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**MAJOR GLOBAL TRENDS AND CAUSAL  
INTERACTIONS AMONG THEM**

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### Author's Note

At the fifth network meeting of the Project on Goals, Processes, and Indicators of Development (GPID) of the United Nations University, 27 July to 5 August 1980 in Montreal, Canada, the members of Working Group C (Jan Danecki, Dietrich Fischer, Iris Fitzpatrick-Martin, Johan Galtung, Patrick Healey, Hossam Issa, Adolfo Mascarenhas and R.K. Srivastava) compiled a list of sixty major trends in the world that are significant from GPID's development theory viewpoint. This note represents a first attempt at bringing some order into this more or less random list of trends, classifying them into trend families, and presents some hypotheses about the shapes of these trends and causal links among them. A first draft of this paper was presented and discussed at the GPID meeting on Social Indicators in Oslo, 17 to 19 October 1980, and I appreciate the useful suggestions received on that occasion. I am grateful to many people for a discussion of ideas contained here, but particularly to Johan Galtung, a never-ceasing source of new ideas. Of course, I alone am responsible for the opinions expressed here. Any further comments and criticisms will be greatly appreciated, including in particular information on significant trends that may have been overlooked.

This paper by Dietrich Fischer was based on the work done by Working Group C at the GPID V Network Meeting, Montreal, 27 July to 5 August 1980. It was first presented at the Indicators sub-project meeting, Oslo, 17 to 19 October 1980. It can be considered as a contribution to the Indicators sub-project and the integrative process in Working Group C in GPID.

Geneva, April 1981

This paper is being circulated in a pre-publication form to elicit comments from readers and generate dialogue on the subject at this stage of the research.

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## 1. Introduction

In the second half of the 20th century, far-reaching changes take place in the world at a more rapid rate than ever before in human history. Possibilities for the future are wide open, between satisfaction of human needs and a decent life for all people for the first time, or destruction of all life in a large nuclear war.

As the primary motor of these changes I see a positive feedback loop between technological innovations and the global spread of new ideas. A special case of new technologies are new means of communication, transportation, and information processing. These technologies make possible the rapid exchange of new (and old) ideas around the earth. This in turn leads to the more rapid development of new ideas, including new technologies as a special case.

This primary loop may be seen as consisting of the interaction of the following four families of trends:

- (1) Growth and expansion of knowledge, in particular of science and technology
- (2) Information, communication, transportation
- (3) The global spread of ideas
- (4) The breakdown of traditional customs and beliefs, of prejudices and of stereotyped ideas.

More about the nature of these and the following major trends will be said in Section 2, where individual trends within these families are listed.

Diametrically opposed to these four trend families one can also observe the following four major counter-trends:

- (1') The accumulation and spread of superstitions, falsehoods and lies
- (2') Impediments to the free flow of ideas, people and goods
- (3') Differentiation of knowledge and beliefs, formation of new divisions in people's perceptions
- (4') Emergence of new dogmas, fashions and prejudices.

The above four pairs of trend families may be seen as interacting with another four pairs.

- (5) Decentralization (technologies for self-reliance)
- (5') Centralization (technologies creating dependence, mutual or one-sided)
- (6) Liberation (movements for more autonomy at every level)
- (6') Exploitation (authoritarianism, repression)
- (7) Global consciousness (the emergence of systems of ideas which lead to peace and development)
- (7') Ethical decay (the dissolution of traditional value systems without replacement, or the emergence of destructive ideologies)
- (8) Resilience (an adaptable system that supports survival and peace)
- (8') Vulnerability (moves towards a system which causes conflicts and is prone to breakdowns).

Most of these sixteen families of trends, shown again in Figure 1, interact with one another to a greater or lesser extent,

strengthening or weakening one another. Section 2 will list individual trends grouped into these families. Section 3 will give some examples of causal interactions. Section 4 will discuss what laws of motion give rise to what curve-shapes for trends. Section 5 contains some remarks on countertrends, and Section 6 on desirable and undesirable trends. Section 7 briefly discusses strategies to influence and "bend" trends. In Section 8 are some concluding remarks. An appendix lists tentative indicators for trends, and my preliminary hypotheses regarding the shape of trends and the current position on these trends.

- |  |   |
|--|---|
| (1) Growth of knowledge, especially science and technology | (1') Accumulation of lies and superstitions           |
| (2) Information, communication, transportation             | (2') Barriers to flow of ideas, people and goods      |
| (3) Global spread of ideas                                 | (3') New differentiations of perceptions              |
| (4) Breakdown of traditions and prejudices                 | (4') Emergence of new dogmas, fashions and prejudices |
| (5) Decentralization                                       | (5') Centralization                                   |
| (6) Liberation   | (6') Exploitation                                     |
| (7) Global consciousness                                   | (7') Ethical decay                                    |
| (8) Resilience   | (8') Vulnerability                                    |

Figure 1 Eight pairs of diametrically opposed families of trends. Trend families (1)-(4) all mutually reinforce one another, and form the primary motive force for the rapid change during the last few and the coming decades, also in other areas of human concern. Most of these sixteen trends interact with one another, to a greater or lesser extent. Some examples of the main causal interactions are discussed in section 3.

## 2. Families of trends

The proposed classification of trends below is obviously only one among many possible groupings. Its purpose is to try to obtain a better understanding of the main trends in the world, and the mechanisms by which they strengthen or weaken one another. Each individual trend listed as a member of a family could again be seen as a family in itself, with subtrends, and subtrends of subtrends etc. For example, the movement for alternative ways of life (trend 6.1) can be subdivided into those who only dream about it but do nothing, those who practice limited forms of it (e.g. eating health food) but remain in the main stream of society, and those who withdraw completely from the dominant way of life. Each of these three major types of movements could again be subdivided into many finer trends, according to the issues raised, organizational forms, etc.\*

The list of trends here is also obviously biased towards the social sciences, reflecting the composition of the group that prepared the original list. A group of natural scientists might have broken down ecological trends into greater detail.\*\*

Bearing in mind these reservations, here is a proposed grouping of trends by sixteen major families.

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\*I am grateful to Monica Wemegah for this observation.

\*\*I am grateful to Patrick Healey for this observation.

(1) The growth of knowledge, including science and technology

- (1.1) The rapid development of mathematics, physics, chemistry, biology, engineering, medicine, the social sciences, and philosophy. This includes the accumulation of factual knowledge, such as statistical data, as well as the increasing ability to understand and analyze this information and to manipulate the world around us.
- (1.2) The development of new forms of art
- (1.3) The increase in mechanization, automation, and robotics
- (1.4) The spread of labor-saving and direct human contact replacing technologies (micro-processors)\*
- (1.5) The development of "run-away" technology with unforeseen consequences (analogous to "run-away inflation")

(1') The accumulation and spread of superstitions, falsehoods and lies

- (1'.1) The renewed interest in horoscopes, palm reading and other unscientific beliefs
- (1'.2) The spread of political lies, deliberate distortions and propaganda
- (1'.3) The selective perception of facts that support prejudices and blindness to facts that disprove them

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\*Trends whose number is underlined were included in the original list of 60 trends compiled by working group C at the fifth GPID network meeting. Other trends have been added here. More trends could certainly be found to be added to this list, and this selection is rather arbitrary. But as more and more trends are added, their importance for global development issues would probably gradually diminish.



