

Global Progress I: empirical evidence for ongoing increase in quality-of-life

Francis Heylighen & Jan Bernheim

Center "Leo Apostel", Free University of Brussels, Pleinlaan 2, B-1050 Brussels, Belgium

E-mail: fheyligh@vub.ac.be, <http://pespmc1.vub.ac.be/HEYL.html>

ABSTRACT. This paper argues that both the relativist and the pessimist critiques of the idea of progress are inadequate. Progress is defined as increase in global quality of life (QOL). Such QOL is intrinsically subjective, but not relative. It can be reliably measured through "life satisfaction"-type questions. The "World Database of Happiness" provides extensive data on social, economic and psychological factors that correlate with overall QOL. They include wealth, health, security, knowledge, freedom and equality. Various statistical data suggest that all these QOL indicators have undergone significant improvements during the last half century, in most of the world. This gives strong support to the thesis that progress objectively occurs.

KEYWORDS: progress, quality of life, happiness, optimism, pessimism, social indicators, forecasting, world view, evolution, development.

1. Introduction

In history, the start of "modernity" is usually taken to be the 18th century Enlightenment. During that period, a belief in rationality, progress and science spread through the intellectual establishment, paving the way for the industrial revolution (see e.g. Bury, 1955; van Doren, 1967; Nesbit, 1980). According to the ideology of modernity, rational thought as implemented in scientific enquiry is the key to discovering the truth about the world and ourselves. Such true knowledge will emancipate all individuals, freeing them from the shackles of ignorance, superstition and dogmatism. Moreover, this knowledge will fuel technological progress. By making production more efficient, it will create wealth and make our lives more comfortable and safe. Thus, the ongoing accumulation of knowledge through scientific research leads directly to economic and social progress. Since there is only one true picture of the world, there can be only one way to progress: by gradually filling in more and more elements of this picture. The more elements are known, the better science will be able to predict and control nature, and the more the individual will be liberated from the vagaries of fate.

Such a simple, deterministic view of historical progress does not fit in well with the complexity and confusion characterizing the 20th century. Atrocities like Hiroshima or the Holocaust paint a very different picture of the effects of scientific advances. Where is the progress in being able to kill thousands of people in a few minutes? Questions like these have brought post-modern thinkers to reject the project of modernity and its belief

in rationality and progress. They argue that the idea that there is one true representation of the world produces intolerance towards those who disagree with this picture. Too often, the supposedly superior Western world view has been used to justify the oppression of women and colonized peoples. Instead, the post-modernists see knowledge as a set of perspectives, where different people have different views, without anyone being "right" or "wrong". Post-modernist thinkers emphasize the relativity of good and evil, and therefore the relativity of progress (cf. Marx & Mazlish, 1996). According to them, the modern Western way of life cannot be seen as objectively superior to the way of life of more "primitive" cultures, both today in Third World countries or in the past before industrialization.

On the other hand, the publicity given to negative events and developments, such as pollution, global warming, resource exhaustion, overpopulation, famines, crime, war and terrorism has created a generally pessimistic mood, where people expect things to get ever worse. Publications such as Paul Ehrlich's (1976a,b) "The Population Bomb", and the "Limits to Growth" report of the Club of Rome (Meadows & Meadows, 1972) have sketched rather gloomy pictures of our planet's future. The media are replete with bad news of all types, from wars to corruption, unemployment, child abuse and the appearance of new diseases. This leads many people to believe that the "noble savage" of the pre-agricultural age and the god-fearing simple person of the pre-industrial age in fact had a much better life than the harried computer user of the present. They see deterioration rather than progress (cf. Marx & Mazlish, 1996), and their vision of the future is one of gloom and doom.

Our purpose here is to argue that both the relativistic and the pessimistic views are inadequate. We wish to show that life in our present society is objectively better than life in earlier ages, and that progress continues unabatedly on a variety of fronts. We will do this in two movements: part I of this paper will review empirical evidence for a continuing increase in quality of life; part II (Heylighen & Bernheim, 2000) will argue on theoretical grounds that all evolution tends to be accompanied by progress, while discussing some of the most common counter arguments that question contemporary progress.

Let us conclude this introduction with a few remarks about the scope and methodology of our inquiries. First, we are humanistic: human well-being is our central concern. (This implies no disregard for nature, on the contrary: the consciousness of humanity as a product of evolution and as part of a larger ecosystem confers due respect for all of nature). Second, we want to study the world as a whole. Though we may look at particular countries or groups for purposes of illustration, or because we lack data about others, we are ultimately interested in progress at the global level. Third, our scope in time is limited to the 20th century, because this period is characterized by a surge in both technological advances and criticisms of those advances, and because it provides more reliable data. Fourth, we want to measure what is measurable, thus supporting speculations as much as possible by concrete data. This requires a statistical approach. We believe in the law of large numbers: a phenomenon involving an individual person may be a mere coincidence, but it becomes a hard fact when it applies to averages for large groups, such as the world population. Thus, the intrinsic unreliability and subjectivity of notions such as "happiness" or "improvement" are reduced if they can be correlated with objective, statistical factors. The following section will discuss in more detail how this can be achieved.

2. Global Quality of Life

Before we can start our analysis we need to define our basic concepts. The mechanistic world view which underlies industrial society tends to reduce progress to mere material growth, increase in knowledge, or at best some additive combination of such objective factors. One might wonder whether such reductionist indicators represent global progress or merely an arbitrary or ideologically biased selection of factors, which are not representative of what people really experience as important. For example, to what extent is increase in GNP to be considered as progress, if wealth is more unequally distributed and this increase is accompanied by a degradation of the environment? The basic question concerns *values*: what is to be considered as the greater good or the greater evil? Universal norms of progress cannot be derived from objective facts. The answer to the question of value is intrinsically subjective. Therefore, we propose to use the appreciation by the subjects themselves as a yardstick, and define progress as *increase in the subjectively experienced quality of life for the world population*.

What we mean by “increase” is obvious enough. This leaves us to clarify what we mean by “quality of life” (QOL). Intuitively, we can equate subjective QOL for an individual with overall happiness or satisfaction with one’s life. We see QOL as an emergent property, which is more than the sum of its components. This does not mean that QOL cannot be measured, though. In spite of the multitude of interacting factors that affect it, people generally have little difficulty in judging the quality of experiences. For example, people can easily tell you whether they like one restaurant better than another, or whether they enjoyed their vacations more this year than last year. Similarly, if the questions are asked in the right way, they are able to seriously answer the serious question on overall quality of life, and express their feeling of satisfaction with their life in general (Bernheim, 1999a).

2.1. Measuring QOL: felicitemetrics

There exist a number of standardized item-based questionnaires for evaluating QOL. These typically subdivide QOL into different domains or components, that are captured by a validated set of selected items. For example the SF-36 test (Ware et. al, 1993) derives a health-related QOL profile with the following dimensions: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. However, such instruments do not allow you to determine the overall QOL of an individual, since it is not clear how the subscores on each of the dimensions should be added. For an individual, it seems impossible to determine the “weights” of each of the components, since one typically only becomes aware of the importance of a component when it is lacking. Moreover the different components will generally interact in non-linear ways, so that even if we knew the relative importance of each, we would not be able to add them together. Finally, we can never be sure that all relevant dimensions of QOL or happiness are included in a multi-item questionnaire. In short, QOL questionnaires are useful for the *per se* worthy goal of identifying problem areas so as to get clues for remedial action. However, they *describe* quality of life components but do not *evaluate* quality of life itself, neither in individuals nor in populations (Bernheim, 1995).

These deficiencies can be overcome by using a global QOL measure, such as ACSA (Anamnestic Comparative Self-Assessment, Bernheim & Buyse, 1984; Bernheim, 1999a), where people evaluate their overall feeling. The original feature of ACSA, in comparison with other “uniscales” or global assays, is that it does this by asking people to compare their present situation with the best and worst situations they have experienced in their life, thus defining an exquisitely personal scale. Using ACSA

together with multi-item questionnaires in principle allows us to derive weights for the different components, by calculating to what extent each component correlates with the overall QOL. However, Rose et al. (1998) found that with ACSA the QOL dimensions of standard instruments have different weights in different categories of people, thus showing that multidimensional instruments cannot be universal or generic.

The specific advantage of ACSA as a global tool is that it uses an internal (personal) standard for QOL. This eliminates social desirability, trait and cultural biases, e.g. where people answer that they are happy or unhappy, because that is what they feel they are expected to do, or because they are constitutional braggers or complainers. Such biases can be culturally determined. For example, we might expect that in the USA, where success or failure is typically seen as the individual's own responsibility, people would not like to admit they feel unhappy, while the French, who like to blame institutions like the unions, the government and the multinationals for everything that goes wrong, would find it perfectly acceptable to complain about their situation. ACSA also avoids peer relativity, where people define their own situation relative, not to personal standards, but to the distribution of the group to which they belong. Thus, with standard instruments quite often similar distributions of QOL are found between e.g. the healthy and the diseased (Bernheim, 1999a).

However, ACSA is still dependent on the relativity of best/worst experiences people have had. One may wonder whether the worst experience for a Rwandan, who saw his parents, siblings and children killed, his body maimed and his property destroyed during the 1994 genocide, is comparable to the worst experience for a Dane, who perhaps saw her father die of old age, or experienced an unhappy love affair. There would be no problem if all people would have experienced during their life a maximal level of happiness/distress, where feelings would reach a point of saturation, so that whatever happens additionally they could not feel better or worse. If people can be expected to have reached these maximum/minimum levels of satisfaction at least once in their previous life (and remember them as such), then their scores on ACSA would all be comparable. Such saturation levels exist for all physiological perceptions, such as physical pain, and are therefore also plausible for the mental domain.

2.2 Is happiness relative or absolute?

These questions point to some deeper issues connected to the measurement of QOL. There are reasons to think that satisfaction is to some degree relative, since people tend to compare their current situation to other situations, which are different for different people. The level of aspiration theory (Brickman & Campbell, 1971) says that this is part of what defines happiness, because people always aspire to improve on what they have. They choose their level of aspiration as higher than what they currently have, but realistically attainable. They judge attainability by comparing their aspirations with their previous experience (an internal standard), and with the situations of the people around them (an external standard). This provides them with a standard or reference level against which progress can be measured. Real happiness in this view can be achieved only if people experience progress towards their aspiration level, while the aspiration level itself moves up in step with their achievements. Although the net result may be the same, a series of small improvements is likely to be more satisfying than a big leap forward followed by a prolonged status quo or deterioration.

