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Psychogenesis of humankind. The psychometrical and the cognitive-developmental approach in comparison

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Abstract

Populations of different societies are enormously differing in their average intelligence scores. Intelligence scores of humans from developing countries are lower than those of humans from developed countries. The intelligences scores of populations of industrialized countries have been continuously growing for more than 100 years. These two groups of phenomena are interconnected to each other. While higher intellectual levels are bound to the rate of cultural modernization, the mental capacities of pre-modern populations aren´t characterized and equipped by abstract ways of thinking. This article intends to make clear that the psychometrical research results can be better understood by putting them into the context of Piagetian Cross-Cultural Psychology. The results of more than 1000 empirical enquiries, carried out in the past 70 years, show that the pre-modern mind is bound within preoperational and concrete-operational structures and does not reach the stage of formal operations. Only adolescents of modern societies have the cultural chance to develop this highest stage of abstractive, deductive and rational thinking. The low intelligence scores indicate to the lack of formal operations among pre-modern populations. The both outstanding theories of intelligence of modern psychology are coming to the same conclusion referring to the problem of the relationship between culture and cognition: Without the influences of modern culture human thinking remains bound to simple archaic levels. Both theoretical approaches support and confirm each other, and they mediate a proper understanding in the cognitive dimension of social change and cultural modernization.

1. Psychometrical intelligence research and culture

1.1. Intelligence development since the beginning of modern industrial society

John Raven, the son of J. C. Raven, who invented the Raven´s Progressive Matrices, calculated the Briton´s growth of intelligence since the 19th centuries. He took the test scores of persons who were between 25 and 65 years of age in 1942 and compared them to persons who were between 25 and 65 years of age in 1992. This data basis enabled the researchers to analyze and to compare persons born in the long time span between 1877 and 1967. According to the valid adjustment of intelligence scores in 1992 (with Raven´s Matrices) the scores of 90% of the Britons born in 1877 are falling under the IQ-level of 75 that is under the level of the weakest 5% of those who were born in 1967. The rise of the

intelligence concerns the total population and does not consist only on improvements in the weak groups. The 5 % with the highest IQ in the 19th centuries would be the 5% of today´s bottom level. The groups of 18-32 years of age attained a rise of at least 20 points for the last 100 years, those between 33-67 years of age gained a rise of 30 points (Raven et al. 1993; Vernon 1969, p. 16). Storfer (1990, p. 89 ff) found in the USA similar results.

During World War I, the intelligence of US-soldiers had been systematically measured. While soldiers with German, English of French origins attained scores above 100 (mean score of US-Americans), soldiers stemming from Southern and Eastern Europe reached scores only within the eighties. Immigrants, being tested during World War I, from the Baltic countries, the Balkan, Poland, Russia, Greece, Italy, Spain, and Portugal had mean IQ-scores around 80 (Sowell 1994, p. 159; Molnar 2002, p. 283 f). In those days, these scores were characteristic to the IQ of inhabitants of the Eastern and Southern European Countries. These immigrants reached scores of about 55, compared to present-day adjustments. White US-Americans attained a rise of 25 points between 1918 and 1995 (measured by the Wechsler-Binet-test). Compared to 1992, the white US-Americans therefore had an average IQ of 75 in 1918 (Flynn 1998, S. 36 f). But the immigrants of Eastern and Southern Europe scored about 20 points below that level. These low scores of 50 to 60 points are nowadays typical for the weakest countries in Black Africa.

The tests have to be updated sometimes in order to get adjusted to changing mean scores of the measured populations. Due to the rise of IQ in the industrialized countries during the course of the 20th century the tests were repeatedly modified. The tests have been updated by inserting of more difficult questions (Sowell 1994, p. 171). Compared to the test standards of 1918, white US-Americans would have attained 125 points at the average in 1995.

The IQ of immigrants from England, France and Germany was above 100 in the USA during World War I, while the IQ of immigrants from the backward Southern and Eastern Europe was below that value. 67% of US-soldiers from England attained scores over 100, so did 49% of the Germans, but only 26% of the Irish, 19% of the Russians, 14% of the Italians, and 12% of the Polish people (Sowell 1994, p. 162). The low performance of these ethnic groups refers to a fact that the psychologist H. H. Goddard explained in 1913 this way: “These people can not deal with abstractions.”

The tests carried out in World War II revealed that the IQ of US-soldiers had risen for 13 points in the time span of about 25 years between the two wars (Tuddenham 1948). The IQ of US-citizens of Italian origin was 92 during the third decade of the past century, it rose to 95 in the fourties, and to 100 in the seventies. The IQ of US-citizens stemming from Poland was measured with 91 in the third decade, grew to 99 in the fourties and reached 109 in the seventies (Sowell 1994, p. 166). The rise of the IQ of the Jews of Eastern Europe is most impressing. Most of the Russian and Polish immigrants had been Jews, measured with scores of around 80 at Ellis island. Within a few decades they succeeded in attaining average scores of about 115 (Pintner 1931, p. 453; Sarich/Miele 2004, p. 231).

White US-Americans, living in remote rural areas, continued to score with around 85 (Sowell 1994, p. 163). Catholic Irish scored lower than Protestants. Rural residents on the Hebrides, tested in 1948, reached mean scores of 90 (Vernon 1969, p. 154 ff).

While the IQ of US-Americans rose between 1918 and 1995 for about 25 points (in the above mentioned tests), to the

same amount as the IQ of British people rose from 1877 to 1992, the IQ of people from Eastern and Southern Europe increased for more than 40 points in the past 100 years. Today, there are no big IQ differences left within white people in Europe, whether they may live in Western, Eastern or Southern Europe (Irvine/Berry 1988; Lynn/Vanhanen 2002).

The proper interpretation of the data induces a clear pattern and indicates a clear explanation. 100 years ago, the higher IQ of the British people, compared to that of US-Americans, French and German immigrants, was bound to the advance of modernization in England at that time. The IQ advance of almost 20 points, British, French and German immigrants had, compared to the immigrants of Southern and Eastern Europe, completely lies in the context of this connection between the levels of intelligence and modernization.

100 years ago, the three advanced countries had developed high levels of industrialism and had built up a school system encompassing the whole population. However, the other backward European countries were characterized by low levels of industrialization and education (Oesterdiekhoff 2005). After World War II, the modernization of Eastern and Southern Europe caused the rise of their populations´ IQ. This fact fits the phenomenon called the Flynn-effect that describes the steady rise of IQ of all populations from industrialized countries during the past 100 years.