(2) Information, communication, transportation

- (2.1) The spread of new information and communication technology, permitting to bridge greater distances in a shorter time (including computers, data banks, satellite communication, fiber optics, etc.)
- (2.2) The development of more rapid and cheaper means of transportation
- (2.3) The emergence of a world market, with a rapid increase in international trade
- (2.4) The increasing mobility of production factors, including labor\*
- (2.5) De-industrialization processes in some First World countries (shift of industries to the Third World where labor is cheaper)

(2') Impediments to the free flow of goods, ideas and people

- (2'.1) The re-emergence of tariff and non-tariff trade barriers
- (2'.2) The spread of censorship
- (2'.3) Passport and visa requirements. The anachronistic persistence of laws inhibiting immigration and/or emigration

(3) The global spread of ideas

- (3.1) The increasing access all over the world to information and ideas (including science and technology) in the form of printed materials, radio and television programs, via telephone, and through direct contact (studies abroad, conferences, tourism etc.)

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\*The last two trends are related to trend (3.6), the spread of the capitalist mode of production, but are more general.

- (3.2) The spread of bourgeois way of life (BWL)\* as general goal
- (3.3) The spread of occidental cosmology to the non-West
  - to be added in oriental cosmologies
  - to substitute for non-oriental cosmologiescarried by language, science, technology, social structures, fighting the West
- (3.4) The spread of oriental cosmology in the inner occident
- (3.5) The emergence of non-stereotyped dialogue between civilizations
- (3.6) The spread of the capitalist mode of production in the monopolist phase (national and transnational, state and interstate)
- (3.7) The spread of trend predictions as self-defeating and self-fulfilling prophecies
- (3') Differentiation of knowledge and beliefs, formation of new divisions in people's perception
  - (3'.1) Increasing scientific specialization; lack of overview over several fields; lack of understanding of the interactions among various fields of knowledge; inability of

\*Johan Galtung has offered the following four-point characterization of the bourgeois way of life:

- (1) Avoidance of manual work, especially heavy and dirty work; a quest for non-alienated, non-manual work
- (2) Avoidance of material discomfort, much material consumption; a quest for non-material consumption
- (3) A small nuclear family, living in privacy, much leisure
- (4) Security: the probability that this will last for self and family

people to keep up with the rapidly expanding body of knowledge and ideas in all fields

(4) The breakdown of traditional customs and beliefs, prejudices and stereotyped ideas

- (4.1) The gradual liberation of people from stereotyped sex roles, which seeks not only an end to the oppression of women, but also the liberation of men in a certain sense
- (4.2) The gradual liberation of old and young people from stereotyped age-group roles, including the increasing involvement of children, youth and retired people in decision-making processes. Similar movements against discrimination on the basis of race, nationality, creed, language etc.
- (4.3) The rejection of prejudices (particularly those handed down by the previous generation or imposed by school and state authorities) when people perceive them as prejudices, after having been confronted with systems of ideas, cultures, or cosmologies which do not have the same (but possibly different) prejudices.
- (4.4) The rejection of traditionally accepted ideas (slavery as a mode of production, hereditary absolute monarchy as a form of government, and possibly soon war as a way to resolve international conflicts)
- (4.5) Increasing social mobility
- (4.6) The decline in respect for traditional authority, customs,

moral standards; crisis in legitimacy\*

- (4.7) The spread of homogenization into a world "culture", decline of national identity and local customs
- (4.8) The extinction of some languages spoken only by small local groups, the washing away of distinctions between local dialects, and the emergence of some widely spoken languages (particularly English) as an international means of communication
- (4.9) The increasing global standardization (e.g. the metric system, the Christian calendar, scientific and legal terms, etc.)
- (4.10) The splitting up of the nuclear family between husband/wife, parents/children, sons and daughters (Countertrend: reemergence of joint and extended family.)
- (4.11) The spread of peer networks, not blood-based
- (4.12) The spread of fundamentalist religiosity, and challenge of institutionalized religions
- (4.13) The spread of atheism
- (4') The emergence of new dogmas, fashions and prejudices
  - (4'.1) The rapid spread across the globe and disappearance of fashion trends in cultural expression, way of dressing, etc.
  - (4'.2) The adherence of scientists to "schools of thought", unable or unwilling to try to grasp arguments from people in other "camps"

\*This includes in particular the declining respect for authority of parents, teachers etc., since the experience of the older generation is often no longer relevant in a rapidly changing world.

- (4'.3) The blind uncritical acceptance of different dogmas and ideologies by many people, preventing fruitful dialogue

(5) Decentralization

- (5.1) The spread of "appropriate" technology (often capital-intensive, labor-intensive, creativity-intensive, participation-intensive)
- (5.2) The emergence of new technologies which permit greater decentralization and self-reliance at every level
- (5.3) The accumulation and dissemination of capital, skills and knowledge necessary for the operation of decentralized technologies

(5') Centralization

- (5'.1) The spread of Western/modern technology (usually capital-intensive, labor-extensive, research-intensive, administration-intensive)
- (5'.2) The accumulation and concentration of finance capital in fewer and fewer hands on a global scale (by banks and transnational corporations), and the accumulation of physical capital equipment for large-scale production under a system of centralized control and decision-making\*
- (5'.3) The spread of technocracy (integrated bureaucracy-corporation-intelligentsia triangles, BCI) as general mode of production (of decisions, goods/bads and services/disservices, knowledge) through education

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\*I am grateful to John Irvine for emphasizing that trend, which had not been mentioned separately in an earlier version.

- (5'.4) The increasing intervention of state governments into people's daily lives
- (5'.5) The increasing role played by large organizations (corporations, unions, political parties, governments, international and national organizations, etc.) in people's daily lives, organizations whose decisions are beyond the control of the individual
- (5'.6) The growing use of large-scale and long-term planning, by governments, corporations and other organizations

(6) Liberation

- (6.1) The emergence of alternative ways of life (AWL) in the inner occident
- (6.2) The spread of communes, cooperatives etc. as mode of production
- (6.3) The spread of subnational autonomy movements, ethnic and otherwise
- (6.4) The formation of new classes by passing from potential class (with a common interest, but unaware of it) to a conscious class and finally to a struggling class
- (6.5) The delinking from centers of exploitation and relinking with other groups that share a common interest
- (6.6) The spread of decolonization (now nearing an end)
- (6.7) The revival of nationalism in search for identity\*

\*Nationalism is to be seen as liberation only if it is not directed against others, e.g. if it serves liberation from foreign domination. Nationalism which seeks to dominate other nations, to put one's own nation ahead of other nations, and ahead of global human goals - à la "Deutschland über alles" - must be seen as a trend towards exploitation, not liberation.

- (6.8) The implementation of the new international economic order
- better terms of trade for the Third World (but decreasing North-South trade)
  - More Third World control over productive assets (nature, capital, labor, technology)
  - more Third World interaction (technical, economic cooperation among developing countries)
  - more Third World counterpenetration (investment in "rich" countries etc.)
  - more Third World control over economic institutions, transnational and interstate

(6') Exploitation

- (6'.1) The spread of autocracy (integrated party-military-police triangles, PMP) as general mode of governance - through loyalty
- (6'.2) The spread of authoritarian/ahuman personality structures, related to pyramidal, authoritarian social structures (family, school, work) and to pyramidal, deductive cognitive structures
- (6'.3) The power balance increasingly towards the macro, away from the micro level
- (6'.4) The spread of rightist reaction against liberation, also fascism (private police forces, paramilitary); search for external control which relieves individuals from making decisions
- (6'.5) The increasing appropriation of surplus by national governments (bureaucracy, military etc.) - arms races

absorbing an increasing proportion

(6'.6) The spread of imperialism and neocolonialism

(6'.7) Gaps in living standard:

- decreasing between elites (BCI, PMP) North - South

- Increasing between elites and people in the Third World (to pay for BCI, PMP)

- constant between elites and people in the North

(6'.8) The spread of massive poverties among the people of the South, non-socialist (hunger, illiteracy, morbidity/mortality)

(6'.9) The spread of "socialism" in the poor capitalist countries (in the sense of (1) BWL as goal, (2) spread of occidental cosmology, (3) technocracy as mode of production, (4) autocracy as mode of governance, and (5) monopoly state-capitalism)

(6'.10) The growing power of transnational corporations

(6'.11) The rise of the Orient (integrated Japan-China-South-East Asia triangle) as hegemonical economic power, penetrating the First, dominating most of the Third World

(6'.12) The differential impact (of the rise of the Orient) in the Occident:

- decline of the inner Occident (North America, Western Europe)

- culmination for the second Occident (USSR, Eastern Europe)

- expansion of the outer Occident (Islam, counter-cyclical to Christianity)

(7) New global consciousness

(7.1) Growing awareness of the dangers of war, environmental



degradation, massive poverty etc. to which humanity is exposed

- (7.2) The awakening interest in non-military alternatives to all-out war as the lesser evil
- (7.3) The spread of non-violent political movements
- (7.4) The growing body of thought on peace research, non-violent conflict resolution, arms control and disarmament, pure defense without offense, international law, international cooperation, better mutual understanding etc.
- (7.5) The spread of peace movements
- (7.6) The spread of ecology movements (the green wave)
- (7.7) The growing body of development thinking
- (7.8) The spread of social justice movements
- (7.9) Efforts to preserve as well as enhance the human environment (e.g. through agricultural activities, dams against floods and drought, pollution control and abatement, pest control using natural enemies, etc.)
- (7.10) The slow disintegration of nation-states and the strengthening of international people-to-people organizations to solve global problems. The ultimate emergence of a world government with limited functions, by consensus
- (7.11) The discrediting of dogmatism as a way of thinking and approach to problem-solving. The triumph of eclecticism, of the non-dogmatic willingness to learn from each other, the growing search to combine the best features of different solutions to a problem, and of combining several systems to eliminate each other's weaknesses (e.g. the combination

of the best features of different economic systems, in order to satisfy human needs better)

(7') Ethical decay

- (7'.1) The decline of ethical qualities, such as concern for others, humility, hard work, unselfish love
- (7'.2) The spread in the First World of a sense of desperation, of the world falling apart
- (7'.3) The spread of militarist/hawkish ideology and approach to conflict

(8) Resilience

- (8.1) The emergence of adaptable and resilient societies, characterized by equality with diversity, a great deal of experimentation, self-correcting negative feedbacks, analogous to a mature ecosystem. Such a society will be able to guarantee satisfaction of human needs such as survival, welfare, freedom and identity\*
- (8.2) The emergence of new forms of representation and control at various levels
- (8.3) New forms of federalism. Decision-makers are made to bear the consequences of their decisions, in the form of pollution charges, public criticism for their wrongdoings in the news media, praise and/or rewards for public service, etc.
- (8.4) Increasing diversification to reduce risks. For example, a move away from monocultures in agriculture

\*This is a pluralist or "model IV" society. See Johan Galtung, "Social Structure and Science Structure," Methodology and Ideology, Volume I, pp. 13-40. Christian Ejlertsen, Copenhagen, 1977.

- (8.5) The building up of reserves as protection against disasters; redundance in production systems to overcome breakdowns.
  - (8.6) The provision of free basic goods and services to increase equality (welfare state)
  - (8.7) Increasing access by people to information, which enables them to make informed choices
  - (8.8) The emergence of new technologies for pollution abatement and for the conservation of exhaustible resources
  - (8.9) The increasing capacity to produce material goods to satisfy material human needs (food, improved medicine, growing access to schooling, improved housing, transportation etc.)
  - (8.10) The negative population growth in some First World countries
- (8') Vulnerability
- (8'.1) The move towards limits of what is feasible, the overloading of increasingly complex systems, the lack of alternatives and safety fall-backs
  - (8'.2) The growth of the human population, which may ultimately approach the limits of what the environment can sustain in the long run
  - (8'.3) The spread of unemployment, particularly in the Third World, due to the use of inappropriate capital-intensive technologies
  - (8'.4) The growth of economic cycles, leading to increasing interdependence and unilateral dependence
  - (8'.5) Increasing tension in networks, where a seemingly localized problem has ripple effects throughout the whole system, and

may even lead to a wide-spread breakdown

- (8'.6) Increasing economic specialization (e.g. monocultures) which increases risk
- (8'.7) Growing adaptation at the expense of adaptability, i.e. lack of flexibility\*
- (8'.8) The general degradation of the environment (decreasing maturity, increasing depletion/pollution)
- (8'.9) Increasingly parallel accumulation of crises in inner and second occident with increasing danger of a major war as parallel crisis management
- (8'.10) Increasing separation of military, political and economic hegemony\*\*
- (8'.11) The spread of nuclear military technology and launching capability
- (8'.12) The general accumulation of means of destruction, including the substitution of more efficient for less efficient weapons
- (8'.13) The spread of credible targets away from the superpowers

\*The dinosaurs were the most widespread and best adapted creatures to the environment of their time, but their lack of adaptability, their overspecialization, led to their extinction when external conditions changed. Less specialized but more flexible species survived.

\*\*Disequilibrated actors, who are strong on one count and weak on another, e.g. nations that are militarily strong but economically weak, are most likely to attempt forced changes in the existing system. See Johan Galtung (1978), "Rank Disequilibrium Theory," in Essays in Peace Research, Volume III, p. 105-196. Copenhagen: Christian Ejlertsen.

- (8'.14) The growing vulnerability of increasingly complex computer-based systems (e.g. fully automated military warning systems)
- (8'.15) The beginning interest in mind/spirit destructive technologies (subliminal advertising, zapping etc.)
- (8'.16) The spread of violent political movements (terrorism)
- (8'.17) The spread of crime in general (theft, corruption, burglary, assault, sex crimes)
- (8'.18) Increasing gap between bourgeois way of life goal and system delivery capacity, generating conflict both among and inside persons
- (8'.19) The spread of somatic "civilization" pathologies - cardiovascular diseases, malignant tumors; increasing addiction to alcohol, tobacco, sweets (also drug addiction)
- (8'.20) The spread of mental "civilization" pathologies - neuroses, psychoses, schizophrenia, suicide
- (8'.21) The spread of spiritual "civilization" pathologies - a general emptiness, meaninglessness, declining capacity of reflection over oneself

### 3. Some examples of causal interactions among families of trends

After having given some content to the eight pairs of trend families shown in Figure 1, we are now in a better position to discuss causal links among them.

Trend families 1-4 form the main positive feedback loop which is at the heart of the rapid developments in recent times, and will remain so at least for several decades to come. New knowledge (1) has led to the discovery and construction of better means of transportation, communication and information processing (2).

These technologies have helped the global spread of knowledge and ideas (3). The spread of ideas has upset long held uncritical beliefs, and has broken down geographical boundaries between cultures, ideologies and cosmologies\* (4). It will tend to lead to a growing global homogenization, where a much richer variety of ideas, knowledge, tastes and ways of life and behavior coexist in any particular location, but where geographical boundaries between them are softened up more and more.

Trend families (2), (3) and (4) all reinforce the more rapid development of new knowledge and ideas (in particular science and technology).