Such a relativistic theory would imply that the measurement of QOL would tell us very little about people's overall situation, since their satisfaction would only depend on their varying, subjective aspirations, and not on their objective level of achievement. Yet, most existing measurements of global QOL have significant correlations with objective factors, such as wealth, health, success and failure, as we will discuss in the following

section. Veenhoven (1991) therefore concludes that the relativistic theory is wrong, and that increases in QOL are the result of objective improvements. Yet, the level of aspiration theory may not be incorrect, but simply incomplete. For instance, Saris (1996) has suggested that overall QOL would be the sum of an absolute, objective factor, reflecting the given situation in which a person lives, and a relative, subjective factor, reflecting the person's changing aspirations. Thus, the contribution of objective factors to overall QOL may be relatively small, yet quite significant. This implies that QOL can be increased by improving the objective factors, but that the effect will be damped by the subjective factors, which are more difficult to change since they seem to be under some form of homeostatic control (Cummins, 2000): insofar that aspirations increase together with achievements, net changes in subjective QOL will be small.

Such a two-tier model also fits in with Maslow's theory of basic needs (Maslow, 1970; Heylighen, 1992). Maslow distinguishes two types of needs: 1) *deficiency needs*, such as hunger, thirst, loneliness, or the need for security, which can be satisfied by providing adequate amounts of food, drink, social contact or safety; 2) *growth needs*, such as the needs for learning, mastery and "self-actualization", which can only be satisfied by continuing development. Thus, the satisfaction of growth needs implies a continuous increase in aspirations, while deficiency needs are satisfied at a given saturation level. If this is true, overall satisfaction can be objectively determined, since the satisfaction of the deficiency needs can be measured by the degree to which the deficiency is eliminated, while the satisfaction of the growth needs can be measured by the degree to which people feel capable of reaching their aspirations, whatever those are. Both aspects depend on the objective qualities of the environment (what Veenhoven (1996b) calls the "liveability of society"): it must provide sufficient food, housing, health care, etc. to satisfy deficiency needs, but also sufficient support for education, achievement and freedom to allow unlimited personal growth.

Maslow denotes the highest level of satisfaction or psychological health by the term *self-actualization*, i.e. the state in which all a person's potentials are being realized. We have argued (Heylighen, 1992) that this potentially confusing concept (which are those "potentials" that are to be actualized?) can be formulated more adequately as the "perceived competence to satisfy basic needs". Happiness in this view is less determined by the objective situation itself than by the subject's feeling of *control* over that situation, that is, the subject's perceived capacity for maintaining or improving it. This encompasses both the deficiency needs (hunger, thirst, health, safety, ...), which can be seen as short-term deviations from equilibrium that must be corrected, and the growth needs (knowledge, freedom, self-esteem, ...), which can be seen as long-term potentialities for increasing control. This may explain why the big leap forward followed by stagnation is less satisfying than the series of small improvements: the former points to a lucky break which the subject is unable to reproduce, while the latter seems to indicate that the subject will be able to progress further and further.

This higher level interpretation of happiness as control over one's self and environment ties in with our evolutionary world view. Indeed, it can be argued that natural selection will prefer individuals who can survive and thrive in a variety of situations, i.e. who are capable to adapt and cope. In this sense, the psychological analysis of happiness leads us back, via the cybernetic concepts of adaptation and control, to a higher level interpretation of the evolutionary concept of "fitness" (Heylighen, 1999). Happiness—in the sense of a preponderance of positive feelings—is then merely the biological signal that everything is OK, i.e. that needs are met, that the organism is fit (Veenhoven, 1996b). Negative feelings, such as pain, hunger, fear or anger, on the other hand, are control signals prompting the organism to take action that will remedy the deficient conditions. This control interpretation may also explain rising

aspirations: if pleasure or satisfaction with a given state of affairs would become too great, then people would simply stop attempting to improve it further. This would lead to a dangerous state of inaction or lethargy, comparable perhaps to the euphoria experienced by a rat that can directly stimulate its pleasure centers by pressing a lever. This can only be avoided by habituation to the pleasurable stimulus, so that the organism would be motivated to strive for ever better conditions, just to maintain its present level of satisfaction.

3. Correlates of QOL

Now that we have discussed QOL as a theoretical concept, we can look at the concrete factors which either contribute to, or signal changes in, QOL. Such factors can be identified as the variables that are statistically correlated with QOL. Correlation does not imply causation. A factor that goes up when QOL goes up, can be a cause of that increase, an effect of that increase, or the effect of a common cause which affects both. These relations are not mutually exclusive: the same factor—e.g. health—can be both a cause and an effect of QOL. This feature is typical for circular or feedback relations. However, in any case the correlated factor can be seen as an *indicator* of QOL. This means that if we see that factor go up, we can expect that in general QOL will go up as well.

A very extensive analysis of such correlates has been carried out by the sociologist Ruut Veenhoven (1991, 1994, 1995, 1996a,b, 1997) and his co-workers at the University of Rotterdam. They have compiled a comprehensive *World Database of Happiness* (Veenhoven, 1994, 1995), which contains the data from hundreds of surveys testing for something akin to global QOL. These polls, carried out by different institutions in different countries using different methodologies, have been recompiled to a common standard so that the results are largely comparable. The quality of input data varies somewhat, but no systematic biases can be found in the methodology. The results are therefore at least ordinally reliable. Although the wording of these polls can vary (using keywords such as "happiness", "QOL" or "satisfaction", which are distinct only among professionals in the field), the basic question they all ask is: "How satisfied are you with your present situation?"

The answers to this question seem comparable to the results of an ACSA score of global QOL, except that there is no explicit reference to the best and worst moments for comparison. As such, the "life satisfaction" questions may be more sensitive to cultural biases, comparisons with peers and some other biases that ACSA seeks to avoid (Bernheim, 1999a). Although Veenhoven (1991) convincingly argues that his results are largely independent of culture, we note that the USA does score markedly better than France, as we predicted earlier on the basis of cultural difference. Of course, the higher score of Americans may be due to objective factors as well, but it is clear that this issue needs further study before we can be certain to have completely eliminated cultural bias.

The average QOL scores for up to 48 different countries were correlated with a number of objective variables that describe various socio-economic characteristics of these countries, such as GNP per head of the population, average education level, freedom of expression, etc. Not surprisingly, life satisfaction turned out to have strong ($R > 0.5$; $p < 0.01$) positive correlations with most of the factors which we would intuitively consider as "good". For example, using data for 1990, correlation of QOL with purchasing power was +0.64, with number of lethal accidents -0.67, with corruption -0.73, and with absence of prejudice +0.58 (Veenhoven, 1997). (In ACSA studies it was similarly found that in clinical settings global QOL is correlated with

different health-related variables, such as gravity of disease or response to treatment, Bernheim & Buyse, 1984). Although we will focus on the results of Veenhoven, because they seem most detailed, it is worth mentioning that other researchers (e.g. Diener & Suh, 1998) using different data have found essentially similar correlations.

It must be noted that some of these variables characterizing a country as a whole—e.g. wealth or education level—can also be used to differentiate individuals *within* a country. However, the correlations between QOL and such individual differences tend to be more subtle. Part of the reason may be that people normally do not choose the country in which they live, whereas their situation (occupation, wealth, education, etc.) within that country to some degree depends on their personal traits and preferences. Thus, individual characteristics will interact with social conditions in determining overall QOL, making correlations more difficult to interpret in terms of external factors. For example, intrinsically greedy people are likely to have accumulated more wealth than their less materialistic compatriots, without therefore being happier. This may in part explain Veenhoven's (1996) observation that wealth is strongly correlated with QOL when different countries are compared, but less so when individuals within the same country are compared—at least if this country is rich enough to allow everyone the chance to acquire wealth.

More generally, the complicating effect of personal characteristics may explain why objective, external factors can explain up to 81% of the variance in QOL between countries (Veenhoven, 1996b), but a much smaller part of the variance in QOL between individuals. Because we want to measure global progress rather than the effect of personality, our discussion will therefore focus on differences in QOL *between* countries, rather than *within* countries. The only exception will be mental health variables, which seem to be affected by overall country development, but for which unfortunately no between-country statistics are available. Let us now discuss the most important correlates, grouped by general category.

3.1. *Physical variables*

The most obvious factor correlated with QOL is physical well-being or *health*. This is the basis for most QOL measures used in medicine to test the usefulness of different treatments by health-related QOL questionnaires. There may be a two-way relation between health and happiness: on the one hand, healthy people will suffer less physical discomfort and therefore be able to enjoy life more; on the other hand, there are indications that people who have many pleasant feelings are more likely to live a long and healthy life than people who feel bad (cf. Grossarth-Maticek & Eysenck, 1995), possibly because stress has a strong negative effect on health. Physical QOL is indicated by variables such as life expectancy and child mortality, which have strong correlations with life satisfaction. Among the factors that contribute to high life expectancy are adequate nutrition and quantity and quality of health care. Veenhoven (1996a,b) indeed found that sufficient food, as measured by average caloric intake, is correlated with life satisfaction when different countries are compared, although the correlation disappears once a sufficient level of nutrition is reached. As we would expect for a deficiency need, more calories than the necessary level do not translate into more satisfaction.

A less obvious correlate, which belongs to the effects rather than the causes of QOL increase, is tallness. Indeed, countries where nutrition and health care have over the last decades improved typically witness a growth spurt among the new generations.

3.2. *Economic variables*

Adequate nutrition and health care require a certain level of wealth. At the level of countries this is usually measured by the GNP (Gross National Product) per inhabitant. However, GNP is not really a measure of wealth, but of the amount of money being transacted. A miser, who has accumulated property but does not spend anything, can be very rich, yet does not contribute to GNP. GNP also depends on fluctuations in the values of currencies, which have little to do with the objective standard of living. The latter problem can be corrected by recalculating GNP per capita so as to take into account the "purchasing power" of money in that particular country. Veenhoven (1996a,b) found that the resulting measure of real income per inhabitant is indeed strongly correlated with life satisfaction. Yet, he noted that the correlation diminishes once a certain level of wealth (about the level of Mexico) is reached. It seems that once people have sufficient money, further earnings contribute little to their QOL, implying that wealth, like nutrition, is an indicator for the satisfaction of a deficiency need.

Although it is traditional to consider GNP per capita as *the* basic measure of socio-economic development, we find nothing in the data that would warrant such a preferential treatment. Although the different QOL indicators we will discuss are all correlated with wealth (cf. Diener & Suh, 1998), this is merely because they are all correlated with QOL, and therefore with each other. Even when affluence is kept constant most of these indicators retain their correlation with QOL (Veenhoven, 1996, 1997), showing that they make a wealth-independent contribution. Moreover, longitudinal studies of country development show that there is little direct correlation between GNP growth and improvement in the other QOL indicators, implying that QOL can increase even without increase in wealth (Easterly, 1998).

3.3. *Social variables*

People's social position and the organization of the society in which they live also play an important role in their QOL. Veenhoven (1996a,b) noted a clear correlation between average happiness in a country, and social equality, which is measured by equality between sexes, and equality between classes. There is also a positive correlation with the amount spent on social security, but this correlation disappears when the income per capita is held constant.

On the other hand, Veenhoven found clear correlations with personal and economic freedom, freedom of the press and political democracy, although the latter correlation again disappears when income is held constant. Unlike wealth, freedom does not reach a saturation level, where further increases do not increase QOL, implying that it would be a growth need rather than a deficiency need.