1.2. IQ gains in different cultures

The rise of IQ started with the beginning of industrialization in the 19th centuries, according to a widespread opinion among researchers (Meisenberg 2006; Flynn 2006; Neisser 1998 b; Oesterdiekhoff 2006). Therefore all pre-modern populations must have been characterized by a very low IQ in the whole history of mankind, in all cultures and ethnic groups around the globe. Scores around 50, typical for populations of the weakest countries in Black Africa of today and corresponding to those of immigrants of Eastern and Southern Europe 100 years ago, are not even the lowest basis of the cultural development of intelligence. Even the scores of present-day Black Africa and of Eastern Europe 100 years ago are results of cultural developments. The IQ of Indians of North and South America, Australian Aborigines, Khoisan and other Black ethnic groups, and pre-modern Europeans and Asians typically are falling in the range of 50 to 70 (Irvine/Berry 1988; Lynn/Vanhanen 2002; Lynn 2006). These scores are measured in this range if the peoples of these cultures didn´t stand much or not at all under modern influences. This is the clear result of thousands of studies carried out in the last 130 years since the days of Francis Galton.

An IQ of 50 points is typical for the IQ of an eight-year-old child in modern society (related to adult standards of course) (Vernon 1969, S. 19, 77). But all grown-ups even in backward societies can speak and think, are enabled to master their daily lives and to act successfully, maybe to certain limits compared to modern adults. Even if their mental capacity does not surpass the qualitative level of a child, pre-modern adults have acquired much more life experience and practical knowledge. The differentiation between quantitative and qualitative aspects of cognitive development is necessary in order to understand both the similarities and differences between children and pre-modern adults (Oesterdiekhoff 2006).

According to present standards, more than 90% of the Britons born in 1877 had an IQ of under 75 (Raven et al. 1993). 90 years ago, Eastern and Southern Europeans showed IQ scores of 55 or 60. Against the background of these and other

data and considerations we have to conclude that even the people of Northwest Europe had such low scores before the beginning of industrialization and modernization in the 17th and 18th centuries. We come to the clear conclusion that the French, English and Germans had IQ scores from 50 to 70 in the 18th century, scores absolutely comparable to those of non-European peoples of pre-modern societies around the globe.

These facts disprove the basis of the ice age theory, still popular among anthropologists and psychologists. According to this theory the harsh climate of ice age caused the genetically higher intelligence of Caucasians and Orientals, while the allegedly easier life in the tropics selected not so strictly concerning this (Lynn 2006; Molnar 2002). But pre-modern European populations had no seriously higher intelligence than pre-modern black or tropical people. So we have to conclude that all pre-modern populations scored in the range from 50-70, whether the ethnic groups were black, yellow, red, or white. The rise of the European intelligence above that level is due to processes lasting for no longer than 200 years. If the ice age theory was right, the higher intelligence of Europeans should have manifested in their early history and could not be a phenomenon limited to the last few centuries. The cultural achievements of ancient and medieval times in Europe have been brought in the context of the mentioned low intelligence range. The scores of ancient Europeans have not been higher than those of the people from Russia, Poland, Greece, Italy, Spain or Portugal 90 years ago, populations, living in modern nations and developing industrial countries. 90 years ago, Russia, Poland and Italy had developed higher standards than the old Roman Empire.

Racial theories of intelligence are refuted by the fact of the actual rise of the intelligence of non-European, black populations, living in societies standing under influences and pressure of modernization. Racial theories of intelligence might be plausible in case that tropical populations would not develop a higher intelligence in modern milieus and cultures. However, the concerning facts do not confirm this possible hypothesis. Even if there may exist genetically based intelligence differences between races, social, especially educational influences can counterbalance them in any case and related to all ethnic groups. Asians and Europeans in pre-modern societies have a lower intelligence than Blacks or Australian Aborigines in modern societies, especially if they are living in city milieus, as for example in Durban, Nairobi or Sydney. The connection between low intelligence and pre-modern social structures to the one hand and higher intelligence and modernity to the other hand concerns all races. Without having these facts and relationships in mind it is impossible to find the key for a proper understanding of the test results to the one hand and of the cultural history of mankind to the other hand (Lurija 2002; Vernon 1969, p. 42, 219, 232; Barber 2005, p. 275; Klich 1988, p. 433 f; Oesterdiekhoff 1997, 2000, 2006).

1.3. Black and White in the USA

The difference of 15 points between Blacks and Whites in the US corresponds to the same difference between Jews stemming from Western and Eastern Europe in Israel, or between Catholics and Protestants in Northern Ireland (Sowell 1994, p. 160; Vernon 1969, p. 74). The gap between black and white US-soldiers in the First World War amounted 17 points, in the Second World War 23, and in Vietnam War still 23 points (Hauser 1998, p. 220). Many authors (such as Herrnstein/Murray 1994) interpreted this long lasting gap in genetic, biological terms. To my opinion there is no reason to explain the phenomenon in other terms and theoretical contexts than those above explicated. Even when the gap

between Black and White wasn´t reduced till 1970, the Blacks nevertheless experienced a rise of their IQ till that time point. The missing decrease of the gap till 1970 is to relate to the fact that both Blacks and Whites increased their IQ in the preceding generations. The evidence for the rise of the intelligence of the Blacks goes back at least to 1909 (Huang/Hauser 1998, p. 319). Even in the First World War, the Blacks in the higher developed north of the US scored with 90, in the south with 80. In the First World War, the black soldiers from Ohio, Illinois, New York, and Pennsylvania scored higher than white soldiers from Georgia, Arkansas, Kentucky, and Mississippi. Black orphans adopted by white families scored with mean values of 106 (Sowell 1994, p. 167). The greater readiness to adoption among upper middle class families obviously accounts to this fact. These social milieus are able to affect positively the development of children, able to encourage and socialise higher intelligence in formerly disadvantaged children.

In the year 1980, the Blacks reached the IQ-level of the Whites of 1930 (Neisser 1998 b, p. 5). A new trend has risen for the age groups born after 1965. The intelligence gap between White and Black has begun to close in the past 40 years. Between 1965 and 1980, the intelligence of the Blacks increased faster than that of the Whites. In the time span between 1970 and 1985, the differences of Black and White in reading competence decreased for about 50%, in maths for 25-40%, and in science 15-25%. The mean IQ difference was reduced for about 7%. Social programs and social mobility account for the cultural modernization of black milieus. Smaller families, longer education and better jobs helped black parents to improve their support for their children´s school achievements (Hausser 1998, p. 220; Grissmer 1998, p. 251, 263).