Like a mirror-image to the interaction of trend families (1)-(4), the opposite trends (1')-(4') also mutually reinforce each other. Lies (1') can only persist as long as they are shielded from critical scrutiny that would result from the free flow of ideas and people. Therefore, lies require for their survival barriers to such free flows through censorship and travelling restrictions (2'). Such restrictions promote differences in the information available to different people and generate differing views of the world (3'). Such differences in perception breed prejudices and the emergence of dogmas (4') and stand in the way of mutual understanding between groups. All these trends (2')-(4') reinforce the emergence and persistence of lies and half-truths (1').

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\*See for example "Five cosmologies; an impressionistic presentation," by Johan Galtung, paper presented at GPID's fifth network meeting in Montreal, July 27 - August 5, 1980.

The growth of knowledge (1), and particularly the development of new technologies as part of (1), has a profound effect on the entire global system. New technologies can be of two major types: (a) those favoring production at a very large scale, in centralized units, often highly capital-, research- and administration-intensive (trend family (5'), centralization). Examples are nuclear energy, large-scale agribusiness, central computers, etc. (b) technologies favoring small-scale activities, which require little capital and are creativity- and participation-intensive (leading to trend family (5), decentralization). Examples are decentralized solar energy, family farms, home computers, etc. Both types of technology may be hard or soft on nature, and labor-intensive or extensive, but generally centralized technologies tend to be harder on nature, and decentralized technologies tend to be more labor-intensive.

Centralized technologies tend to lead to large economic cycles and an integrated world market, creating dependencies, with growing inequality and exploitation of the weaker by the stronger (6'). They lead to the emergence of a technocracy. Technocrats favor the further development of centralized technologies, which will perpetuate the role their class plays and reproduce exploitative social structures. Therefore, trend families (5') centralization and (6') exploitation mutually reinforce each other.

Technologies favoring decentralization (5) make possible the liberation of smaller from larger units (6), through self-reliance. Pluralistic egalitarian societies, in which there is room for

participation and creativity, will constantly discover new technologies which enhance these features. That is, decentralization (5) and liberation (6) mutually reinforce each other.

Resilience (8) is aided by liberation and variety (6). But it does not normally result from total decentralization. Some global coordination is needed, for example to protect the environment and to resolve conflicts so as to guarantee survival. On the other hand, decisions which can be made at a local level without interfering with a larger unit are best taken at the most decentralized level possible, because this is where first-hand information is available and where delays in responses are shortest. Decisions which do not affect others are best taken at a decentralized level, to minimize disputes and sources of conflict. Resilience depends on the proper mix of hierarchical alpha-structures and egalitarian pluralistic beta-structures, in Galtung's terminology. In terms of the economy, a desirable system may consist of some large-scale units for efficient production (e.g. of solar cells or micro-computers) and small units which have the potential to be self-sufficient when necessary (i.e., which are self-reliant), but which do not isolate themselves constantly in self-imposed autarky. For this reason, resilience (8) depends on both decentralization (5) and centralization (5') in the proper mix. Every decision ought to be taken at the most appropriate level. Another analogy may be useful to illustrate this point. The human body represents a beautifully functioning alpha-beta structure, which is the result of a long process of evolution and selection of the fittest. Many important biological processes go on constantly within the cells of



the body, without any signals from outside guiding them. Other processes (e.g. digestion, blood circulation etc.) need some overall control, but they do not depend on the conscious part of our brain. Only a few activities, which often require some creativity and foresight, are planned by the conscious part of our brain. An excessively centralized system would be an organism in which all activities are directed from one center, e.g. if we would have to consciously regulate our digestion, heartbeat etc. Our brain would be overwhelmed with information, completely bogged down, decisions would tend to be postponed, with disastrous consequences. Some highly centralized economic systems do not seem to be too far from that image. On the other hand, it is clear that without some coordination of the activities of the body cells, and without consciousness, no higher forms of life could exist.

One more example that shows how pluralist variety (5, decentralization) promotes resilience may be useful to consider. Genetic variety is very important for the survival of a species. For example, if there is only a single variety of a food crop, some plant disease against which it is not resistant can destroy an entire harvest. But if there are many different strains of the same crop, some of them will tend to be resistant against the disease. This is why Norman Borlough, who helped discover high-yielding grain varieties that led to the green revolution, is now devoting his time to collect seeds from a great variety of grasses and traditional, low-yielding grain varieties, which are being abandoned in favor of a few high-yielding varieties, so as to build a reservoir of genetic variety as a protection against possible future crop failures.

The wrong kind of mix of centralization (5') and decentralization (5) leads, of course, to greater vulnerability. For example, in a centrally planned economy with large economic cycles, a supply problem in one sector can paralyze many other sectors throughout the country. If production is organized in smaller, self-reliant units, which are not completely dependent on each other, a problem in one place remains localized. But isolation and lack of transport facilities also prevents aid coming in from outside in case of a disaster, and in this way can make a system more vulnerable than when some central coordination promotes flexibility. Much more needs to be said about the proper mix of centralization and decentralization which promotes resilience. For example, a society in which military power is vested in the hands of a few generals, while food production, health care and education is left to the "protective cocoon" of the extended family, makes people very vulnerable. If defense is democratically controlled and organized\*, and the state provides good health insurance, free education to all, and maintains food reserves as protection against disasters, people are much safer.

Exploitation (6') leads to frustration of the oppressed, who will ultimately seek to overthrow the old system, if necessary through a violent revolution, making the system vulnerable (8'). A resilient system must be just, i.e., free of both direct and structural violence.\*\*

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\*See Johan Galtung, "On the Strategy of Nonmilitary Defense," Essays in Peace Research, Volume II, pp. 378-426. Christian Ejlert, Copenhagen, 1976.

\*\*See Johan Galtung, "Structural and Direct Violence: A Note on Operationalization," Essays in Peace Research, Volume I, pp. 135-139 (with Tord Höivik). Christian Ejlert, Copenhagen, 1975.

The breakdown of traditional beliefs (4) can give rise to a new global consciousness (7), which seeks better solutions to the growing problems facing humanity, or it can lead to a decay of traditional ethical values, with nothing replacing them, and it can even lead to the emergence of new ideologies which are destructive, seeking violent and simplistic solutions to problems (7').

A new global consciousness seeking peace, justice, development, ecological balance etc. promotes resilience (8) and liberation (6).

Ethical decay (7) leads to vulnerability (8') and exploitation (6').

Finally, some remarks are needed about the relationship between the eight pairs of opposite families of trends.

Truth (1) emerges from the struggle between different ideas and hypotheses, some of which will turn out to be inconsistent with observations and false. But there is a big difference between mistaken but honest beliefs on one side, and the deliberate spreading of untruths known to be false to the propagator, for selfish motives (1'). Truth and lies are in a constant struggle, like health and disease. Without open discussion and unprejudiced examination of all ideas and proposals, true knowledge cannot develop. Lies cannot be eliminated by suppressing (censoring) them, but only by exposing them and confronting them with superior ideas.\*

If the spread of ideas, people or products (2) is too rapid for existing institutions to adjust to them, these institutions

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\*This should be as obvious as the fact that hiding the symptoms of a disease does not cure the disease.

will try to put up barriers (2') to preserve themselves. But such barriers can probably not remain effective forever.

Parallel to a greater homogenization of ideas across the globe (3), there is a greater diversification of ideas in any given place (3'), due to the greater access of people to different sources of information.

The breakdown of traditional belief systems (4) makes room for new dogmas (4'), which will break down again, sooner or later.