A more subtle factor may be the "social capital" of a society, that is, the capacity for efficient cooperation between people, with a minimum of conflict and profiteering. This social capital is implicit in the legal system, the organization of the economy and the unwritten rules which individuals follow in their interactions with others. For example, a society in which no one trusts anyone, and everybody is constantly trying to cheat the others, will have a low social capital. One partial measure of this, a country's level of corruption, has indeed a strong negative correlation with happiness (Veenhoven, 1996a). Moreover, happiness has a positive correlation with tolerance and (less pronounced) with trust in other people (Veenhoven, 1997).

3.4. *Security variables*

Peacefulness, safety and political stability seem to be important requirements for a society to have high QOL. It seems obvious that the QOL will be lower in countries

involved in external or civil wars, or which are at the mercy of crime, terrorism and political upheaval. Available data indeed show significantly lower life satisfaction in countries with high murder rates or high accident rates (Veenhoven, 1996, 1997). Veenhoven also found a negative, albeit weaker, correlation between happiness and the importance of the military in a nation.

3.5. *Cognitive variables*

Perhaps the most important variables contributing to QOL are those which determine the general level of knowledge. Veenhoven (1996, 1997) found that the factor of education (as measured by literacy and school enrolment) has a large positive correlation with QOL when different countries are compared. Media attendance, the number of people getting information through radio, TV or newspapers, too shows a strong correlation. For individuals within one country, though, differences in education do not correlate well with life satisfaction. The fact that more highly educated people tend have to higher aspirations may contribute to this. This may also explain the lack of correlation with intelligence, as measured by IQ tests, within one country. (Between country differences in IQ are not available, but are likely to reflect differences in the levels of education and health).

3.6. *Mental health variables*

An individual's general character and outlook on life correlates strongly with happiness. According to Veenhoven's (1996b) survey of research findings, life-satisfaction tends to be greater among people with good mental health, social assertiveness and empathy. Not surprisingly, happy people tend to exhibit the major characteristics which Maslow (1970) associated with self-actualization, the highest level of mental health: openness to experience, psychological resilience, and the belief that events can be controlled by the individual. Persons with these character traits also tend to be the most lucky ones, in the sense that they have many successes or pleasant experiences. Those who lack these traits, on the other hand, are also those most prone to get in trouble or have different kinds of accidents or problems. Most of these findings boil down to the principle that happy people are those most able to control their environment (Veenhoven, 1996b), supporting our evolutionary interpretation of QOL.

3.7. *Unrelated variables*

Not all the variables that one might intuitively associate with QOL produce the correlations that one would expect. Some variables which would seem to indicate lack of QOL, such as unemployment, suicide rate, or distrust in institutions, show in fact little or no correlation (Veenhoven, 1996a). This indicates the complex origin of these phenomena, involving subjective, cultural factors, unreliable data collection, or negative side-effects of a primarily positive evolution (see part II of this paper).

For example, the correlation between unemployment and QOL when comparing countries, though not very strong, is actually positive! Suicide rate and expressed trust in institutions, for which the correlations are practically zero, on the other hand, are clearly dependent on culture. In some societies it is more acceptable to commit suicide (e.g. Japan), or to be cynical about the government (e.g. France or Belgium), without this implying that life in those societies is intrinsically less worth living or that their institutions are intrinsically less effective.

Some other non-correlated variables remind us that the dimensions we use to estimate QOL must be carefully selected. The proportion of industrial production in the GNP might seem to indicate industrialization and therefore economic development.

However, the importance of industry typically increases when a country develops out of an agricultural stage, and then decreases again when it turns into a service-based economy. The proportion of agricultural production in the GNP is a much better indicator, since it continues to decrease even after the country has made the transition to a service economy.

Finally, there are some variables that are controversial, in the sense that some observers might expect them to correlate positively, while others would expect negative or zero correlations. These include population density, population growth, and church attendance. The data of Veenhoven (1996a) show correlations close to zero for all of them. We can conclude that high QOL can be achieved as well in densely populated countries (e.g. the Netherlands) as in sparsely populated ones (e.g. Australia), and in countries where religion is prominent (e.g. the USA) as well as countries where it is rather discrete (e.g. the Scandinavian countries).

3.8. Conclusion

Practically all factors that are intuitively seen as measuring improvement, from wealth, safety and health, to knowledge, freedom, equality and honesty, are strongly correlated with QOL, as measured through life satisfaction questionnaires. Therefore, these factors are also mutually correlated. Even if people would disagree with our choice of quality of life or "happiness" as a fundamental measure of progress, it seems unlikely that they would dismiss all these other factors as well. Which of these factors you choose as fundamental is rather academic, since they all tend to go up or down together. Therefore, if we can show that most of these factors effectively improve over time, it will be difficult to deny the objective existence of progress—however you define it.

Yet, the fact that not *all* intuitive "improvement" variables are correlated with QOL suggests that the results of this analysis are non-trivial. The presence of correlation gives us an objective criterion for deciding which particular variables—e.g. education or church participation, accident rate or suicide rate, media attendance or industrial production—are good indicators of progress. Selecting only the correlated variables makes it in principle possible to formulate an overall "index of progress". Unlike existing indicators, such as the "Physical Quality of Life Index" (PQLI, see Morris, 1979), the "Human Development Index" (HDI, see UNDP, 1996), or the "Index of Social Progress" (ISP, see Estes, 1984), it would be difficult to criticize such an empirically supported index as being arbitrary or ideologically biased.

We may note that of these existing indicators, the PQLI, which combines life expectancy, child mortality and literacy, and the HDI, which moreover includes per capita GNP and school enrolment, are based on factors which all correlate with QOL. The more detailed ISP, on the other hand, includes a number of factors such as population growth and unemployment, for which we found no correlation with QOL, and seems therefore less reliable. Although the number of included factors is quite limited, the HDI is at present probably the most reliable overall indicator of progress. It could be improved by adding some factors that measure e.g. freedom, equality, media attendance and security. This would allow it to more finely distinguish between the developed countries, where the HDI factors are close to their saturation levels.

It is also worth noting that the basic values which come out of this correlation analysis largely correspond to those formulated in the Universal Declaration of Human Rights. Although human rights discussions tend to focus on the violations of the rights to freedom and to physical security, the Declaration also includes the rights to equal treatment, adequate standard of living, social security, health care, and education. The emphasis of Western governments and media on the freedom-related rights often leads to the accusation that the declaration is culturally biased. However, if the other rights are

taken into due account, the World Database of Happiness data can be taken as empirical evidence that the Universal Declaration provides a pretty accurate, culture-independent inventory of the basic conditions for happiness.

In conclusion, although we started by defining the basic value of QOL through people's subjective feeling of happiness or satisfaction, a review of statistical correlates brought us to a set of objective indicators that seem largely independent of subject or culture. This indicates that the postmodernist focus on the relativity of values, although a valuable reminder that there are many different contexts or points of view from which to consider a statement, is misguided if it is used to deny the possibility of progress.

4. Progress in QOL

As yet there have been few longitudinal studies in which the changes in QOL have been directly measured over prolonged intervals. One often cited example is Easterlin's (1974) analysis for the post-war decades in the USA, which found that life-satisfaction remained stable in spite of a doubling in income levels. On the other hand, results from less wealthy countries in the Third World and European Union seem to show small increases over the last decades. Such longitudinal studies are prone to "homeostatic" distortions, as people will increase their aspirations with improvements in the overall socio-economic situation, and thus tend to report a constant level of satisfaction. Such homeostatic damping is likely to become stronger as countries come closer to a hypothetical maximum or saturation level for QOL, and therefore it is to be expected that the most developed countries would show only very small changes in reported QOL.

To reduce this effect, it might be interesting to do longitudinal studies with a QOL measure which is less subject to relativity of expectations, such as ACSA. In pilot studies with ACSA biographical interviews, a majority of elderly Belgian cancer patients reported that since World War II, the overall quality of their lives had considerably improved. It is also worth mentioning that for most of those having lived consciously through WW II, their worst experience was directly or indirectly linked to the war.

The lack of clear data about QOL evolution can be compensated by the wealth of data on the evolution of most of the variables correlated with QOL, such as wealth, life expectancy and level of education. Since these variables are generally easy to measure in an objective way, are not under homeostatic control, and in general do not have intrinsic saturation levels, they will be much more sensitive to improvements in the "liveability" of a society. Therefore, they seem to propose more fine-grained measures of social progress than global QOL itself. As we will show now, apart from the mental health variables for which it is difficult to get objective data, all these factors have undergone a spectacular increase during the past century in all major regions of the world.

4.1. *Physical progress*

Fig. 1 shows the increases in life expectancy for the world as a whole, the developed and the less developed countries. It turns out that life expectancy for the world is increasing with over 3 years every 10 years, while in the developed countries it has slowed down to little over 1 year, showing that the poor countries are quickly catching up with the rich ones in this respect. Yet, further medical advances and more healthy life styles promise a continuing increase even in the richest countries for the foreseeable future. Life expectancy is probably the most reliable measure of the physical component of QOL. Other physical indicators such as the amount of calories available for nutrition per head of the population, or the average height of individuals also show a steady increase for practically every country for which data are available. The most spectacular

improvement is perhaps the steep decline in child mortality, which appeared first in the most developed countries, and now has reached even the poorest countries. Needless to say, these mortality statistics also indicate an immense decrease in the emotional suffering caused by the loss of loved ones.

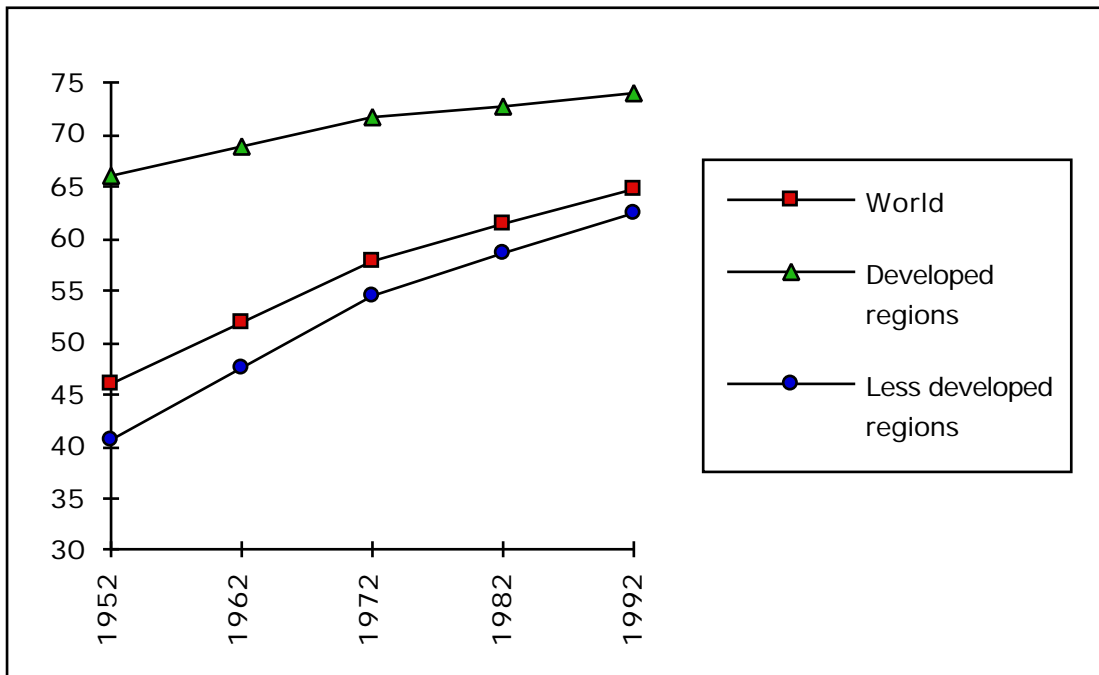


Figure 1: increase in life-expectancy for the period 1950-1995. Source of the data: United Nations Population Division (1994).