1.4. IQ gains after 1945

The IQ has continuously risen not only in the industrialized countries after 1945, following a trend going back at least to the 19th century. The IQ of school children (aged 6 to 16 years) increased for 17,5 points (Wechsler) between 1948 and 2002 in the US (Flynn 2006). The IQ (Raven´s Progressive Matrices) of the Dutch people increased for 21 points between 1952 and 1982. In France between 1949 and 1974, a gain of 25 points (Raven´s) was attained, in maths and vocabulary 9 points (the gains in fluid intelligence mostly have been greater than in crystalline intelligence). Children aged from 6 to 15 gained 20 points (Wechsler) in Japan between 1951 and 1975. The age groups from 7 to 15 in Western Germany developed similarly and won 20 points (Wechsler) between 1954 and 1981, too (Flynn 1987, p. 172-182). However, the IQ rise has been stagnating in the industrialized countries after 1990.

The IQ of the Russians tremendously increased in consequence of the communist modernization and educational programs (Vernon 1969, p. 16, 232; Lurija 1986). The same factors account for the IQ rise of the Chinese. They won 22 points (Raven´s) from 1936 to 1986 (Flynn 1998, p. 49). The Eastern Asians (the so-called “Orientals”) had childish and superstitious minds 100 years ago, more than the Europeans at that time (De Groot 1910). Japanese children, living in rural areas around 1920, had an IQ of 77, according to the former adjustments (Lurija 2002, p. 42), so did Chinese rural residents (Sowell 1994, p. 160).

The orientals, whether they lived in their original countries Japan, China, Taiwan, and Korea, or as immigrants elsewhere, succeeded more and more in outperforming other ethnic groups in the course of the 20th century. While they are not

superior to Caucasians in verbal topics, they have nowadays surpassed them in all other mental areas. The IQ of Chinese and Japanese was below that of the Whites in the sixties and seventies according to the conclusions of J. Flynn (1991), basing on his reanalysis of eleven leading enquiries carried out in the USA. According to these studies, their non-verbal mean IQ was in the range of scores from 94 to 101, the verbal mean IQ ranged from 90-95. The Orientals were in comparison to the Whites more successful in their careers and jobs despite their lower IQs (Chan/Vernon 1988, p. 352; Iwawaki/Vernon 1988, p. 375). According to Flynn´s observations, Orientals can better exploit their intellectual potential due to their strengthened discipline. So they are better in school achievement tests than in IQ tests. Children from poor, but oriental origins outperform children from wealthy milieus, but other ethnic backgrounds such as Native Americans, Black or Mexican ones (Sowell 1994, p. 159, 172). The cultural factor is more decisive than the socioeconomic factor. Discipline, achievement values and a positive parental attitude to education are more strongly developed among Orientals than in other ethnic groups (Sowell 1994, p. 172, 181 f; Vernon 1969; Iwawaki/Vernon 1988; Chan/Vernon 1988; Flynn 1991).

According to Lynn (2006), the average IQ of Orientals amounts 105 today, of Europeans 99, and of Indians and North-Africans 84 each (adjusted to British mean scores). The mean IQ of Black Africa amounts 67 and that of the Khoisan only 54. The following numbers result from a regional, not ethnic classification, according to Barber (2005, p. 280): Europe (25 nations) 97.48, Africa (17) 70.82, Asia (20) 91.50, North and South America (15) 87.13 and Oceania (4) 92.25. America, Asia, and Europe attained the highest IQ gains during the 20th century. The IQ (Raven´s Matrices) rose for 18 points in Argentina from 1968 to 1998 and in Israel from 1954 to 1984. There is evidence for rising IQ scores even in Black Africa, for example for Kenia, but to a smaller amount (Flynn 2006). The relationship between the Black African and the British IQ has not changed in the past 130 years (70: 100), although the British IQ has enormously risen in this time span. 130 years ago, already Francis Galton measured the Black African IQ with 70. The African IQ obviously increased nearly to the same amount as the British IQ did. This increase is due to the remarkable social changes that took place in the Black continent. Simon Biesheuvel (1943), the great old man of Black African intelligence research, showed clearly that improvements in nutrition, education, and parental attitudes can increase Black African intelligence a lot.

1.5. Causes and conditions of the IQ gains

There is a causal connection between pre-modern social structures and low intelligence to the one hand and modern social structures and higher forms of intelligence to the other hand. Which concrete structures of modernity force *and* attract the rise of higher intelligence? Greater and more extensive test experience of modern, educated populations can not explain the rise of the IQ. A lot of test experience provides a gain of 6 points, not more, even not in developing regions (Flynn 1998, p. 42; Vernon 1969, p. 103 ff). IQ gains between *generations* in the past 100 years are bigger than the best *individual* educational programs have attained. Persons who spent their whole youth from 3 to 18 years of age learning in the frame of such programs could increase their IQ to an amount of up to 20 points above otherwise expected scores. Against this background the neo-Lamarckian theory of Storfer (1990) seems to be very attractive, even if in consequence of the studies of A. Weisman since 1883 such positions are held to be refuted. However, Storfer maintains that the IQ gains are a result of life experiences and their genetic storage.

But among all factors examined so far it is quite clear that quality and quantity of school attendance are the strongest factors for the rise of IQ. Illiteracy is usual and widespread in pre-modern societies. Compulsory school attendance and the spread of secondary school systems and universities are necessary parts of modernization processes wherever they have taken place so far. The length of school attendance explains two third of the rise of IQ (Barber 2005, p. 274).

According to Herrnstein and Murray (1994, p. 144, 32), the share of high school graduates to an age group amounted 6% in the USA in the year 1900, comes to 55% in 1950 and to 75% in 1962. In 1948, 13% of a cohort got a bachelor´s degree, 25% in 1972 and 30% in 2000. The high correlation between IQ and school achievement, measured with r = 0.92 (Meisenberg 2006, p. 121), gives evidence that the extension of school attendance and the increase of the quality of school education are the most relevant causes of the IQ gains during the 20th century. Illiterate children in Black Africa lose 5 points per year in comparison to schooled children (Vernon 1969, p. 77). The school attendance in England came to the double amount of that in Jamaica in the sixties. One third of Jamaican children were illiterates at that time. The correlations between the amount of school attendance and the mean IQ of 75 in Jamaica are quite obvious (Vernon 1969, p. 168, 172).

„It is virtually axiomatic that formal education has a marked effect on test performance in the African context. Strong positive relationships between test performance and the amount of schooling have been found in nearly every African study, regardless of whether it was conducted within the strictly psychometric or the more experimental cognitive research paradigms.” (Kendall et al. 1988, S. 306)

Health, nutrition, small families, parental attitudes and behaviour, parental care for discipline and support – these are the decisive factors affecting both IQ and cognitive development according to J. Piaget (Vernon 1969, p. 66, 218 f, 232; Biesheuvel 1974, p. 223; Adjei 1977).