Excessive centralization (5') will lead to delays in decision-making and breakdowns in the system, which will give rise to spontaneous self-help on a decentralized basis (5). On the other hand, an overly decentralized system is rather weak, and may attract some form of central coordination and/or control, either emerging from within through voluntary cooperation, or being imposed from above or outside.\*

Exploitation (6') will nurture the desire for liberation (6). Abuse of liberties makes people receptive for the demagoguery of authoritarian minds who call for authoritarian (i.e., exploitative) solutions to problems.

Ethical decay (7')\*\*, the spread of short-sighted selfish behavior, shows people the need for a new consciousness (7) to avoid a breakdown of society. When things seem fine, people become complacent and new decay may set in again.

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\*Patrick Healey once observed that multinational corporations would love it if, for example, Papua New Guinea consisted of 10,000 isolated villages without central government. They could then take them one by one.

\*\*During most of human history, people were probably guided in their

Vulnerability (8') generates the desire for resilience (8), instability the desire for stability. But resilience, the absence of problems, can lead to complacency and a lack of vigilance, which in turn makes a system vulnerable again.

Depending on the way these opposing trends interact, they may hold each other in a constant equilibrium, or time delays in the reaction can lead to cyclical fluctuations or to an overshoot and collapse mode. More on this will be said in the next section.

#### 4. Curve shapes of trends resulting from various laws of motion

In this section, the underlying laws of motion for a number of frequently encountered trends are described, with examples from the natural and social sciences. There are, of course, many other shapes of trends than those listed here.

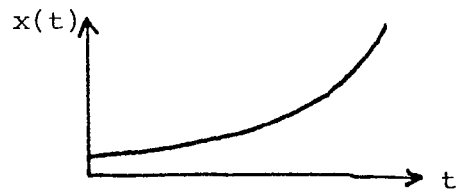
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actions mostly by traditional customs and beliefs, not by considerations of short-term self-interest, as much of economic theory would have us believe. Today there is growing contempt for such blind faith, and people believe they are more rational. But old customs, which had evolved over long periods, often (not always) had deeper reasons behind them, even if those reasons were not understood by most of the people adhering to such customs. For example, the prohibition by certain religions against the consumption of pork made sense when pork was a frequent transmitter of parasitic diseases, while today this custom has lost its usefulness in most places. Traditional modes of behavior often served the function of letting people live in peace with nature and with one another. As such traditions lose their power over people's way of conduct and are being critically evaluated, they ought to be replaced by a new awareness of necessities, based on a more scientific understanding of the world, which leads people to behave in ways consistent with long-term survival. Otherwise the loss of reverence for nature and for life may lead us into disaster.

#### 4.1 Exponential growth

If the rate of growth of a variable is proportional to the value of that variable at any given moment, the result is growth at an ever more rapid rate, yielding the familiar exponential curve.\*

$$dx(t)/dt = A x(t)$$



Example 1: Growth of an animal population without enemies in an unlimited environment. The rate of growth (the excess of births over deaths) is proportional to the size of the population at any given moment, on a statistical average.

Example 2: The growth of knowledge. During some periods of history, people have believed that they were close to the limit of what there is to know, or of what human beings are destined to know. But many scientists claim that the more questions are answered, the more new questions appear, not just about details to be filled in, but fundamental new problems. Whether the body of knowledge will ever converge to a finite limit is doubtful. Of course, if the human species were extinct in a large war or ecological catastrophe, then this trend would come to an abrupt end.

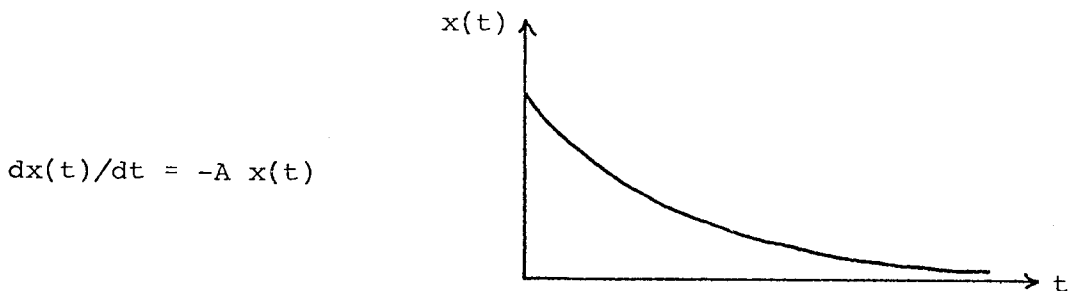
Example 3: The accumulation of physical capital, as long as the availability of natural resources does not impose any constraint.

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\*Mathematical formulas may be skipped, without loss of continuity. Parameters A, B,  $t_0$  etc. are positive constants.

#### 4.2 Exponential decay

The rate of decline is proportional to the current value of a variable.



Example 1: The amount of a radioactive substance remaining after a certain time period. The number of nuclei decaying per time unit is proportional to the number of nuclei present.

Example 2: The amount of useful genetic information remaining after a certain time, while this information is being destroyed through spontaneous mutations (due to cosmic radiation, chemical mutagens, radioactivity etc.). This trend is counteracted by natural selection, which gives preference to those organisms that are better adapted or more adaptable to their environment. The interaction of these trends can actually lead to a gradual improvement and further development of genetic information, if mutations are sufficiently rare that selection has time to operate. If mutations are too frequent, a rapid deterioration of the genetic code results.\* Most mutations

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\*This would be the likely result from a depletion of the ozone layer by man-made chemicals used in spray-cans etc. The increase in ultraviolet radiation would cause not only more skin cancer but also an accelerated rate of mutations in plants, animals and humans, with

lead to organisms that are unable to live. Only very rarely do they bring an improvement.\*\*

Example 3: The time required to perform certain production tasks. For example, the time required for certain operations in the textile industry has followed closely an exponential decline over the last 200 years. The time required for basic computing operations has declined by about a factor of 10 every 5 years for the last 30 years, and appears to continue along that trend for another several decades. Technical breakthroughs are spaced approximately equally over time, and these improvements reduce the time required for a given task by roughly the same percentage. The time required for other tasks, which do not lend themselves to mechanization and automation, has remained essentially constant over very long periods.\*\*\*

#### 4.3 Oscillations

The acceleration of a variable is negatively proportional to its current value.

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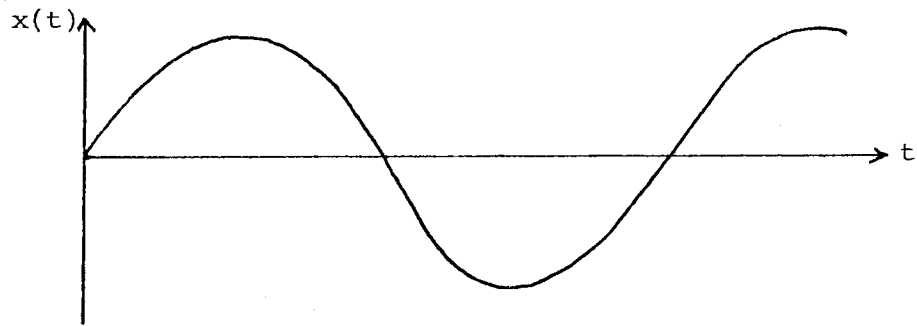
potentially disastrous effects on life on earth. Harmless substitutes for these chemicals are known, but the greed of a few chemical companies that oppose a ban might cause irreparable damage.

\*\*The probability that a spontaneous mutation improves a genetic code may be compared to the probability that a random typographical error improves the meaning of a written text.

\*\*\*As William Baumol once said, to play a Haydn quartet still takes the same time that it did 200 years ago, namely four people for thirty minutes.

