oesterdiekhoff, Georg W.
2011a. *The Steps of Man Towards Civilization. The Key to Disclose the Riddle of History.* Norderstedt: Bod.
- Oesterdiekhoff, Georg W.
2011b. La sociología genético-estructural como heredera de la sociología clásica y de la teoría de la civilización. In V. Weiler (ed): *Norbert Elias y el problema del desarrollo humano*, pp. 71-96. Bogotá, Colombia: Ediciones Aurora.
- Oesterdiekhoff, Georg W.
2012a. *Die geistige Entwicklung der Menschheit.* Weilerswist: Velbrück.
- Oesterdiekhoff, Georg W.
2012b. Was pre-modern man a child? The quintessence of the psychometric and developmental approaches. *Intelligence* 40: 470-478.
- Oesterdiekhoff, Georg W.
2013. *Die Entwicklung der Menschheit von der Kindheitsphase zur Erwachsenenreife.* Wiesbaden: Springer VS.

- Oesterdiekhoff, Georg W.
2014. *Traumzeit der Menschheit. Wesen, Ursprung und Untergang der Religion* (forthcoming).
- Oesterdiekhoff, Georg W. & Heiner Rindermann.
2007. The spread of AIDS in developing countries. A psycho-cultural approach. *Journal of Social Political and Economic Studies* 32: 201-222.
- Oesterdiekhoff, Georg W. & Heiner Rindermann (eds).
2008. *Kultur und Kognition*. Hamburg, Münster: Lit-Verlag.
- Piaget, Jean.
1932. *The Moral Judgment of the Child*. New York: Free Press.
- Piaget, Jean.
1950a. *Introduction à l'épistémologie génétique*. Vol. 1: La pensée mathématique, vol. 2: La pensée physique, vol. 3: La pensée biologique, la pensée psychologique, la pensée sociologique. Paris: Presses Universitaires de France.
- Piaget, Jean.
1950b. *The Psychology of Intelligence*. London: Routledge & Kegan.
- Piaget, Jean.
1959. *The Child's Conception of the World*. New York: Littlefield, Adams & Co.
- Piaget, Jean.
1969. *The Child's Conception of Physical Causality*. Totowa, New Jersey.
- Piaget, Jean & Bärbel Inhelder.
1941. *Le développement des quantités physiques chez l'enfant*. Neuchâtel: Delachaux & Niestle.
- Piaget, Jean & Bärbel Inhelder.
1958. *The Growth of Logical Thinking from Childhood to Adolescence*. New York: Basic Books.
- Piaget, Jean & Bärbel Inhelder.
1969. *The Psychology of the Child*. New York: Basic Books.
- Piaget, Jean & Rolando Garcia.
1989. *Psychogenesis and the History of Sciences*. New York: Columbia University Press.
- Pinker, Steven.
2011. *The Better Angels of Our Nature. Why Violence Has Declined*. New York: Viking Press.
- Pomeranz, Kenneth.
2001. *The Great Divergence. China, Europe, and the Making of the Modern World Economy*. Princeton: Princeton University Press.
- Poortinga, Y.H.
1977. *Basic Problems in Cross-Cultural Psychology*. Amsterdam, Lisse: Swets & Zeitlinger.
- Radding, Charles M.
1985. *A World Made by Men. Cognition and Society 400-1200*. Chapel Hill: University of North Carolina Press.

- Rindermann, Heiner.
 2008a. Relevance of education and intelligence at the national level for the economic welfare of people. *Intelligence* 35: 127-142.
- Rindermann, Heiner.
 2008b. Relevance of education and intelligence for the political development of nations. *Intelligence* 36: 306-322.
- Rindermann, Heiner & J. Thompson.
 2011. Cognitive capitalism: the effect of cognitive ability on wealth, as mediated through scientific achievement and economic freedom. *Psychological Science* 22: 754-763.
- Rosenberg, Shawn et al.
 1988. *Political Reasoning and Cognition. A Piagetian View*. Durham & London: Duke University Press.
- Rüsen, Jörn et al (eds).
 2012. *Shaping a Humane World*. Bielefeld: Transcript.
- Sanderson, S.
 1999. *Social Transformations. A General Theory of Historical Development*. Boston: Rowman & Littlefield.
- Schröder, E.
 1989. *Vom konkreten zum formalen Denken*. Bern: Huber.
- Seitz, Konrad.
 1999. *China. Eine Weltmacht kehrt zurück*. Berlin.
- Signer, David.
 2004. *Die Ökonomie der Hexerei*. Berlin.
- Smith, Adam.
 1776. *An Inquiry into the Causes of the Wealth of Nations*. London: Strahan & Cadall.
- Snooks, Graeme D. (ed).
 1994. *Was the Industrial Revolution Necessary?* London.
- Spence, Jonathan D.
 1990. *The Search for Modern China*. New York: W.W. Norton & Co.
- Stern, William.
 1924. *Psychology of Early Childhood up to the Sixth Year of Age*. New York: Holt.
- Thorndike, Lynn.
 1923-1946. *History of Magic and Experimental Science*, vol. 1-6. New York.
- Thorndike, Lynn.
 2003. *The Place of Magic in the Intellectual History of Europe*. London.
- Vernon, Philip E.
 1969. *Intelligence and Cultural Environment*. London: Methuen & Co.
- Wallerstein, Immanuel.
 1974. *The Modern World-System*. New York: Academic Press.
- Wallon, Henri.
 1928. La mentalité primitive et celle de l'enfant. *Revue Philosophique* 105: 82-105.

- Weber, Max.
1987. *The Protestant Ethic and the Spirit of Capitalism*. New York, London: Routledge.
- Weiler, Vera.
2011. El culto de lo insondable o la búsqueda de lo cognoscible. In Vera Weiler (ed): *Norbert Elias y el problema del desarrollo humano*, pp. 7-18. Bogotá: Ediciones Aurora.
- Werner, Heinz.
1948. *Comparative Psychology of Mental Development*. New York: Follet.
- Wittfogel, Karl August.
1957. *Oriental Despotism. A Comparative Study of Total Power*. Yale University Press.
- Wooley, Jacqueline.
1997. Thinking about fantasy: are children fundamentally different thinkers and believers from adults? *Child Development* 88: 991-1011.
- Zeininger, Wolfgang.
1929 *Die magische Geisteshaltung im Kindesalter und ihre Bedeutung für die religiöse Entwicklung*. Leipzig: Barth Verlag.
- Zellman, Gail L. & D.O. Sears.
1971. Childhood origins of tolerance for dissent. *Journal of Social Issues* 27: 109-136.
- Ziégler, Jean.
1968. *Sociologie et Contestation*. Paris.