In the year 1920 in USA, 18% of the mothers and 16% of the fathers graduated from high school, compared to 81% of the mothers and 86% of the fathers in 1983. Highly educated parents can educate their children and help them with their homework much better (Greenfield 1998, p. 90, 137). These social factors mostly are a part of a coherent set, their individual influence each can hardly get analytically separated and weighted. These factors are mostly altogether weakly developed in pre-modern societies, while in modern societies the rate of families with high values in these features has continuously increased. The entire socialisation theory and test research of the past 100 years verifies this explanation model. It is valid concerning to nearly all methods of testing achievement and cognitive structures (Vernon 1969, p. 33; Biesheuvel 1943, 1974, p. 223; Klich 1988; Dasen/Berry 1974; Dasen 1977; Freitag 1983; Schöfthaler/Goldschmidt 1984; Irvine/Berry 1988).

Undernourished groups develop weaker IQ scores. However, in cross-cultural studies the influence of nutrition on intelligence very often has been overestimated (Lynn 1998; Martorell 1998). According to Flynn (2006, 1998, p. 44), education accounts more than nutrition to the IQ gains especially in industrialized countries after 1945. There is a lot of evidence for the higher influence of education than nutrition even in developing countries despite widespread malnutrition (Dasen 1977; Eckensberger 1979; Lurija 1986; Biesheuvel 1943, 1974; Oesterdiekhoff 2006; Greenfield 1981).

The transformation from physical to mental job activities in economy and professional world requires more and more the development of higher forms of intelligence. The rate of unskilled workers has been diminishing, while the rate of more intellectual job activities has been increasing. The rate of skilled jobs such as technicians, managers and professionals amounted 17% in the USA in 1950, but 33% in the year 2000 (Flynn 2006). These jobs require, support and enforce intellectual flexibility, abstractive thinking and on-the-spot problem solving. Not only the educational system, but also the professional world is a decisive motor in the promotion of intelligence and mental capacity (Oesterdiekhoff 1997).

1.6. Causal interaction between culture and intellect

The increase of intelligence has been a prerequisite of the structure and development of the industrial society. A hypothetical weakening of intelligence caused a decrease of innovations and organisational capacities, implying a deterioration of the entire economy. The increase of the intelligence to the one hand and the different stages of cultural development to the other hand are mutually conditional. Cognitions and artefacts (institutions, knowledge, and technologies) build a network of mutual reinforcements and so both attain higher levels. But, only in the early modern time cultural development reached a level to be enabled to drive the human intelligence above archaic stages. Book printing and school education might have been the decisive factors to push the intelligence into new and higher stages. The so increasing intellect could open the door for the process of modernization and industrialization in Europe which itself again revealed necessities and possibilities to put through nationwide compulsory school systems. This educational extension again promoted the professional, technological and economical development. This cycle dynamic between mind and society hasn´t stopped since the beginning of modernity and forms the basis of modern cultural development (Oesterdiekhoff 1997, 2000, 2006).

Above all, human mankind has continuously increased their intelligence, especially in the last 200 years. This increase of intelligence took place, but in a smaller and narrower range, in the past millenniums, too. The literate Greeks might have been more intelligent than other ancient people 2300 years ago. Against the background of the above mentioned enquiries, for example the examinations of Raven (1993) and Storfer (1990) and further results (Oesterdiekhoff 2006), we can be sure that even the ancient Greeks will not have reached the British IQ of 1877. The entire pre-modern mankind was characterized by an intelligence that ranged below an IQ of 70, no matter whether they were populations of old Rome or China, or hunters and gatherers from remote areas and deserts (Irvine/Berry 1988).

1.7. Intelligence research as part of developmental psychology

The intelligence of mankind moved in a range typical for children from 4 to 10 in our culture. Due to their greater life experience (than children have) the humans could master their lives successfully (within certain limits), but their mental capacity was restricted and suffered from a lack of abstractive and reflective competences. In the second part of this article I am going to show that the nature of the low intelligence of pre-modern populations precisely lies in the existence of primitive cognitive structures and in the lack of abstractive competences. All these features must be explained in terms of developmental psychology. Pre-modern populations really are characterized by archaic, childish mental processes,

while modern populations comparatively have mentally matured by establishing the formal operational thinking, for the first time in world history. The rise of IQ must be identified with the development of abstractive and logical thinking, named formal-operational thinking in terms of developmental psychology. The process of mental maturation of mankind started in Europe since the eve of industrial revolution. It was the same mental maturation that nowadays in industrialized countries the adolescents develop between their 10^{th} and their 18^{th} year of age. The ontogenetic development of formal operations that characterizes today the normal cognitive development of adolescents and adults is the result of a maturation stage of mankind not older than 300 years ago (Oesterdiekhoff 2006, 2006 b, 2000, 1997). This mental maturation is the main cause of industrial revolution and vice versa (causal interaction between cognition and culture). The intelligence continues to rise with progressive modernization of the industrial societies. The modernization of Asia, Latin America and partially of Africa caused the rise of their IQ, too. In the course of the 19^{th} and 20^{th} century, mankind has been surpassing the childish, archaic mental state and is more and more developing the operational thinking.

The psychometrical intelligence research partially acknowledged the origin and reference to developmental psychology as its own and real theoretical basis. For example, William Stern was both a leader of developmental psychology and intelligence test research. The young Jean Piaget worked in the laboratory of Alfred Binet in Paris. With progressive age children and teens continuously improve their test results until they reach their adult scores. This ontogenetic rise of intelligence requires the development of age-related test adjustments. Youths and adults with lower than average test scores are behind the normal paths of intellectual development. For example, adult imbeciles with their IQ between 20 and 50 are corresponding to children from 4 to 8 years of age (= preoperational stage of cognition), while persons suffering from debility with an intelligence from 50 to 70 are corresponding to children between 8 and 13 (= concrete operational stage) (Vernon 1969, p. 19; Inhelder 1944). This developmental implication and classification is a general praxis in psychometrics. Mental developmental age and maturational level are widely used concepts. Already Porteus estimated the IQ of the Kalahari-Khoisan to a developmental age of 7.5 years. Illiterate Brazilians do not develop above a mental level of 7 years of age, a typical and regular final stage of illiterate people. The intelligence of pre-modern adult populations does not surpass the level of children ten or twelve years of age living in modern societies (Vernon 1969, p. 77, 142, 19; Freitag 1983; Crijns 1966; Porteus 1937; Werner 1959), a result that has been completely verified by Piagetian Cross-Cultural Psychology over the last 70 years.