4.2. Economic progress

The average increase in wealth for most countries is well-documented. Poverty on the world level has decreased from over 70% in 1960 to 30% at present. Averaged over the different decades, a yearly increase in GNP of about 2% seems normal for the developed countries. This increase is primarily due to an increase in productivity of about the same amount. Although more difficult to measure, the underlying increase in productivity is more stable or reliable, as it is less dependent on the "boom and bust" cycles of the economy than GNP, where periods of stagnation or recession are followed by increases of 6% or more.

The increased productivity means that less resources and labor are needed to produce the same amount of goods. Buckminster Fuller (1969) called this on-going trend to do more with less "*ephemeralization*". Perhaps the most spectacular illustration of the underlying technological progress is Moore's Law, the observation that the speed of microprocessors doubles every 18 months, while the price halves. This improvement results mainly from miniaturization, so that more (processing power) is achieved with less (materials).

Ephemeralization explains the stable or declining prices (corrected for inflation) of physical resources and energy. The decline is particularly evident if the value of a resource is expressed as a percentage of the average income (Simon, 1995). The richer people become, the less they need to spend on basic resources such as food, energy and materials. This refutes the widely quoted pessimistic predictions (Ehrlich, 1976a) according to which our resources are near to exhaustion. This was illustrated by a famous 1980 bet (Tierney, 1990) between the economist Julian Simon, who wagered that the price of \$1000 worth of 5 natural resources would decrease, and the ecologist

Paul Ehrlich who betted that they would increase. In 1990, ten years later, all five resources chosen by Ehrlich as being near to exhaustion, had in fact become cheaper, providing Simon with a handsome \$600 gain.

4.3. Social progress

For the social variables, somewhat less clear statistics are available, although Estes (1984) has developed a comprehensive International Index of Social Progress which includes such diverse variables as number of years since introducing unemployment compensations, violations of civic liberties and female primary school enrolment as per cent of males. Over the longer term, there does seem to be a clear increase in equality between the sexes (world-wide) and a less pronounced increase in equality in income (although this trend presently seems to be reversed in the developed countries). Even though the wealth gap between rich and poor countries does not seem to decrease, the gap in other QOL indicators such as life expectancy, child mortality and literacy has definitely been reduced (cf. Easterly, 1998). With the collapse of the communist block and the gradual disappearance of right wing dictatorships (Spain, Portugal, Philippines, Latin America, etc.), the last decades have witnessed a quite spectacular increase in democracy and general freedom of expression. The number of countries that can be broadly called "democratic" has risen from 6 (out of 43) in 1900, to 37 (out of 121) in 1980, and 117 (out of 193) in 1998 (Emmott, 1999).

4.4. Progress in security

Clear figures are available about the number of people killed in accidents and through homicide. Data for the USA and a number of European countries show a steady decrease in the number of lethal accidents, with the present rate less than half the rate at the beginning of the century (Holen, 1995). This happened in spite of the fact that automobile traffic, which is by far the main cause of lethal accidents, has increased spectacularly. Although the absolute number of traffic deaths is higher than in the beginning of the century, the number of deaths per mile driven has fallen to a fraction of what it was, and even the absolute number is now starting to decline. For deaths caused by homicide, which are but a small fraction of the accidental deaths, there is also a long term tendency toward decrease, although the last few decades have seen a slight increase for the USA, which has reversed recently (Chesnais, 1995).

The relation between general socio-economic development and the number of people killed in war seems to form an inverted U-curve: as Peeters (1979) argues, economic development first increases the risks of large scale war, as more money and more lethal technologies become available for building up military power, but then decreases as a higher level of social and cognitive development makes both leaders and the public understand how much there is to be lost and how little to be gained by waging war (cf. Bernheim, 1999b). This pattern is clearly recognizable in Western Europe, which went through two world wars in the first half of the 20th century, and remained war-free during the second half. This is confirmed by the fact that rich countries have significantly less war deaths than poor countries (Easterly, 1998). We would therefore expect that the risk of war would become quite small once a country has reached a development level comparable to mid-century Europe. Many Third World countries haven't reached that level yet and as such provide increased risks for military conflicts (e.g. Pakistan and India, cf. Peeters, 1979). Yet, the control exerted by supranational institutions and alliances, which are dominated by the most developed countries, makes it increasingly unlikely that such conflicts would escalate into large-scale war.

Although we haven't found precise figures as yet, we would therefore hypothesize that the number of people killed in wars as a percentage of world population would show a tendency towards decrease over the last few decades. Although recent wars such as the Gulf War or the war in Kosovo have received a lot of publicity, the number of deaths (measured in the ten thousands) are quite small compared to wars such as Vietnam, Korea or WW II (measured in millions). The end of the cold war has made it quite unlikely that we will witness anything like a 3rd World War. Also, for the first time in history, the consequences of conflict have become at once highly predictable and utterly unacceptable.

4.5. Cognitive progress

For the cognitive variables, there are plenty of data that show a strong and consistent improvement. Illiteracy has virtually disappeared in the developed world, and is quickly receding in the developing countries. In practically every country of the world, the average time spent in school has been constantly increasing over the past century. Both the percentage of people enrolled in school and the number of years people stay in school are continuously increasing (Simon & Boggs, 1995). Never have so many people known so much about so many subjects (Bernheim, 1999b). With the increasing importance of permanent education, there does not seem to be a limit to this growth in the amount of education received. At the same time, the explosive spread of communication media, from telephones to newspapers, and TV to computer networks, has made access to information much easier. This is also reflected in the growing number of books and journals that are published and read everywhere in the world.

Cognitive progress is not limited to a mere accumulation of information, though. Even intelligence, as measured by IQ tests, has been undergoing a constant increase during the last century of about 3 points per decade, for the 20 or so countries for which data are available. This surprising phenomenon has been called the "Flynn effect", after the researcher who most extensively studied it (Flynn, 1987). Even more surprising is that the increase is strongest for those components of IQ that are least related to school knowledge. The Flynn effect is therefore not merely a result of increased schooling, but is probably due to a combination of factors, including better nutrition, better health, more parental attention, and more cognitive stimulation by a more complex and information-rich environment

4.6. Progress in mental health

According to Maslow's (1970) theory of self-actualization, increased satisfaction of basic needs should lead to improvement in mental health. This should show itself in decrease of neuroticism, more openness to experience, empathy, self-esteem, and belief in one's capability to change things for the better. It seems likely that such an increase in the average mental health of the population would have occurred during this century, but we have as yet found no data to support this conjecture. On the other hand, one might expect that increasing stress due to the accelerating pace of life and increasing cognitive load (see part II of this paper) has had a negative effect, especially during the last two decades.

Mainly on the basis of intuition it seems to us that people are more open-minded, autonomous and self-confident than a century ago (cf. Bernheim, 1999b). The general attitude towards life seems more relaxed and spontaneous. Rigid control of behavior and emotions was probably necessary in difficult living conditions. Now that many physical and social constraints have relaxed, this has created room for acceptance and expression of different feelings, emotions and desires, such as sexual pleasure (Bernheim, 1999b).

This has reduced psychopathogenic repressions and increased the capacity to enjoy pleasant feelings. As a result, some mental disorders, such as hysteria, seem to have almost disappeared.

As we will discuss in part II, other disorders, such as anxiety and depression, however, seem to have become more frequent. The question, though, is whether these problems are really more common or merely more visible, as the advances in psychological awareness have attracted the attention to a whole range of conditions that used to be ignored earlier. Support for this more sceptical view of reported increases in psychopathology can be found in the data of Bulmahn (2000), who observed that the frequency of a broad range of anxiety-related symptoms in the German population has *decreased* over the last 20 years, in spite of rapid modernization.

4.7. Synthesis

Practically every factor that correlates with QOL and for which data are available shows a consistent, on-going improvement over the last century. None of the QOL correlates shows a consistent deterioration. Unless we would have overlooked essential components of QOL—which seems unlikely—this proves the objective existence of progress over at least the past century. Table 1 summarizes the different variables and their evolution.

<i>type</i>	Variable	Correlation with QOL	Increase over time	Progress
<i>physical</i>	infant mortality	–	--	++
	life expectancy	++	++	++
	adequate nutrition	+	+	+
<i>security</i>	lethal accidents	--	--	++
	murder rate	–	–	+
	war deaths	–	–?	+?
<i>economic</i>	purchasing power	++	++	++
	productivity	+?	++	++?
<i>social</i>	freedom	++	++	++
	equality	+	+?	+?
	corruption	--	–?	+?
<i>cognitive</i>	education level	++	++	++
	literacy	+	++	++
	IQ	+?	++	++?
	access to information	+	++	++
<i>psychological</i>	openness to experience	+	+?	+?
	mental health	+	+?	+?

Table 1: Indicators of progress.

The marks in the last three columns specify the correlation between the given variable and the column header. "+" means positive, "-" means negative correlation; a double mark means that the relation is especially strong; "?" means that the relation is conjectured but that we have no hard data to confirm it yet. Positive correlation with QOL implies that a factor measures happiness. Positive correlation with time means that the factor increases. If both columns have the same sign (a happiness factor that increases or an unhappiness factor that decreases), then the factor indicates the presence of progress.

The same progress appears if we use the most reliable of the "objective" indicators, the Human Development Index (UNDP, 1999): the percentage of the world's population ranked "low" in terms of human development has shrunk from 73% in 1960 to 35% by 1990. Between 1975 and 1997, most countries have made substantial progress in human development (UNDP, 1999), while only one (Zambia) among those for which full data are available experienced a decrease in HDI value (mostly because of the AIDS epidemic).