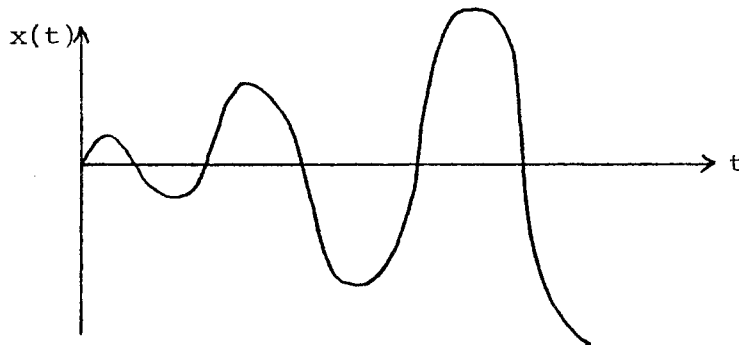


$$d^2x(t)/dt^2 = -A x(t)$$



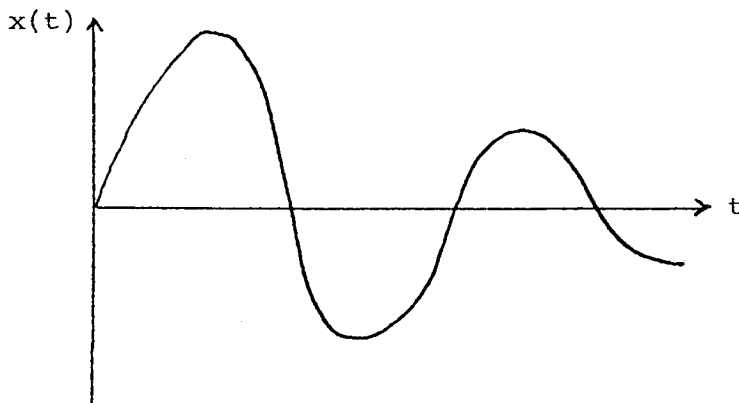
The oscillations may be damped or explosive if first derivatives and/or time lags are involved.

$$d^2x(t)/dt^2 = -A x(t) + B dx(t)/dt \quad \text{or} \quad d^2x(t)/dt^2 = -A x(t-t_0)$$



explosive oscillation with positive feedback from motion and/or delay in the application of corrective force.

$$d^2x(t)/dt^2 = -A x(t) - B dx(t)/dt \quad \text{or} \quad d^2x(t)/dt^2 = -A x(t+t_0)$$



damped oscillation with friction (=negative feedback from motion) and/or anticipation of corrective force.

Example 1: The classical example of an oscillatory movement in physics is the pendulum. If a pendulum is immersed in a fluid, its oscillations are damped.

Example 2: Commodity production cycles.\* Many farm products typically exhibit cyclical fluctuations in their price and output. For example, when the price of soybeans is low, fewer farmers plant soybeans, and this leads to some scarcity, driving the price up. This induces more farmers to grow soybeans, resulting in oversupply and a price collapse, etc., from the beginning. If farmers learn from the past and form correct expectations about future prices, these oscillations tend to be damped. If they lag behind with their response, the oscillations can actually increase with each cycle, until they hit some limit (e.g. prices never become negative).

Example 3: An oppressive dictatorship will foment popular discontent, possibly resulting in a violent uprising. This can lead to a temporary situation of near anarchy, which makes it easy for a new dictator to seize power (probably using a different rhetoric). This closes a full circle, which may then start over again. Such struggles for power may follow each other ever more rapidly, with violence breeding more counterviolence. If people learn from history, they may learn to keep whatever can be saved from the past, to be more patient and generous, and to build a resilient, desirable society, between the extremes of dictatorship and anarchy (possibly some form of representative democracy with an appropriate degree of federalism).

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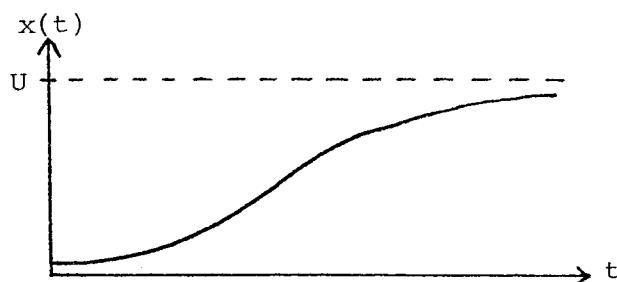
\*See for example Dennis L. Meadows, The Dynamics of Commodity Production Cycles. Cambridge, Mass.: Wright-Allen Press, 1970.

#### 4.4 Logistic growth

If growth takes place in a finite environment, then the rate of growth is not only proportional to the size of the current population, but also to the amount of resources remaining. Such a law of motion yields a logistic growth curve.

$$dx(t)/dt = A x(t) (U-x(t))$$

where  $U$  represents an upper limit for  $x$ .



Example 1: The number of bacteria (dead or alive) in a bottle with a given amount of nutrient solution, as a function of time. In the beginning, the number of bacteria grows almost exponentially, but then it approaches a finite upper limit.

Example 2: The size of the (living) human population, in an environment with limited renewable resources, if there is a peaceful transition to a steady-state population, and if there is no colonization of outer space.

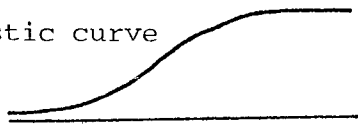
Example 3: The fraction of the adult population in a country able to read and write, over a typical phase of development.

#### 4.5 Bell-shape

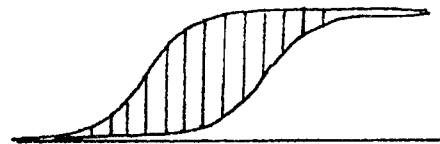
The best known bell-shaped curve is the normal distribution. But it does not typically describe the development of a trend over time. There is a great variety of laws of motion which result in

a bell-shaped trend line. Two of the most plausible explanations of such trends may be their interpretation as the rate of change in a logistic growth curve (the first derivative), and as the difference between two logistic growth curves.

logistic curve



the slope is bell-shaped



the difference between two logistic curves is bell-shaped



Example 1: If the total number of bacteria (dead or alive) follows a logistic curve, and if each bacterium lives a finite time, then the number of living bacteria follows a bell shape.

Example 2: If the cumulative amount of petroleum used since the beginning of history follows a logistic curve (which is plausible), then the quantities used in each successive year follow a bell shape.

Example 3: A scientific paradigm will be accepted at first only by a small minority. But if it has explanatory power that is superior to that of older paradigms, it will spread, slowly at first, then ever more rapidly, until it is more or less generally accepted and established. In that sense it initially follows a logistic growth curve. But it will not hold its dominant position forever. After some time it will be gradually replaced by another, yet superior paradigm. Thus the number of people adhering to it over time roughly follows a bell shape.

Example 4: About the same as on scientific paradigms can be said about social classes. They start small, as a progressive force, struggling against the dominant class, which has become reactionary and conservative. But as a new class gains power, it becomes itself established, and tends to change into a regressive force. Thus it carries in itself the seed of its own destruction, by giving rise to new contradictions, after the old ones have been solved, and is ultimately replaced again by more progressive forces.

Example 5: The "bourgeois way of life"\* as a goal is sought by a growing number of people. But once they have had it (not before) they will begin to search for something better, less oriented towards material consumption, and more towards a harmonious relationship with other people and with nature. The hypothesis is therefore that BWL as a goal follows a bell shape over time. The list could go on.