„Moreover more backward groups typically fail to progress as far as others along this scale, and though they may develop lower-order skills which are highly effective for survival, their reasoning capacities remain similar in many ways to those of younger children, or even regress through lack of appropriate stimulation. That is they learn to be unintelligent, instead of acquiring the skills that constitute intelligence. An important implication is that man has by no means reached the limits of his mental powers; there is immense room for improvement at the lower end of the scale, and also the possibility of more effective ´techniques´ at the top end.” (Vernon 1969, S. 215)

The very nature of the test results on intelligence (and on the Flynn-effect) in different cultures can be grasped only by the consideration that low scores are stemming from the childish-archaic mental state as their source and origin. The Flynn-effect reflects the mental maturation of mankind in the literal meaning of the word. The developmental psychology reveals the very nature of psychometrical intelligence research. Psychometrics has a real scientific basis only in the frame of

developmental psychology.

2. Piagetian Cross-Cultural Psychology and structure-genetic sociology

2.1. The relationship between theory and empirics in psychometrics and developmental psychology

I want to show in the second part of this article that the cross-cultural developmental psychology works out the same results as the psychometrical intelligence research. Both paradigms are leading in intelligence research and have the largest experience in cross-cultural research. The cross-cultural Piagetian research relies on the publications of Jean Piaget, the most prominent scholar in developmental psychology, and on more than 1000 enquiries in more than 100 cultures and ethnic groups, carried out in the frame of Piagetian theory. The developmental psychology has the theoretical frame that reveals the very nature of the psychometrical results. More than the psychometrics, the developmental psychology mediates a clear and encompassing insight in thinking, psyche, personality, and world view of humans on different developmental stages. While psychometrics only can collect answers, but has finally no theory to explain their sources, especially not the sources of the wrong answers, developmental psychology can explain both wrong and right answers by referring them to different stages of cognitive development. The answers are indicators to different cognitive developmental stages as their origins and the test behaviour (answers and reactions) is designed to be an empirical indicator matching theoretical explanations.

The theory of Jean Piaget describes four stages of mental development which come into being in a hierarchical and logical sequence during childhood and adolescence. Each following stage is characterized by a plus of mental, abstractive and logical capacity. Each stage is characterized by cognitive structures that process the social, physical and psychic experience in a different way. These cognitive structures can sharply be identified by specific answers and test behaviour which have their sources in these structures and are therefore typical only for them.

2.2. Stage theory of cognitive development

The decisive cause for the stepwise character of the cognitive development of children is finally of physiological nature. The human brain needs a time span of two decades for its full development. This maturation of brain corresponds to the successive development of mind, psyche and personality (Piaget/Inhelder 1980; Kohlberg 1974).

The suckling develops his abilities in the frame of a mere practical, not symbolic intelligence during the first, sensory-motor stage of his life. Language, mental representations and symbolic activities are formed in the second, preoperational stage of mind, starting after the 18^{th} month of life. This second stage forms the specific human intelligence and provides humans with the necessary basic abilities for action, speaking, and thinking. The stage of concrete operations develops between the 6^{th} and the 12^{th} year of age. Humans learn in this stage to organize their world experience by logical co-ordinations. But the logical co-ordinations are only then successful in this stage when the material object is given to the senses. The fourth stage of formal operations is defined by logical co-ordinations referring to ideas, thoughts and

abstractive mental concepts (co-ordination of ideas is more difficult than that of objects). The formal operations develop reflexive, abstractive, experimental, and hypothetical-deductive instruments and capacities. This stage is bound to adolescents and adults in modern societies and comes there into being in the second decade of life (Piaget/Inhelder 1980; Piaget 1984).

I name the mind below the stage of formal operations as pre-formal and conceptual-realistic. This pre-formal mind is the mind of children and provides the basis for the world view of children, characterized by animism, magic, artificialism, and anthropomorphism (Piaget 1981; Werner 1959; Bühler 1930; Zeininger 1929; Stern 1928). The mechanical, magic-free world view comes into being as a consequence of the breakthrough of formal operations, but both interconnected developments are bound only to adolescents living in modern societies. The mind of adults in pre-modern societies remains in the limits of pre-formal and magic-animistic structures.

2.3. Cognitive development in different cultures

The maturation of brain and mind from suckling to adult takes place on the basis of general laws in every culture. Different cultures nevertheless affect this biological-psychic development by influencing the final developmental stage adults can achieve. Humans in modern societies develop mostly at least the sub-stage A of formal operations, are capable to think in syllogistic, abstractive and logical ways. Only schizophrenic and other mentally disordered persons in modern societies preserve the magic-animistic thinking and world view of children and pre-modern societies (Werner 1959; Zeininger 1929; Piaget 1981; Inhelder 1944). The final stages of adults in modern societies therefore distribute along the cognitive levels of adolescents between 10 to 18 years of age (Oesterdiekhoff 2000, p. 114 ff; Piaget 1974 b). Formal-operational thought is a feature of educated milieus in industrialized countries and delivers the basis to scientific education and activities (Piaget/Inhelder 1977; Piaget/Garcia 1989).

The laws of developmental psychology are valid for humans of all cultures. On the lower stages, the reactions and answers of humans of all cultures correspond to the known reactions and answers of humans of modern societies. This fact fits the universal state of stage theory and developmental psychology and their claim to derive basis structures of human development from the development of brain structures. The lack of formal operations among pre-modern adults is far from being an exemption to this regularity, because they do not think in exotic and unknown, but in pre-formal structures. A leading head in Piagetian Cross-Cultural Psychology came to the conclusion: “Whenever Piagetian tests are applied in non-Western cultures, the same stages as those originally described by Piaget are found, but the rate of development is usually affected by environmental influences.” (Dasen 1974 b, S. 381). „It was found that the responses and explanations given by the Aboriginal children could be classified without difficulty into the stages described by Piaget.“ (Dasen 1974 b, S. 395).

All humans from pre-modern societies develop the sensory-motor and the pre-operational stage along the usual developmental path. The third stage, the concrete-operational thought, however, develops with a time lag of some years. Besides, it is developed only by a more or less big rate of the adult population and even then only in special aspects and areas. Formal-operational thought is usually absent from adults in pre-modern societies. The partial development of

concrete operations and the lack of formal operations are the two main features of pre-modern cognitive structures. The influence of culture on cognition is therefore remarkable. The percentage of adults that reaches the concrete operations usually ranges between 20 to 70%, depending on the examined population and theme. Pre-modern populations are asymptotically divided in preservers and non-preservers, in those who attain the concrete operations, and those who fail in doing so. Even among preservers in pre-modern societies, the concrete operations do not reach all parts of experienced and processed reality, but remain bound to special themes and fields of experience. Physical aspects such as masses, volumes, lengths, numbers, space, time, weight, classifications, causality, chance, probability, possibility, necessity, and social aspects such as understanding of perspectives, social interactions, concepts of punishments, intentions etc. are reaching selectively the stage of concrete operations, depending on the culture examined and on varying percentages of humans. While humans in industrial societies develop the concrete-operations in almost all fields of experience, the percentage of humans in pre-modern societies, who develop this third stage, do this only in some selected and special fields of experience. For example, while residents of deserts regularly preserve lengths and spaces, but not volumes and weights, village residents behave directly opposite in these four experience fields. And this phenomenon must be considered in the context that only certain percentages in both archaic societies preserve the named fields (Dasen 1974, 1974 b, 1977; Eckensberger 1979; Freitag 1983; Greenfield 1981; Kohlberg 1974; Mogdil/Mogdil 1976, Vol. 8; Poortinga 1977; Schöfthaler/Goldschmidt 1984; Werner 1979; Vernon 1969; Hallpike 1994; Oesterdiekhoff 1997, 2006).