This general trend may be exemplified by the probability of accidental death (Holen, 1995). This factor is both strongly correlated with QOL, and consistently decreasing. Unlike the increases in some more ideologically-loaded factors, such as wealth, equality, or freedom, nobody would deny that decrease in accident rates constitutes an objective improvement. Yet, there is not any single, obvious cause for this decline. It is rather a combined effect of a multitude of small improvements in the most diverse domains, from seat belts in cars to better fire detection, more reliable technologies, higher awareness of objective risks, more stringent regulations for dangerous work, and more responsible behavior by better educated citizens. The only thing these diverse developments have in common is that they decrease the probability of serious misfortune, and thereby improve the control people have over their fate.

5. Summary and Conclusion

Cultural relativism has led post-modernist thinkers to argue that the 18th century concept of progress has become meaningless. At the same time, the emphasis by the media on social and environmental problems has fostered an atmosphere of gloom and doom. This paper set out to show that both the relativist and the pessimist positions are flawed. This means that we had to: 1) define progress in a universally acceptable, culture-independent manner; 2) show that progress defined in this way effectively occurs. We have attempted to update the concept of progress by replacing the materialistic and reductionistic assumptions underlying the philosophy of the Enlightenment by a more evolutionary and holistic framework.

The resulting holistic concept of progress had to be operationalized, so as to make it empirically testable. Our definition of progress as increase in global quality of life led us to study the different indicators of quality of life. The extensive data from the World Database of Happiness allowed us to determine which objective social, economic and psychological variables have a significant correlation with QOL. The results confirm the values that most people intuitively hold: health, wealth, security, knowledge, freedom, honesty and equality all seem to contribute to our feelings of well-being. These factors together explain between 63% and 81% (depending on the size of the country sample) of the variance in QOL for the 50-odd countries for which data are available (Veenhoven, 1996b, 1997). We then checked to what extent each of these factors has increased for the world population as a whole. Representative data for roughly the last half century seem to indicate that all these factors have indeed progressed. This makes a strong case for the objective existence of progress.

Yet, in the absence of longitudinal, direct measurements of QOL, it can always be argued that however extensive the list of indicators that we have considered, it lacks some important factors (e.g. amount of pollution). If these factors would show deterioration, then our thesis of global progress could again be put into question. Because our conception of QOL is holistic, we can of course never discuss *all* possible factors that contribute to it. Therefore, we must analyse progress in the most general, most abstract way. This will be attempted in part II of this paper (Heylighen & Bernheim, 2000). The resulting theoretical framework will be connected back to reality

by considering those factors that are most often associated with pessimistic prognoses: pollution, global change, population growth, acceleration of change, and information overload.

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Global Progress II: evolutionary mechanisms and their side-effects

Francis Heylighen & Jan Bernheim

Center "Leo Apostel", Free University of Brussels, Pleinlaan 2, B-1050 Brussels, Belgium

E-mail: fheylich@vub.ac.be, <http://pespmc1.vub.ac.be/HEYL.html>

ABSTRACT. This paper attempts to update the 18th century concept of progress by an evolutionary theoretical framework, while replying to some of the contemporary critiques. Progress, understood as increase in fitness (or its proxy, quality of life) necessarily accompanies evolution by natural selection. In socio-cultural evolution, this mechanism is reinforced by growth of knowledge and virtuous cycles, but can be accompanied by negative side-effects such as overshooting and parasitism. The most pressing of the contemporary side-effects, such as pollution and the increased pace of life, are discussed, but it is concluded that they can be tackled without really endangering global progress. The anxiety that they engender is unfortunately amplified by a "bad news" bias in the media, leading to an inappropriately pessimistic view of the situation by the public.

KEYWORDS: progress, quality of life, optimism, pessimism, social indicators, world view, evolution, development, global change, information overload.

1. Introduction

Whereas part I of this paper (Heylighen & Bernheim, 2000) argued on empirical grounds that global quality of life is progressing, the present part II wishes to explain this observation on the basis of a theoretical framework. The evolutionary world view (cf. Heylighen, 1992b, 1999) that underlies this framework is intended to transcend the in retrospect simplistic assumptions of 18th century rationalism and mechanicism, and to address their shortcomings. It is based on a number of insights developed in diverse scientific disciplines, both traditional, such as history, sociology, and the life sciences, and more novel, such as cybernetics and the sciences of complexity. Thus, we wish to revive the progressive ideals of the Enlightenment, while criticizing its erroneous assumptions.

Our philosophy departs from the Newtonian world view in three essential respects:

1) *holism or emergentism*: the idea that the whole is more than the sum of its parts. When different components are put together, they may interact either synergistically or antagonistically, but in general this interaction creates something new, an "emergent" system or property.

2) *beyond materialism*: non-material, "mental" factors, such as organization, knowledge, goal-directedness are essential in the functioning of such systems.

3) *evolutionism*: systems are not static entities governed by deterministic laws, but the products of evolution, a self-organizing, creative process based on variation and the selection of “fit” variants.

These assumptions provide an alternative for the reductionism and materialism which characterize industrial society, and which play an obvious role in many current problems, such as resource exhaustion, pollution, reduction of cultural diversity and alienation. They emphasize non-material needs, creativity and the awareness of being in evolution. They also make a case for gradual, evolutionary changes, rather than revolutionary transformations. Evolution is innovative and conservative at the same time: it keeps what works, while exploring possible avenues for improving the things that could work better. Revolutions tend to be based on absolutes or utopias: simplistic, reductionist pictures based on a particular ideology. Thus, an evolutionary world view can be progressive, while its emphasis on feedbacks, checks and balances dissuades from all too costly revolutionary experiments (such as the excesses of the French, Soviet or Chinese revolutions).

2. Evolutionary Mechanisms of Progress

2.1. Natural selection

Having shown through empirical evidence that progress seems to accompany global change in part I (Heylighen & Bernheim, 2000), we must investigate why there is progress rather than regress. First, in spite of recent criticisms (Gould, 1996), it can be argued that the process of evolution is inherently progressive. We understand evolution here in the most general sense, as the process which generates novel designs, whether of biological organisms, physical systems, technical inventions, social organizations, or simply ideas. Evolution proceeds by the variation of a given design and the selection of the most *fit* variants.

"Fitness" refers to the probability that a given design will survive and be (re)produced in a given environment (Heylighen, 1999). Fit variants by definition will become more numerous, while unfit variants will decrease in numbers. Therefore, the average fitness of a population of designs can only increase or remain the same, but never decrease. (Applied to biological systems, this is a paraphrase of Fisher's (1930) fundamental theorem of natural selection.) If we assume that there always exist fitter designs, then variation will sooner or later generate such a design, and therefore average fitness will continue to increase. Formulated in this way, the principle of natural selection (the "survival of the fittest") is a tautology, and the increase of fitness an inescapable fact. The real matter for debate is whether "fitter" also means "better". Taken in its original biological meaning as a measure of the potential for population growth, fitness would seem a poor indicator of progress in a world with finite resources. However, in our present society there are better determinants of fitness than merely the number of people surviving and reproducing.

We have argued in part I of this paper (Heylighen & Bernheim, 2000) that what we called "quality of life" (QOL) can be seen as an extension of "biological" fitness to our present human situation. Indeed, QOL is measured by people's subjective appreciation of their life, and these accumulated feelings of pleasure or displeasure essentially represent the degree to which our biologically inherited needs, such as hunger, thirst, security, companionship, and curiosity, are satisfied. These needs and the corresponding feelings of pleasure and pain have evolved to steer us away from dangers and towards opportunities, that is, to maximize our fitness. Therefore, for an individual person, QOL seems a good proxy for fitness.

QOL is more than an imperfect, psychological indicator of biologically determined fitness, though. As we will discuss in the next section, evolution in this age is not primarily biological, but cultural: what is selected are no longer the genes, but the *memes*, i.e. the ideas, beliefs, habits, etc. that are transmitted from person to person (Heylighen, 1997a; Dawkins, 1976). There are many specific criteria that determine which memes have most chance to survive and spread (Heylighen, 1997a), but in essence people are most likely to adopt a new idea if it enhances their QOL in some way. For example, they will switch to new food if it is more healthy or more tasty, they will accept a new theory if it is more reliable and has more practical applications than another theory, they will adopt new traffic rules if these are likely to reduce the number of accidents. On the other hand, if it turns out that a promising new idea (say, communism, or the widespread use of pesticides) actually decreases QOL, it will be abandoned sooner or later. Thus, QOL has turned from a mere indicator of biological fitness into a direct determinant of socio-cultural fitness.

In conclusion, natural selection of the more fit (i.e. QOL-enhancing) alternatives takes place not only in nature, but at all levels of society: in general, good ideas are retained and publicized, while bad ones are forgotten; successful firms and organizations expand and are imitated, while unsuccessful ones disappear from the scene; competent people are promoted and become role models, while the incompetent remain uninfluential or seek a better education; prosperous nations attract immigrants and influence world policy, while poor, unhappy ones lose people through emigration, and are held up as examples of how not to organize society. Of course, there are many exceptions to this general principle, some of which we will discuss in the section on negative side-effects, but as a rule positive developments are more likely to be retained by selection than negative ones.

One might still object that fitness is a *relative* notion: what is fit in one type of environment will no longer be fit in another (cf. Gould, 1996). For example, the agricultural technique of slash and burn may be adaptive when used by small tribes in large forests, but is no longer so if the population expands and the forests dwindle. Since the advances made by a system in adapting to its environment tend to change that very environment, the inexorable increase of fitness relative to a given environment may have little value in practice.

Yet, there is at least one way in which fitness can increase in an *absolute* sense: doing more with less. If a new design can achieve more than a previous design, while requiring the same resources or less, then its fitness will be higher in *all* environments. Achieving more means being able to cope with a larger variety of problems or getting better results on any one problem. Requiring less means being less dependent on what the environment provides. Together, they imply more power, productivity and efficiency, that is, increased control over the problems that threaten QOL or survival. We noted in part I that such a trend of doing more with less (called "ephemeralization" by Buckminster Fuller) is conspicuous in the evolution of our society. Although it is difficult to estimate the relative efficiency of extinct organisms from paleontological evidence, it appears likely that the same trend also characterizes biological evolution.

It is in this sense of increasing control over one's life that the progress in QOL which we discussed in part I can be seen as a special case of the increase in fitness that characterizes evolution as a whole (cf. Heylighen, 1999). Economic development can similarly be seen as an increasing control of society over the products and services that it needs (Heylighen, 1997b).

2.2. *The growth of knowledge*

Although natural selection on its own leads to increase in control, once a minimal level of control has been reached, progress can take place in a more efficient way. Since it is based on trial and error, progress through natural selection tends to be slow and inefficient. Although natural selection in a sense guarantees that negative developments won't last (because they will eventually be eliminated), this elimination is usually fraught with suffering and loss of resources. The survival of the fittest normally implies the demise of the unfit. For example, it can be argued that Soviet-style communism was an intrinsically unfit system, and that it had to collapse sooner or later, to be replaced by a more fit Western-style democracy. However, it would have been more efficient, resulting in less suffering and much faster progress, if that replacement would have taken place at an earlier stage.