#### 4.6 Catastrophic shifts

An excellent mathematical description of a simple environmental model has recently been given by Gallopin.\*\* He uses catastrophe theory to show how a variable may suddenly drop from one state of equilibrium into a less desirable equilibrium, from which it is much

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\*See footnote on page 7.

\*\*Gilberto C. Gallopin, "Development and Environment: An Illustrative Model." Journal of Policy Modeling 2(2), 239-254 (1980).

more difficult to bring it back up again. For equations and diagrams, I refer to that paper. Here only three illustrative examples are added.

Example 1: A lake has a certain capacity to abate pollutants. If that capacity is exceeded, then irreversible changes in the ecology of the lake can take place, and it loses its original abatement capacity. Even if no further pollutants are added, the lake may not recover and remain polluted. Lake Erie was recently believed to have reached that stage. But it seems to have improved again slightly, a hopeful sign. If the oceans should ever become polluted beyond recovery, this might mean an end to life, also on land.

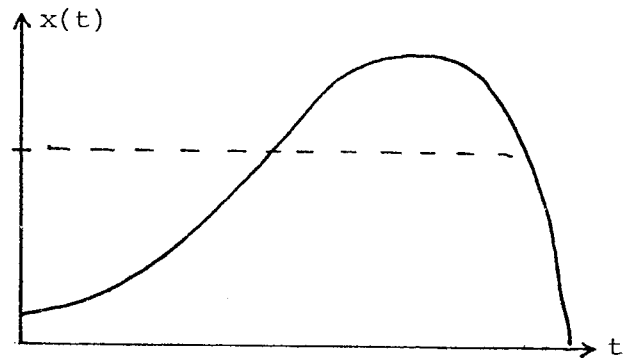
Example 2: As long as a piece of iron remains at a certain distance from a magnet, a weak force is sufficient to keep it away. If that weak force is temporarily relaxed, the piece may get stuck on the magnet, and now a much stronger force is needed to remove it from there again.

Example 3: As long as the people in a country maintain certain standards of good conduct and respect the laws, only mild, occasional controls are needed to insure that the laws are being observed. Possibly, verbal exhortation alone is sufficient. But once corruption and crime become commonplace, it is very difficult to reestablish some minimum order. A much greater effort is then needed to regain adherence to certain ethical standards.

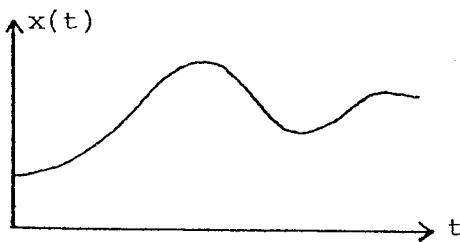
4.7 Exceeding a sustainable limit with subsequent collapse

If the pressure which comes to bear when an upper sustainable limit of a variable is approached is delayed, then a variable may temporarily exceed that limit, but its value can totally collapse to zero afterwards.

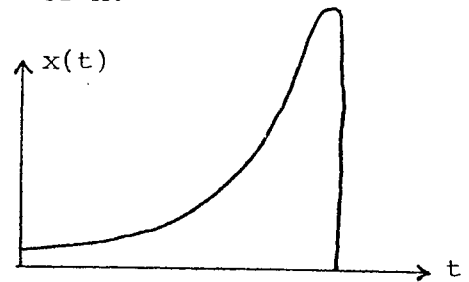
$$dx(t)/dt = A x(t) (U - x(t - t_0))$$



Another mathematical law, which describes a similar trend shape, is  $dx(t)/dt = A x(t) - B y(t - t_0)$  ;  $dy(t)/dt = C x(t) y(t)$  . The interpretation here is that the growth of a prey,  $x$ , permits the growth of a predator,  $y$ , which after a time delay destroys  $x$ . The longer the time lag  $t_0$ , and the larger  $C$  (which determines the growth rate of  $y$ ), the more violent is the "explosion", i.e. the excessive growth and subsequent collapse of  $x$ .



short time lag and slow growth of  $y$



long time lag and rapid growth of  $y$

Example 1: Nature abounds with regulatory mechanisms of the sort just described. For example, some wood-worms feeding on living trees can destroy an entire forest, if their reproduction is unchecked. But there also exists a species of wasps which lay their eggs into the bodies of living wood-worms, and so act as their parasites. Since these wasps reproduce at a substantially faster rate than the wood-worms, the population of wood-worms will be wiped out, and with them the wasps, who depend on the wood-worms for their reproduction cycle. (Since the extinction of the two species is only localized, both can immigrate again from elsewhere, and the cycle can begin anew. Wherever and whenever there appears an excessive concentration of wood-worms, it will soon be held in check by the wasps.)

Example 2: The larger a mass of uranium is concentrated in a small space, the more free neutrons are released, on the average, by each free neutron, before it escapes. If the average number of neutrons released is greater than one, i.e., if a critical mass is exceeded, then a chain reaction begins and a nuclear explosion takes place. If the critical mass is accumulated slowly, then excessive heat would be generated as soon as the critical mass is reached, and the lump of uranium would evaporate before too great damage is done. Therefore, in a nuclear bomb two half-spheres of uranium are shot at each other very rapidly by a chemical explosion, so that the corrective mechanism of the heat generated cannot operate in time, and an extremely violent and destructive explosion results.

Example 3: If there exist mechanisms in a society for the correction of injustices and the redress of grievances in time, then the society



is quite stable, because corrective actions will be taken before the injustice becomes intolerable. But if these mechanisms are blocked by an excessively sluggish bureaucracy, or by outright repression as in a dictatorship, then pressures build up to intolerable levels, resulting in a violent upheaval, often sparked by a minor trigger event. As long as the majority of the people are reasonably satisfied with the government, acts of violence against the established order remain isolated, and do not spread spontaneously. The failure to recognize that is one of the fundamental errors of terrorists. But if there is a sufficiently widespread malaise among people, a minor event can sometimes lead to the emergence of a very widespread and strong popular movement. For example, the imposition of a tea tax in Boston harbor in 1773 led to a crystallization of the long-pent-up grievances of the American colonies against the unresponsive rule of the British king, and to the American war for independence. Castro's landing in Cuba with 60 men sparked the disintegration of Batista's demoralized army and led to his overthrow. The recent events in Poland are another typical example. A minor issue such as the increase of meat prices led to widespread strikes, with a long list of demands, particularly the abolition of privileges for party members and the police, a free press, and independent trade unions. Concessions by the government on almost all of these points helped to defuse the crisis before it resulted in bloodshed. Also, some moderation on the part of the strikers may have helped avert a Soviet intervention.

A rigid system which suppresses demands for changes is more stable in the short run than a softer system, but it collapses in the long run. A flexible system will exhibit more variability and less order in the short run, but it adapts itself more easily to new situations, and avoids catastrophic ruptures. This is the main advantage of more decentralized over excessively centralized systems.

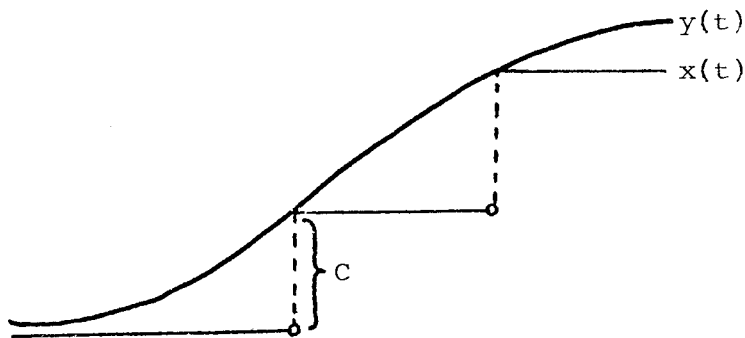
Another example from the physical sciences may help illustrate what has just been said.