The lack of formal operations and the only partial development of concrete operations in pre-modern societies are deeply interconnected. It is the more intelligent part of the population that is ready to form the operations. The more intelligent part is only able to form the concrete operations, with a time lag of some years compared to western developments, but completely fails to develop the formal operations. The broken and partial development of the concrete operations hints to the lack of formal operations.

Adults from hunter and gatherer bands, from rural village regions, from socially weak and illiterate milieus in present-day developing regions do not develop the formal operations. Their final stage is characterized by pre-operational or concrete-operational stages of thinking. Their final adult stage lies along the cognitive level of children from 5 to 10 (or 12) years old. “According to this evidence, it can no longer be assumed that adults of all societies reach the concrete operational stage. However, the cross-cultural differences summarized above are *quantitative* ones only. It is the rate of development which is in questions, not the structure of thinking. As such, the generality of Piaget´s system is not threatened.” (Dasen 1974, p. 418)

Humans in industrial societies develop at least sub-stage A of formal-operational thought, i. e. they master syllogistic, hypothetic-deductive, reflexive and abstractive ways of thought. About 50% of young adults in industrial societies also master sub-stage B with more difficult tasks such as systematic, experimental and combinatory controls. Schröder (1989, p. 204 f) showed that 50% of German adolescents aged 15 attain sub-stage B. These values are typical to other Western countries (Mogdil/Mogdil 1976, Vol. III, p. 149).

All enquiries in formal operational thinking in pre-modern societies came out with the result that the highest stage is not

developed in pre-modern societies. “The formal properties of thought, which are evidenced by some of the formulations the European children use, are absent from the explanations the Aborigines give.” (Dasen 1974 b, p. 395). Opposite to archaic cultures, some first elements of formal thinking are evidenced in developing countries standing under modernization pressure. So Barbara Freitag (1983, p. 354) found out that illiterate children aged till 16, living in Favelas in Sao Paulo, stay to 50% at the border to concrete operations, further 41,6% are staying within concrete operations, and 8,4% at the border concrete / formal operations. 59% of the youth in Sao Paulo master the first steps of formal thinking after 8 years of school attendance. While 66% of white boys and 44% of white girls after six years in Australian schools master the pendulum task (sub-stage B), nobody among 1500 people from Papua New-Guinea was capable to solve this problem. Only a small percentage of university students from Papua New-Guinea and Black Africa were successful in this task (Kelly 1977, p. 183), a fact confirming the old observation (for example, from Erich Wulff) that students from developing regions have to learn both the discipline and logical thinking. Normally, secondary school should provide pupils with formal operations. But in developing countries there is no guarantee that schools are successful in doing so.

Peluffo (1967) evidenced that 55% of the sons of workers in Geneva and of sons of clerks and professionals in Sardinia reached the formal operations, but only 25% of rural adolescents and 20% of illiterate adult rural residents in Sardinia. This shows that formal thinking is no genetic heritage to Europeans and had not existed in pre-modern Europe. The rising modernity is the cause of the spread of formal thinking in Europe and the rest of the world.

„However, formal operational thinking is apparently absent in many world cultures and is not even universally present in the population of economically developed countries… One interpretation is what might be called the deficit-deprivation hypothesis. In this view, some children may not attain higher forms of cognition because their culture or ecology does not provide them with prerequisite experience or information.” (Chapman 1988, S. 98). Hundreds of enquiries and authors have drawn the same conclusion. This conclusion is the result of 70 years of empirical research, the résumé of all relevant enquiries (Oesterdiekhoff 2000, p. 110 ff; Werner 1979; Hallpike 1994). Jean Piaget has shown in almost all of his publications that the thinking of children corresponds to that of pre-modern cultures in every single aspect. „In particular it is quite possible (and it is the impression given by the known ethnographic literature) that in numerous cultures adult thinking does not proceed beyond the level of *concrete operations*, and does not reach that of propositional operations, elaborated between 12 and 15 years of age in our culture.“ (Piaget 1974 b, S. 309)

Both Piagetian Cross-Cultural Psychology and psychometrics can show that the development of intelligence is not genetically bound to specific races, but results from cultural influences. All pre-modern cultures are characterized by conceptual realism and pre-formal thinking, while formal operations are specific to industrialized countries. Pre-modern populations are always pre-formal, no matter whether they are Europeans, Asians, Americans, Africans, or Australians. However, when Australian aborigines, Black Africans, Asians or Native Americans are integrated and socialised by modern milieus early in their lives, then, according to all related studies, they develop operational competences like modern white ethnics (Dasen 1974 b, 1977; Poortinga 1977; Eckensberger 1979; Werner 1972; Mogdil/Mogdil 1976, Vol. III, Vol. VIII.; Hallpike 1994; Oesterdiekhoff 2006, 2006 b).

Persons reach the same levels both in IQ-tests and Piaget-tests. There are strong correlations between classical

intelligence tests and Piaget-related tests. Piaget-tests are involved in psychometric test batteries for more than 50 years, for example by Jensen, Tuddenham, and Vernon (Vernon 1969; Mogdil/Mogdil 1976, Vol. VIII, p. 59 f; Freitag 1983; Bruner/Greenfield 1981). „Children in non-industrial societies have been found to score at the lower levels of Piagetian operativity as well as on traditional Western intelligence tests." (Mogdil/Mogdil 1976, Vol. VIII, p. 70). When, for example, Orientals are better than Whites in IQ-tests, then in Piaget-tests, too (Mogdil/Mogdil 1976, Vol. VIII, p. 60).

The conclusions are quite clear. The higher intelligence scores correspond to the formal operations in industrial societies, the lower IQ scores go together with pre-formal thinking in pre-modern societies. It is the same phenomenon, named in two different approaches. These relationships meet all races, cultures and continents. IQ scores below 50 correspond to pre-operational types of reasoning, scores between 50 and 80 correspond to concrete-operational reasoning, scores above 80 sub-stage A and above 110 sub-stage B of formal operations.