Unlike biological evolution, cultural evolution has developed a number of shortcuts for the tortuous process of blind variation and natural selection. It is knowledge in its diverse forms which allows us to anticipate to some extent what will happen. This allows us to avoid blind alleys, without first needing to explore them. Campbell (1974) has conceptualized knowledge as a "vicarious selector". Knowledge selects the most adequate actions from the variety of potential actions, in the same way that natural selection selects by destroying inadequately behaving systems. The difference is that knowledge does not destroy actual systems, it only eliminates unpromising potentialities. Knowledge substitutes for the environment, allowing us to make selections *before* the environment is able to destroy the system that would prove unfit. Thus, blindness is replaced to some degree by foresight, allowing intelligent, informed choices.

Yet, knowledge is in principle always incomplete (Heylighen, 1992b). No theory is able to make perfectly accurate predictions in all situations. Therefore, there always remains an element of blindness or unpredictability, so that well-intended actions can result in undesirable consequences. Examples abound of wonder cures with fatal side-effects, household chemicals that cause cancer, social housing projects that engender vandalism and crime, or political utopias that can only survive through harsh repression.

Our difficulty to anticipate problems (*feedforward*) is to some degree compensated by our capability to correct mistakes after the fact (*feedback*). The moment you observe that things start to go the wrong way, you can take counteraction to compensate the deviation. For example, if the central bank notices that the economy of a country is overheating, it can reduce inflationary pressures by increasing interest rates. The bank economists do not need to know the precise causes of the overheating to effectively control inflation. In many cases, simple reactions based on a minimum of knowledge are sufficient to correct the problem. Feedforward and feedback together determine the classic cybernetic paradigm of regulation or control. Even with deficient knowledge, progress can be made towards the chosen goals, and disturbances can be corrected, whatever their origin.

Still, feedback control requires at least an *awareness* of the problem, that is, the perception that the real situation deviates in a some way from the desired situation. In totalitarian regimes, where feedback from the population to the authorities is minimal, that awareness is often absent. In such cases, the process will eventually have to fall back on natural selection: a system that is incapable of solving the problems that threaten its survival will eventually disintegrate and be replaced by a system that can cope better. Moreover, effective feedback requires the knowledge of at least one way to counteract the deviation. Even without such knowledge natural selection will reduce the problem, albeit in a slow and inefficient way. This is what happened with the great epidemics that plagued humanity during the Middle Ages: eventually the number of

victims dropped, not because of effective countermeasures, but simply because only the more resistant populations were left.

2.3. *Virtuous cycles*

Although the quick expansion of knowledge to some degree explains why progress is much more visible now than it was a few centuries ago, the spectacular acceleration of social and economic development requires some further explanation. In part I of this paper, we discussed the different components of progress, such as wealth, education, health, security, etc., as if they were independent. They obviously are not. Each and all of them contribute to the overall QOL or fitness of humanity. This means that progress in one domain will make society more competent to push for progress in another, by increasing its overall capacities. Progress in the latter domain will similarly boost progress in the former, thus creating a virtuous cycle of progress producing more progress. A few examples will clarify this general principle.

The growth of knowledge obviously benefits all other domains: it creates economic growth through technological developments, improves health through education and medical advances, decreases the probability of war or accidents by better informing people about risks and opportunities, leads to more democracy by making people more aware of the issues and more capable to express their opinions, etc. In turn, the growth of wealth will benefit all other domains, including the domain of knowledge: it makes more resources available for education, research, medical interventions, improved security, increased freedom because of reduced dependency on income, etc. We can go on with health: more healthy people will be more productive in general, whether it is in the material, the intellectual or the social domain. Similarly, people who feel more secure will invest more resources and energy in developing themselves or the economy.

The same positive feedback or mutual reinforcement can be observed within each of the major domains. The best example is scientific progress where advances in one domain (say, particle physics) often unexpectedly boost research in another domain (say, computer networks), which can then again help forward the former domain. Similarly, higher productivity in one economic sector will generate resources that can be invested in another sector, thus improving productivity there as well. In conclusion, progress feeds on progress, thus continuously promoting its own development.

It must be noted that there are vicious cycles too, where positive feedback aggravates negative developments. We will discuss, for example, the increase of crime through inner city dereliction. The novelty is that such phenomena have become detectable, analysable and to some extent controllable.

2.4. *Negative side-effects*

It is necessary to analyse the undesirable side-effects of evolution in more detail. It is important in that respect to distinguish between "blind" evolution, and "controlled" progress driven by knowledge. Evolution's trial-and-error mode implies a great amount of errors, and therefore a lot of avoidable waste and suffering. However, the inefficiency of variation is compensated by the relative efficiency of selection, which eliminates inadequate trials at an early stage. The controlled mode, guided by knowledge, produces far fewer errors. However, because its results are largely shielded from natural selection, its errors will persist much longer, with potentially more devastating effects. Ironically, the more fit a design, the more flaws it can afford to accumulate before it is eliminated by selection.

One common side-effect of all evolutionary processes is the appearance of *parasitism*. A design (e.g. an organism) that thrives provides plenty of resources for

another design to profit from. If that second design uses up resources needed by the first one, without providing anything in return, the relation is one of parasitism. Parasitism in the present sense not only encompasses living organisms, such as viruses, bacteria or worms, that live off another organism, but any type of self-sustaining and self-reproducing phenomena that thrive at the expense of other self-sustaining phenomena. Examples of parasitic phenomena in society are addictive drugs, computer viruses, clothes fashions and religious cults (Cullen, 1999), which maintain and spread at the expense of the addicts, computer users, slaves to fashion, or cult members.

Like all self-reproducing phenomena, "parasites" develop through a positive feedback process: the more numerous they are, the faster they spread. This vicious cycle must stop, however, when the process runs out of resources: if a parasite has exhausted the hosts' reserves, it can no longer grow. In the worst case, when the parasite is extremely virulent, this means that the parasite is eliminated together with its host. In the more common case, parasite and host populations reach a relative equilibrium, characterized by an on-going "arms race", where the host tries to evolve better defenses to counter the negative effects of the parasite, while the parasite tries to evolve more efficient strategies to make use of the host's resources. In the longer term, parasitism tends to evolve to *symbiosis*: a state of "peaceful coexistence" or even "mutual support", where both parties live together without any one being harmed by the other's activities (Dawkins, 1976).

As the examples of addiction and computer viruses illustrate, contemporary progress provides plenty of opportunities for the appearance of new types of parasitic phenomena. The abundance of resources produced by a highly industrialized society—from agricultural produce to computer processing power to leisure time—are guaranteed to invite the evolution of new types of organisms, systems, or patterns of behavior that make use of those resources, usually at the expense of the people for whom those resources were intended. Moreover, the ever increasing efficiency of communication and travel in our society makes it ever easier for the parasites to spread, as illustrated by computer viruses and the AIDS epidemic.

Although parasitism explains many of the unexpectedly vicious side-effects of progress, our evolutionary understanding of this phenomenon again leads us to an optimistic view for the long term: because of natural selection, parasites are much more likely to evolve to a benign form than to cripple their hosts (and thus reduce their own opportunities). In the meantime, parasites can create a lot of suffering, though, and therefore society would do well to monitor and control their development in the earliest possible stages. In our present, information-based society, the most dangerous parasites may well be the ones that infect our mind: misleading ideas and patterns of behavior that are easily transmitted from one individual to another one (Dawkins, 1976; Brodie, 1995; Heylighen, 1997).

Another common side-effect of progress is simpler in origin but perhaps more subtle in its effects: *overshooting*. Controlled progress, unlike trial-and-error, is goal-directed. Most goals are not specific end-points but general *values*: phenomena or states-of-affairs that are considered intrinsically good, and for which it is preferable to have more than to have less. In practice, however, there are limits beyond which having more of something provides no benefits, or can even be harmful. For example, there may be a trade-off where an increase in one desirable feature will lead to a decrease in another desirable feature. The precise trade-off point is difficult to foresee, and therefore goal-directed progress will have a tendency to overshoot: to produce more of a particular desirable good or value than is optimal.

Of course, overshooting can be easily corrected through feedback: once you notice that you have gone too far, you move back a little until you are on target. However, such

a massive and complex process as societal progress has a large momentum: it is difficult to slow it down and make it turn back. This is due in part to the *inertia of desire*: it is difficult to convince people that they should stop longing for something that they have always considered desirable in the past. For example, in a situation where most children die young, it is desirable to have more children rather than less, but in an era of vaccination and antibiotics, this desire will quickly lead to overpopulation.

We can distinguish three major types of negative effects produced by overshooting: 1) *overabundance*; 2) *exhaustion*; 3) *pollution*. The first type of side-effect is simply the observation that there can be too much of a good thing. For example, too much food leads to obesity and the concomitant health problems; too much communication leads to information overload and the resulting stress (see further); too much fertilizer leads to pollution of rivers. Overabundance of a particular resource can also invite parasitic phenomena, as we noted earlier. For example, too much free time may spur behaviors that "kill time" or "create a purpose", such as drug addiction or joining a cult.

The second type of side-effect follows from the fact that to produce a valuable good, you generally need to consume another valuable good or resource. If the speed of production and therefore consumption is excessive, the resource may be exhausted, endangering the maintenance of the original good and perhaps many other products that depend on it. As we illustrated in part I, resource exhaustion is in general corrected rather quickly by a negative feedback mechanism: as the resource becomes more scarce, it automatically becomes more valuable, and therefore more effort is invested in its conservation and renewal.

Finally, "pollution" is the general phenomenon that the production of a desirable good may, as a side-effect, lead to the production of some undesirable "waste products". If the production overshoots its optimal value, the drawbacks of the waste product may offset the benefits of the produced good. Here, negative feedback correction is unfortunately not so automatic, since the one who produces the waste generally does not pay for its clean-up, and therefore has little incentive to minimize waste. Again, we will discuss pollution more concretely later on.

All these examples of overshooting, as we noted, can be corrected by negative feedback. If the control system does not react adequately, natural selection will eventually eliminate overshooting. Therefore, overshooting will create problems in the short term, but these are likely to be solved in the long term. However, powerful control systems are likely to have more inertia, and therefore may sustain unfit states far longer than natural selection alone would allow. A well-known illustration is the "Peter Principle" (Peter & Hull, 1969), the observation that in a bureaucracy people tend to be promoted up to their level of incompetence. This is a clear example of overshooting, where people progress through the ranks on the basis of proven success until they reach a level that is too high for their capacities. Natural selection would correct this mistake and "demote" the person back to the level where he or she is most fit, but the inertia inherent in large bureaucracies makes it likely that the person will remain stuck in that position for the rest of his or her career. We should make sure that society as a whole does not fall into the same trap, and push us into situations that demand more than we can comfortably handle.