Imbecility can be identified with pre-operational reasoning, debility describes concrete operations as an adult final stage (Inhelder 1944; Anthony 1965; Werner 1959). Of course, there are differences between these three groups, mentally challenged persons, primitives, and children. But the common characteristics are quite obvious. They lie in the archaic and primitive character of their cognitive functions. The early psychoanalysis (Freud, Jung), the early developmental psychology (Werner, Piaget), and psychiatry (Storch, Zucker, Prinzhorn) worked out these common characteristics and come to the same conclusions in this regard.

As late as 2001 James Flynn realized that the IQ gains are a result of a real increase of intelligence, and not only methodological artefacts or little things with regard to intellectual improvements (personal communication with him). If he (and others, too) had the appropriate theoretical context, then he would realize the encompassing importance of that phenomenon. He and others do not know that psychometrics is a part of developmental psychology of cognitive structures. The IQ gains are not only a manifestation of the development of narrowly limited mental techniques, but are a manifestation of the development of "higher mental functions" according to Lurija and Wygotski (1990), manifestation of the psychic-cognitive maturation of mankind. The IQ gains express the surpassing of archaic, elementary psychic-cognitive levels, the quit of the childish mentality of pre-modern cultures in favour of riper structures.

2.4. Primitive mind and archaic culture

Children and "primitives" do not develop hypothetical-deductive, systematic and abstractive ways of thinking, but their mind remains bound in concrete structures. Both groups do not master syllogistic and verbal-logical problem tasks (Lurija 1986; Lurija/Wygotski 1990; Hallpike 1994; Oesterdiekhoff 2006). This fact alone clearly proves that pre-modern populations really had not IQ scores above 75.

Both children and "primitives" do not have formal operational concepts of causality, chance, probability, possibility, necessity, volumes, space, time, and all other physical, social and moral phenomena (Hallpike 1994; Mogdil/Mogdil 1976; Freitag 1983; Oesterdiekhoff 2006, 1997, 2000).

The mind of both groups bases on magic, animism, and conceptual realism. While the formal operational thinking in youth

of modern societies extinguishs the magic-animistic belief systems in favour of a rational understanding of reality, these primitive schemes persist in pre-modern adults in fully fairy-tale power and childlike vividness. These basis structures form the foundations of superstition, cosmology, mythologies, world view and religion of pre-modern cultures (Piaget 1981; Werner 1959; Stern 1928; Tylor 2005; Frazer 1977; Thorndike 1923, 2003; Evans-Pritchard 1978; Lévy-Bruhl 1930, 1959; Oesterdiekhoff 2006; De Groot 1910).

Both groups are tending to a dreamlike and fairy-tale thinking that fits all features of preoperational modes of thought. Peasants, kings and philosophers take it for granted that humans are able to fly in the air faster than rockets only by magical powers or can convert themselves in animals, stones or trees, are able to reveal huge storms or other big things at far distant places. The always working belief in witches, sorcerers, and shamans arouses from that childish basis in all pre-modern societies. The belief in telepathy, teleportation and telekinetic delivers the foundations for these fairy-tale illusions (Müller 2004). Fishermen in Mozambique still today prick out the eyes from their children, attach them on their nets in order to enable the nets to better see and catch the fish underwater. Humans commit suicide in order to find thieves in the world of spectres or to give the “spared” years to a beloved person.

Pre-modern humans explain their happiness or misery by direct interventions of spectres or demons. They explain even daily details of their lives this way. The physical death is very often understood in terms of magical murder in the ancient cultures, so that a natural death of an old man is followed by a real murder to an innocent person who is held to be the sorcerer-murderer (Evans-Pritchard 1978; Lévy-Bruhl 1959).

Religions in pre-modern cultures are more colourful and vivid than in modern societies. The daily sacrifices are interpreted as necessary prerequisites for every successful step in the everyday life. The rites guarantee the physical existence of the cosmos in a literal sense according to the artificialism of children (Frazer 1977; Tylor 2005; Piaget 1981). The own ancestors are worshipped as the most important gods in all (!) archaic cultures, as the children everywhere, even in modern societies, appreciate their parents as gods, here like there born from the same motives and sources of a deeply childish mentality (Bovet 1919; Oesterdiekhoff 2006 b). Religion and belief are in all parts and aspects manifestation of pre-formal cognitive structures. The modern process of secularization and agnosticism is nothing else than the stepwise rise of formal operational thinking respective the consequence of the Flynn effect, the quit of mankind from infantile mental stages (Oesterdiekhoff 2006, 2006 b, p. 57-63).

The homologies between children and “primitives” also concern both the social and moral understanding and behaviour. The most important trial in the archaic world is the ordeal, universal around the globe and as old as the mankind is. The ordeal implies the magical belief that natural processes and objects such as fire, water, poison or other elements can find appropriate and true judgments. This exactly corresponds to the infantile belief, the belief in “immanent justice”, described by Piaget. The children in modern societies believe in ordeals till the eight or tenth year of age; adults in pre-modern societies pertain this belief all their life as empirical surveys have found out (Piaget 1973; Oesterdiekhoff 2006; Evans-Pritchard 1978; Lévy-Bruhl 1959). The ordeals in Europe vanished not before the rise of the age of enlightenment.

Also other pre-modern law concepts correspond to pre-formal ideas. For example, the “objective responsibility” as an insufficient differentiation between motives and consequences of actions is typical for both the old law and children´s

thinking (Oesterdiekhoff 2006). Furthermore, punishment systems in all pre-modern societies are very cruel and severe (v. Dülmen 1988). Accordingly, little children tend to identify the justice of a punishment with their toughness, even brutality (Piaget 1973). The development of humanism is in all details a part of higher cognitive functions.

Archaic cultures are cultures of cannibals, in Africa, Australia, Oceania till the 20th centuries, and in both America as long as they were Indian. This phenomenon mostly disappeared in Eurasia in the first millennium B. C. Cannibalism hints to a primitive, archaic psyche. Overall, the entire history of customs and morals follows the laws of cognitive development.

The fights of gladiators, the killing of beasts and humans in antique amphitheatres are a clear expression of a primitive psyche that was further developed than the cannibals´ psyche but lower than the psyche of modern populations. Cognitive, not institutional structures account for this barbarian phenomenon. Pre-operational types of reasoning and low intelligence scores (as parts of a primitive psyche) are the main causes for the existence of these barbarian customs, standing in the centre of antique leisure time practices (Oesterdiekhoff 2006 b).

All primitive cultures have this fairy-tale, primitive, wild, and emotionally childlike character, more or less distinct according to the particularly arrived cultural level. This extreme emotionality affects all aspects of cultural life, politics, sexual relationships, war, vengeance, violence, ceremonies, celebrations, religion, entertainment and social relations (Elias 1976; Huizinga 1975; Jüttemann 1991). A lot of traces of this mentality are to find in developing countries till today.

Social relations and emotional behaviour vacillated stronger between extremes and were less in balance than today, less regulated by consideration, empathy and taking over perspectives. Emperor Commodus repeatedly entered the arena to kill unarmed slaves and animals just in front of the eyes of the state´s elite, cheered by the collected citizens of Rome. Slaves are sold on markets as if they were cattle. Sun and moon are worshipped. Humans worship snakes, mountains or rivers as gods. Humans are ritually sacrificed for all kinds of reasons. Kings and shamans heal sick persons by superstitious rituals. Humans are scared of ghosts and demons, sometimes more than of real enemies. Humans hold their hands into fire, take poison, or go over glowing coals in order to find a judicial decision. There is no doubt that these phenomena must be referred to the lower psychic-cognitive development of pre-modern populations. Humans in modern societies continuously have surpassed these primitive structures, have become more reasonable, more rational and more mature due to the increase of intelligence and operations for the past 200 years (Huizinga 1975; Elias 1976).

2.5. Archaic and modern cultures

The list of homologies concerns all areas of experience and could hardly be completed (the most important homologies are collected in Oesterdiekhoff 2006, 1997, 2000). Pre-formal thinking and the cultural patterns and institutions, emerging from these ways of thinking, are dominant in all pre-industrialized non-European cultures and in Europe till the age of enlightenment and industrialism. Belief in witches and sorcerers, magic and animism, superstition and the worship of ancestors, ordeal and cruel punishments – all these primitive patterns can be found in all pre-modern societies till to the beginning of mankind. They have been pertaining in all pre-modern cultures around the globe till to the age of enlightenment (in Europe) or till to the beginning of modernity (induced by Western contacts in non-European cultures).

The psychic-cognitive development of mankind did not surpass the childlike-elementary and pre-formal stage till the eve of modernity. The modern culture therefore bases on the cognitive progression of mankind, on the evolution of formal operations. This mental evolution took place for the first time in Europe and spread from there across the globe. It is a surprising fact that even the antique and pre-modern civilizations are intellectually more close to primitive tribes and peasant cultures than to modern societies. Belief in witches, magic, animism, superstition, cult of sun and moon, oracles, worship of the ancestors are dominant characteristics of both the old Rome, China, and India on the one hand and native tribes on stone-age levels in Australia, America, and Africa on the other hand (De Groot 1910; Thorndike 1923, 2003; Friedländer 1957; Frazer 1977; Tylor 2005). Populations both in antique civilizations and native tribes have been characterized by pre-operational types of reasoning and low IQ scores below 75. Only populations of industrialized countries have become mature, enlightened and rational, and have surmounted the infantile stages of mankind.

Modern industrial society has reached a higher cultural stage than the pre-modern world in every single aspect. Their technical, economical and institutional superiority can´t be limited to economical and technical factors, but the material superiority must be seen as manifestation and material consequence of their populations´ psychic-cognitive progression (Oesterdiekhoff 1997, 2006 b). The development of sciences and technology (Piaget/Garcia 1989), of philosophy (Fetz 1982), of arts and music (Don Le Pan 1989; Gablik 1976), of bureaucracy and state (Weber 1980), and of law and economy (Oesterdiekhoff 1997) since the early modern times are in their basic properties consequences of the evolution of the formal operations or IQ gains. The music of Bach and Beethoven, the physics of Newton and Einstein, the biology of Linné and Darwin, the philosophy of Descartes and Kant, the sociology of Comte and Spencer – these cognitive transformations are manifestations of “higher cognitive functions”, according to the Russian psychologists Lurija and Wygotski.

Modern economic growth to an amount of about 2 % per year in the past 200 years in the West, the basis of the wealthy living standards, results from a steady increase of labour productivity. Technical innovations and organisational achievements account to these increases of productivity. According to Adam Smith, aptitudes and knowledge account to these professional abilities. Operational cognitive structures are both cause and consequence of the growth of knowledge, abilities, aptitudes on the one hand and productivity, technical and organisational improvements on the other hand. The causal interaction of culture and cognition, institutions and cognitions, manifests in the interdependencies of science, professional knowledge, and cognitive competences on the one hand and productivity, economic growth and capital stock on the other hand. The cognitive evolution of industrial populations accounts to the interactive cycle of the increase of competence to the one hand and to the growing capital stock to the other hand (Oesterdiekhoff 2006 b, p. 129-155, 1997, p. 123-156).

This approach explains why European immigrants in America, New Zealand, Australia and South Africa built up industrial modernity parallel to European developments, while non-European populations have had enormous difficulties to introduce modern structures even when they had been confronted and equipped with their material achievements, technologies and knowledge (Oesterdiekhoff 1997, 2006 b).

3. Summary

Psychometrical intelligence research and structure-genetic sociology (Piagetian Cross-Cultural Psychology) are coming to the same conclusions referring to the explanation of human intelligence. Adults of all pre-modern societies around the globe are characterized by a low IQ or by pre-formal types of reasoning, while the increase of IQ or the development of formal operations is a new phenomenon in world history, bound to the development of modernity. Both research approaches have found out that the socio-cultural structures of pre-modern societies are not able to force or attract psyche and cognition to surmount elementary levels. Both research paradigms in the frame of their particular methods and techniques reached the same results that show which cultural features of modernity have caused and socialised the development of modern psyche and personality.

The comparison of both paradigms indicates that psychometrical intelligence research is a part of the developmental psychology of cognitive structures. Developmental psychology alone can evidence and reveal the full meaning and importance of the results carried out in the frame of psychometrics. The test scores do not reflect narrowly limited mental techniques, but they really are a part of an entire cognitive system, indicators to a certain level of the development stage of psyche and personality. The Flynn effect is not an anomaly, as often interpreted, but fits all data referring to the relationship of culture and cognition intelligence researched has found out so far.

Putting psychometrics in the frame of developmental psychology or structure-genetic sociology reveals enormously their importance for the development of the basics of humanities and social sciences. Psychometrics can now be connected to basic questions regarding to social evolution and social change, development and underdevelopment, and to basic structures of the history of customs, morals, science, law, and religion. Mind and intelligence, psyche and morals have not had the present-day level for the past 200.000 years. Environmental influences can variously shape and design the plastic brain structures and the immature psyche in childhood. Different cultural levels cause different psychic-cognitive levels. Industrial society succeeded in promoting and driving the psychic development of humans into higher stages than ever attained before.

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