3. Negative Trends: real and apparent

Given these theoretical arguments and the overwhelmingly positive trends which we reviewed in part I of this paper, it seems difficult to understand why the idea of progress has fallen into disrepute and why there is so much pessimism among contemporary commentators and the public at large. Several causes can be discerned.

First, we are definitely far from living in the best of possible worlds. Many things are still much worse than we would like them to be, and some are effectively deteriorating. Because progress has raised our standards and expectations, we tend to pay attention to problems which used to be ignored or considered inevitable in earlier periods, such as poverty, pollution or child abuse (Bernheim, 1999b). This is a healthy attitude. The problem, however, is that there exists an inherent bias which exaggerates the negative developments while disregarding most positive ones. We will first discuss this general bias and then examine some real and apparent problems which contribute to the negative feelings.

3.1. *The bad news bias*

Why cannot society fully enjoy its undeniable successes? One factor is that negative events simply receive much more attention. Psychological research has shown that there is an asymmetry between positive and negative emotions: neutral situations produce a mildly positive feeling, the *positivity offset*, while unpleasant or potentially dangerous situations elicit a strong negative reaction, the *negativity bias* (Ito, Berntson & Cacioppo, 1999). This can be explained straightforwardly through evolutionary mechanisms: the positivity offset helps the organism to explore its environment and thus discover opportunities, while the negativity bias helps it to avoid dangers. Since much more can be lost by ignoring a danger than by ignoring an opportunity, the strength of the negative reaction tends to be much larger than the strength of the positive reaction. Thus, our brains are programmed to get much more aroused by negative than by positive or neutral stimuli.

This psychological mechanism influences our perception of progress in society. A phenomenon will only attract attention if it deviates from the default expectation of no change. Negative developments are usually the result of a sudden, unexpected disturbance: an error, an accident, a conflict, or a natural disaster. Such situations require quick action, and they arouse the immediate and full attention of the people involved. Positive developments, on the other hand, are usually the accumulated result of the sustained efforts of many people. They merely require further continuation of the activities, without much emotion. Thus, because of the asymmetry between positivity offset and negativity bias, negative changes are much more likely to be noticed and remembered than on-going progress.

Although this negativity bias has always existed, the present problem is its amplification by the media. Something is deemed newsworthy only if it is likely to grab the attention of many people. This excludes most of the slow, predictable processes of improvement, while favoring negative events such as murders, wars, famines or kidnappings. Marshall MacLuhan summarized this phenomenon as "good news is no news". Simon (1999) called it the "bad news bias", discussing many examples of how it works in practice. One of these concerned data about the catastrophic loss of farmland in the USA that had been making the headlines. When Simon investigated the situation, he found that the statistics were simply wrong. He even managed to make the authorities admit that they had made a mistake. Yet, no newspaper seemed interested in publishing the corrected—but less spectacular—statement that farmland was actually increasing.

The irony of the situation is that on-going progress increases the bad news bias. As communication technologies improve, and journalists and investigators become more competent, they will be able to gather and publish more news. As people's access to information and general education level increase, they will be subjected to more news. Given a growing amount of news about all possible events, a stable proportion of

negative events, and a stable tendency to publicize only the negative events, the overall amount of bad news is bound to grow.

The effect on the public's mood can be illustrated most simply by contrasting people's appreciation of their own situation with the appreciation they have of society at large. Eckersley (2000) calls the former "personal QOL", the latter "social QOL". He notes that personal QOL is typically positive, while social QOL is typically negative. In other words, people tend to judge the state of society to be much worse than their own situation. But this is paradoxical: if most people are quite happy, how can society as a whole then be so bad? The positivity offset explains why people on the average tend to be rather satisfied: if they haven't experienced any major problems themselves, they will feel good. The bad news bias explains why they tend to believe that other people are so much worse off: as they are constantly bombarded by warnings about crime, corruption, poverty, drug abuse, etc., they naturally, but incorrectly, infer that these problems are the rule rather than the exception. The more worrying phenomenon is that, according to Eckersley's survey data, a sizeable percentage of people admit that their personal QOL is affected by their worries about society at large. Thus, although the negativity bias and the increasing reach of the media are intrinsically positive phenomena, that help us to tackle problems at an early stage, together they may have created a bad news bias strong enough to reduce our QOL, thus providing another example of overshoot.

Often the media's emphasis on problems is being justified by the fact that it may motivate the public to do something about those shortcomings. However, the negativistic atmosphere can be so strong that people react in the opposite way: why should I exert myself to improve things if the world is going down the drain anyway? The resulting vicious cycle may be illustrated by the following example.

A number of governments confronted with inner city deterioration noted that the feelings of insecurity increased more quickly than the objective risks of becoming a crime victim. The inhabitants' fears appeared to be fed more by superficial signs of decay, such as graffiti, public drunkenness and vandalism, than by personal experience as crime victims. This gave people the impression that the urban environment was going to the dogs, and that nothing would be done about it. Many would leave the neighbourhood. Others would become fatalistic, no longer bothering to clean up litter, or warn the police when witnessing crimes. This reinforced the downward spiral, creating an atmosphere of anarchy in which disadvantaged youths would become increasingly desperate in their search for a meaningful way of life, and increasingly bold in defying the law.

Instead of spending all their resources on tackling the really harsh problems, such as drug trafficking, murder or organized gangs, the most successful attempts to reverse this downward trend have focused on combating the apparently more benign but conspicuous signs of deterioration, such as littering, broken windows and petty crime (Kelling & Coles, 1996). Paradoxically, when these superficial problems got under control, the more serious crimes were found to diminish as well. For example, after decades of seemingly unstoppable increase, the murder rate in New York City has more than halved in the last few years. Although this policy is best known under the label of "zero tolerance", which emphasizes the repressive aspects, we prefer the labels of "quality of life" or of the "broken window" (Kelling & Coles, 1996), which emphasize the positive contributions to the neighbourhood atmosphere (which may even include the creation of parks, flower beds and playgrounds).

One reason for this success seems to be that the inhabitants have regained a feeling of control over their neighbourhood, and thereby the motivation to work for its further improvement. This ties in with our proposed model of happiness as the *perceived* competence to satisfy needs (Heylighen & Bernheim, 2000; Heylighen, 1992a): whether

people *feel* capable to solve their problems contributes more directly to QOL than whether they in fact *are*. Similarly, it seems likely that the all too common feeling of hopelessness among young people (Eckersley, 2000), which is at the root of drug abuse, vandalism and suicide, is at least in part caused by the barrage of bad news and the repeated warnings of impending doom in the media. Instead of motivating people to do something about it, exaggerated emphasis on negative trends has the opposite effect. A more positive portrayal of the situation, on the other hand, is likely to harness enthusiasm for further improvement.

3.2. *Environmental conditions*

Perhaps the most important cause for concern, fuelling most of the prophecies of doom, is the perceived deterioration of the environment. It cannot be denied that the natural world is affected by developments such as ozone depletion, deforestation, species extinction and the greenhouse effect. Since most of these developments are side-effects of economic growth, many people tend to think that material progress necessarily goes together with ecological deterioration, so that we can no longer speak about global progress. Although some of these ecological problems are quite serious, we must make several qualifications to this pessimistic evaluation.

First, although industrial pollution negatively affects our health, these effects are much smaller than the positive effects brought about by medical advances and a higher standard of living. The on-going increase in life expectancy is incontrovertible proof of this assertion. The fear for different chemical products released in the environment by human activities is often out of proportion with the objective risks. One reason for this is that people tend to overestimate the dangers of artificial toxins in comparison with natural toxins. The fact that something is natural does not mean that it is safe: the traditional tests for carcinogenicity find a similar proportion of potentially cancer-producing chemicals among natural as among artificial products (Ames & Gold, 1997). The best way to reduce mortality from cancer and other "modern" diseases is to promote a more healthy life-style: regular exercise, no smoking, plenty of fruit and vegetables, and reduced consumption of red meat, saturated fats and refined sugars. These simple measures are likely to add several years to our life-expectancy, much more than any reduction in pollution or pesticide use could (Ames & Gold, 1997).

Second, although pollution on the world scale is still increasing, there is a clear trend towards decrease in the developed countries. Statistics for air and water pollution in major cities and regions in Europe and North America show a consistent improvement over the last decades (Simon, 1995). The London smog, which was a notorious killer in the beginning of the 20th century, has all but disappeared. At the same time, the Thames river is teeming with fish again. As economy and technology advance, more money and better techniques become available for minimizing pollution. As the general quality of life increases, people are less willing to undergo the effects of pollution, and more motivated to enjoy a pleasant, natural environment. This leads to more stringent laws on emission of pollutants, and to more encompassing disposal and recycling schemes. There is no reason why the same development would not take place in the poorer countries once they reach a higher level of development.

Third, the problems of global change, although serious, should be considered in the right perspective. The tackling of ozone depletion is an unexpected success story, where the scientific discovery of the destructive effects of CFCs on ozone was followed shortly by the observation of a growing "ozone hole" in the atmosphere, and by an international treaty for the phasing out of CFC production. The release of CFCs has been significantly reduced since, and is expected to stop completely in the next two

decades. The ozone hole is predicted to reach its maximum size a few years from now, and start diminishing from then on.

The tackling of global warming by reducing the emission of greenhouse gases is much less forceful, though. International agreements have as yet hardly managed to slow down the increasing production of carbon dioxide by burning fossil fuels. However, the dangers of global warming need to be put into perspective. Recent scientific developments have made it clear that the temperature of the Earth has undergone many large fluctuations during the past thousands of years, and has at times been both significantly colder (the Ice Ages) and significantly warmer than it is now (Stock, 1993). The hypothesized increase of the average temperature with 1 to 3 degrees Celsius by the end of the 21st century would therefore not be unprecedented. Moreover, there is some reason to believe that life and civilisation were in fact thriving better during the warm periods (Moore, 1998), as higher temperatures and rainfall increased crop yields. Though global warming would create a number of problems, its *overall* effect may be positive rather than negative. If there are "losers" and "winners", then international solidarity can be organized to help the losers. Moreover, there are still plenty of alternative methods to tackle the increase in carbon dioxide, from "seeding" the oceans with minerals to boost the growth of algae, to the management of forests so that they absorb a larger amount of carbon-dioxide (Moffat, 1997). In any case there are still so many uncertainties concerning its intensity, effects, or possible ways to avoid it, that concern, further research, and vigorous precautionary action are in order, but pessimism seems inappropriate.

Perhaps the most serious environmental problem is the fast reduction in tropical rain forests, and the concurring loss of biodiversity. Although such losses seem largely irreversible, some qualifications are needed. First, loss of tropical forests is to some degree compensated by increase in temperate forests (Simon, 1995). As countries in the tropical regions get more economically developed, and curtail their demographic expansion, it is likely that they too will start to invest more in forest management, while reducing their need for farmland by increasing agricultural productivity. Second, the history of life shows that here too the Earth has witnessed very large fluctuations, both in forest cover and in species diversity (Stock, 1993). There have been periods where over 96% of known species have been extinguished, yet life always managed to recover and rediversify. With the growing number of natural reserves, increased protection of wildlife, and development of biotechnological means to maintain or increase biodiversity, it is unlikely that we will ever come near to such drastic levels of extinction. The key novelty is that for the first time mankind not only has the power to destroy the natural environment, but also the means to save it.

Finally, the problem of the population explosion (Ehrlich, 1976) has lost much of its urgency. Since it came to the fore in the 1960's, population growth on the world level has consistently decreased. In the developed countries, population growth is practically zero, in the developing countries it is rapidly decreasing. According to the latest median projections of the UN Population Division, world population is expected to stabilize at less than double the present level by the year 2100. The increase in population density causes major problems only in very poor, agricultural countries, such as Rwanda or Bangla Desh, where more land would be needed to feed the population. In Rwanda, for instance, contrary to elsewhere the Malthusian apocalyptic predictions have been verified by the 1994 genocide, which literally decimated the population. The introduction of vaccines and antibiotics broke the balance between maximal fertility and high mortality, leading to extreme overpopulation. In these circumstances, political conflict degenerated into wholesale massacre. In Bangla Desh, on the other hand, the

education of women and spread of anticonception methods has produced a spectacular drop in fertility, making the problem much more manageable.

Countries such as the Netherlands, Singapore and Japan show how a high population density can very well go together with high economic and social development levels. As we noted in part I of this paper, overall QOL is independent of either population density or population growth. Since productivity increases in general more quickly than population, population growth at the world level should not lead to the exhaustion of resources or farmland. However, it is clear that for the densely populated agricultural countries mentioned before, population control remains a high priority.

3.3. Change and Information Overload

The most difficult problem of all may be the ever accelerating speed of change in our present society. Scientific, technological, cultural and social innovation are taking place at such a breathtaking pace that no one can really keep up with them. People constantly need to revise their skills in order to adapt to the changing circumstances. The problems of unemployment and growing disparity between richer and poorer classes in most Western nations are largely due to the fact that not everybody can cope as well with this need for constant re-education. As traditional agricultural and industrial jobs are disappearing, employees need to adapt to the intellectually much more demanding jobs of the information society. Many lack the necessary educational background. Even the intellectually most advanced groups, the researchers, educators, managers and technologists, often feel overwhelmed by the changes in their domain.

It is obvious that too much change strains people and organizations. The futurologist Alvin Toffler (1970) has made a detailed study of the acceleration of change and its psychological effects. He suggested that it would lead to a set of severe physical and mental disturbances, which he called the "future shock" syndrome. Researchers have indeed found a positive correlation between change and physical illness. The "Social Readjustment Rating Scale" is a psychological tool which measures the amount of change experienced by a person over a given time interval (Holmes & Rahe, 1967). Using this scale, it was shown that individuals with high life change scores are significantly more likely to fall ill, and this as well for positive (such as marriage or promotion) as for negative changes (such as divorce or job loss).

The way change affects our physical state is evidently through its effects on our mental state. The instinctive reactions of an animal to stressful situations fall into three main categories: fight, flight or fright. The corresponding human emotions seem to be aggression, fear or anxiety, and depression or despair. These basic attitudes can be recognized in current patterns of social behavior. Wanton aggression seems to underlie phenomena like vandalism and hooliganism. Helplessness and despair can be recognized in the increasingly common "burn-out" syndrome, and in the ever so frequent depressions. But perhaps the most common neurosis in present society is anxiety, as illustrated by the record use of anxiolytic drugs, and the many irrational fears and scares, where far-away threats trigger disproportionate reactions. On the socio-economic level, anxiety is apparent in the growing feeling of insecurity and in the public's growing distrust of different authorities and institutions, whether they be government, police, health providers, or church (Nye et al., 1997). This distrust is stirred up by the media's ever more extensive reporting of cases of corruption, abuse of power or professional misconduct.

The acceleration of change is accompanied by an increase in the information needed to keep up with all these developments. This too leads to physical, psychological, and social problems. A world-wide survey (Reuters, 1996) found that two thirds of

managers suffer from increased tension and one third from ill-health because of information overload. The psychologist David Lewis, who analysed these findings, proposed the term "Information Fatigue Syndrome" to describe the resulting symptoms. They include anxiety, poor decision-making, difficulties in memorizing and remembering, and reduced attention span (Reuters, 1996; Shenk, 1997).

Part of the problem is that technological advances have made the retrieval, production and distribution of information so much easier than in earlier periods. This has reduced the natural selection processes which would otherwise have kept all but the most important information from being published. The result is an explosion in often irrelevant, unclear and inaccurate data fragments, making it ever more difficult to see the forest through the trees. This overabundance of low quality information has been called "data smog" by Shenk (1997). Whereas information used to be scarce, and having more of it was a good thing, it seems that we now have reached the point of saturation, and need to limit our use of it.

Another contribution to the growing uncertainty comes from the erosion of belief systems: religions, such as Catholicism or Hinduism, and ideologies, such as Marxism or the 18th century philosophy of Enlightenment. Such philosophical systems provide people with a "world view" (Aerts et al., 1994), offering them a body of principles on which they can rely and a sense of how their own existence fits into the larger whole. Thus, people get a positive vision of the future, and a system of ethics and values that can give meaning to their life. The precipitous developments in science, society and culture, however, have invalidated many of the assumptions underlying these traditional systems of faith. As a result they have lost most of their authority. Since no new systems of belief have as yet had the chance to develop, many people have lost their sense of direction and of confidence in the "natural order" of things. Sociological research indeed seems to indicate that the feelings of insecurity and distrust are strongest among the people who profess the least faith in a religion or ideology (Elchardus, 1998). On the intellectual level, this fragmentation of traditional world views leads to the relativistic, "postmodernist" outlook which we criticized in part I.

In conclusion, it seems that the biggest problem facing present-day society is not that there is too little progress, but rather too much of it. Neither our mind, our physiology nor our social and philosophical systems seem fit to cope with such a rate of change and such an amount of new information. The resulting experience of ever increasing complexity in all domains of society may contribute to *alienation*, a feeling of powerlessness, meaninglessness and lack of understanding (Geyer, 1992). Unfortunately, change, complexity and information overload are abstract phenomena, which are difficult to grasp. Therefore, few people have as yet understood that they are at the root of the anxiety they feel. When trying to rationalize their vague feelings of unease, people will rather look for more easily recognizable causes, such as unemployment, pollution, crime, corruption or immigration. These phenomena, which have become both more visible and less tolerated, play the role of scapegoats: they are blamed for the lack of QOL which people experience, while being only tangentially related to it. This may lead to backlashes and irrational reactions, such as racism, intolerance and persecution of the groups that are held responsible (Geyer, 1992).

Because progress feeds back on itself, there is no slowdown in sight. We should rather expect a further acceleration of social and technological change, which will be limited only by our capacities to cope. In analogy with the Peter Principle, society may be "promoted" to a level of progress that is more than it can competently handle, but less than the level where natural selection would intervene and "demote" society to a lower level of development. It is obvious that such an evolution would seriously limit our QOL if we do not learn how to better cope with change, or to gain control over the

rate of evolution. In the longer term, we can hope that a new equilibrium will be reached, characterized by a type of social organization adapted to a much higher level of complexity. The corresponding higher level of functioning has been described by metaphors such as the information society or the "global brain" (Stock, 1993; Russell, 1995; Heylighen & Bollen, 1996).

In the meantime, we can only try to better manage change, controlling as much as possible its negative side-effects. One possible counteraction would consist in consciously postponing the widespread introduction of innovations until their usefulness has been proven and their implementation has stabilized (cf. Toffler, 1970)—although this might be difficult to implement in a competitive market economy. Such a policy seems particularly in order for the domain of information technologies, where market pressure has forced producers to bring out new versions of their hardware and software every few months. This leaves insufficient time for the producers to duly test and streamline their products and for the consumers to gather the necessary experience to use them efficiently. The result is poor quality of work, and increasing stress among both producers and consumers.

Another counteraction is to support permanent education, so as to avoid the formation of an underclass of "information poor", while maintaining or developing a decent level of social security, so as to minimize people's fear that they too might drop out. We must devise new educational strategies, devoted less to learning static facts and more to learning how to learn. A complementary measure would be to promote rules of "information hygiene" (Shenk, 1997), teaching people how to control the amount and quality of the information they take in or produce, so as to minimize information overload, "bad news" biases, and the spread of parasitic ideas (Brodie, 1995). Finally, we should investigate and develop methods and technologies to more intelligently process and filter the available data, so that only the most relevant, most accurate and clearest information would need to be given attention to (cf. Heylighen & Bollen, 1996).

4. Conclusion

In part I of this paper, we proposed empirical evidence that all major indicators of quality of life are increasing for the world as a whole. In this second part we focused on the real and potential negative side-effects that accompany this global progress. We concluded that they pose real problems, which need to be tackled. Yet, we also noted that their effects on QOL are probably less severe than they are usually portrayed and that there exist effective methods to tackle them. Although the environmental situation is still deteriorating on the world level, the first signs of improvement are unmistakably there. The problems of too rapid change, increasing complexity and information overload are more subtle, though, and have as yet hardly been addressed. Although their long-term effects are perhaps not as menacing, they threaten to seriously reduce global QOL, while slowing down progress in other domains. They may well be at the root of the wide-spread anxiety in our present society.

Unfortunately, the resulting tendency to worry is amplified by a needless media bias towards bad news. It seems to us that much of the resulting pessimism and despair could be avoided by a more realistic—and therefore more positive—portrayal of the global situation. We hope that the present paper will contribute to the creation of such a more hopeful and optimistic outlook, which may produce the enthusiasm and energy needed to tackle the remaining problems. In particular, we hope that our universalist vision of progress may provide a building block for a new world view (Aerts et al, 1994), which may give people a renewed sense of hope and confidence in the future. Such a progressive world view would replace the mechanistic picture—which sees us as

separate, atomized individuals governed by deterministic laws—with the notion that we are creative participants in a global evolution towards the greater good for the greater number.

As a first step towards the establishment of such a world view, we had to explain on theoretical grounds our observation that evolution is progressive. Natural selection on its own is already sufficient to explain why positive developments tend to persist and develop, while negative ones tend to be aborted sooner or later. However, to explain the unprecedented speed and efficiency of progress during the last centuries we had to invoke additional mechanisms. The growth of knowledge allows us to ever more efficiently anticipate and control the results of our actions. The resulting acceleration in development is further boosted by virtuous cycles, where progress in one domain accelerates progress in other domains. Still, the fact that evolution is intrinsically uncertain means that we must remain on our guard for foreseeable and as yet unforeseeable problems. We must in particular be ready to take action against potential new forms of parasitism, and against the side-effects of overshooting: overabundance, exhaustion and pollution. The best guarantee for continuing success is an open mind and a pragmatic attitude, unrestricted by dogmas or prejudices, but confident in the feasibility of progress.

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