Example 4: If two tectonic plates move relative to each other, tension will build up in the crust of the earth. If the rock at the boundary between the two plates is relatively soft, this tension will result in frequent minor tremors. If the rock at the boundary is very hard, tension will build up to enormous levels, and finally be released in a major earthquake.

#### 4.8 Discontinuous ruptures

The example of intermittent shifts in tectonic plates just mentioned really corresponds to another type of law of motion. Two variables may move more or less in parallel, over the long run. But while one of the two variables moves smoothly (in the above example the position of the center of a drifting tectonic plate), the other variable is "sticky", remaining unchanged until sufficient tension has built up for a sudden jump (the edge of a tectonic plate, which touches another plate along a geological fault line in the above example).

Mathematically, such a motion can be described by two functions, one of which follows a smooth path over time (here  $y(t)$ ), while the other variable (here  $x(t)$ ) remains constant until it differs from  $y(t)$  by more than some critical threshold level  $C$ .\*



$$x(t+dt) = \begin{cases} x(t) & \text{if } |x(t)-y(t)| < C \\ y(t) & \text{if } |x(t)-y(t)| \geq C \end{cases}$$

Example 1: The prices that a publicly regulated monopoly (e.g. an electric utility or telephone company) can charge to its customers are usually fixed by law and remain unchanged for some time, while production costs may gradually increase or decrease over time. When the difference between production costs and prices charged becomes sufficiently large, a court hearing is held, where new

\*For a more thorough discussion of possible forms of interaction between two variables, see for example Johan Galtung (1977), "Bivariate Diachronic Analysis" in Methodology and Ideology, Essays on Methodology, Volume I. Copenhagen: Christian Ejlert.

prices are set, corresponding to actual costs. Since such court hearings are expensive, they are usually postponed until cost and price differ by a substantial margin. (The company will request a hearing if costs increased, whereas the regulatory agency should seek a hearing if costs decreased.)

Example 2: The classical example of a periodic, abrupt break is Marx's theory of social change resulting from tension between the means of production and the mode of production. A newly established social structure (mode of production) initially may represent the most favorable conditions under which a further development of the productive forces (i.e., technology, or the means of production) can take place. But as the means of production continue to accumulate and to change in nature, the unchanging mode of production gradually becomes a "fetter" on the further evolution of the means of production, a fetter that must burst to make room for further progress. Why do the means of production (i.e. technology) evolve gradually, while the mode of production (i.e. social institutions) changes stepwise, often accompanied by violent revolutions? The deeper reason for this difference lies, I believe, in the fact that the adoption of a new production technology represents a private decision, which many individuals can take, one after another. A change in social institutions, on the other hand, represents a social decision, which an entire society must take, acting simultaneously. For example, the innovations underlying large-scale manufacturing with a division of labor were made gradually, by many individual inventors, and found their way to individual

craftsmen and merchants, who began to adopt them, one by one, without depending on any concerted action by the rest of society. But the abolition of serfdom, which gradually became more and more urgent so that free and mobile workers could provide the necessary labor force to run large-scale capitalist enterprises, was something that no single entrepreneur could introduce alone. Wide-ranging changes in the legal framework and in society's institutions were necessary, which required the joint action of a large number of people.

Support for a new mode of production gradually builds up in a society, and resistance to a change declines, but it never vanishes entirely. When the support is stronger than the resistance, a change can take place. Sometimes, institutional changes can be brought about peacefully, through a democratic process, e.g. if those who are opposed to the change and lose privileges in the process realize that they cannot prevent the change and would only lose more in a violent confrontation, or if they are accessible to peaceful persuasion.\* But where such insight is lacking, and the minority that prefers the old system resists by force, or calls for support from outside, this tends to provoke attempts at changes of social institutions through violent revolutions. If a revolution is attempted too early, before it has gained a

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\*For example, workers in West Germany won the formal right to participate in companies' management decisions through parliamentary means.

sufficient number of supporters and sufficient power, it will fail and cause a setback.

This concludes Section 4. This discussion of what laws of motion yield what types of trend lines should be useful for the construction of a model that considers the interaction of various trends, how they promote or inhibit one another, or modify one another's qualitative behavior.

The next section briefly addresses the question whether it is possible to classify trends into dominant trends and counter-trends.

#### 5. Dominant vs. counter-trends

To most trends, there usually exist a great variety of other trends that strengthen it, and many that weaken it. There does not seem to exist a unique relationship between a given trend and "its" counter-trend. For example, one observable trend is the growing authority state governments have over people's lives. Trends which can weaken that authority are people's more active participation in local movements, and their withdrawal into the micro-level of family life, and/or the inner level of self-reflection and religiosity or philosophical concerns. But the strengthening of global organizations, such as the United Nations, or the growth of non-territorial actors such as national, international and local professional organizations, youth movements, joint-interest groups etc. can equally well be seen as trends that weaken state power. Which is "the" counter-trend to growing state power? I would not dare to say.

Suppose we have selected some pair of trends that are opposed to each other, say the accumulation of arms as a threat to peace and the growing interest in the nonviolent resolution of conflicts as promoting peace. (From what was said above, it follows that there exist many other pairs of opposing trends which include one of these two trends.) The next difficulty arises in determining which of these two trends is dominant, and which is to be relegated into the role of counter-trend. A first comparison might be to see which of the two trend variables currently has a larger value. But how can one compare variables which are not measured in the same units? Can one equate one ton of arms with one peace researcher? Even if the two variables of two opposing trends can be measured in the same units, for example the number of members of a repressive police force and the number of members of a nonviolent social justice movement, they may not be comparable after all. The police may have fewer members, but still be more powerful.

One could avoid the problem of comparability by saying that the trend which is growing is dominant, and the one which is declining is the counter-trend, or vice versa. But both trends in a pair may be growing at the same time (e.g. the number of policemen and of demonstrators), or both may be declining at the same time. Even if one variable grows significantly faster than the other, it may be still so weak that one may hesitate to call it the dominant trend.

In some exceptional cases one can, of course, unambiguously determine which of two trends is dominant. For example, the spread of a few languages to a growing number of people today dominates over the trend of the differentiation of languages into local dialects

and new languages, because the latter process takes very long, and the former process is much more rapid with modern means of global communication.\*

#### 6. Desirable vs. undesirable trends

The classification of trends into desirable and undesirable ones seems less ambiguous and more useful than a dichotomy of trends into dominant and counter-trends. Of course, one cannot say of a trend in general whether it is good or bad without specifying for whom it is good and for whom it is bad. For example, the spread of complex, organization-intensive technology is good for the technocrats who control it, and bad for the majority of people who are forced into dependence on a few individuals.

The position is taken here that desirable trends are those which help the satisfaction of human needs (survival, welfare, freedom and identity) for all, present and future generations. ("For all" implies striving for equality and "for future generations" implies the preservation of a natural environment able to sustain life, among other things.)

From this viewpoint, trends can be classified into desirable ones, undesirable, ambivalent (meaning that they have both desirable and undesirable aspects) and neutral trends (which are neither desirable nor undesirable). I have not found any neutral trends in the list of trends of Section 2, probably because such trends would not be considered significant from GPID's development theory viewpoint.

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\*As Adolfo Mascarenhas has mentioned, in 1900 Tanzania had 170 language groups. Today it has one national language.



I would propose the following classification of the 16 families of trends shown in Figure 1 (p.3):

<u>desirable</u>	<u>undesirable</u>	<u>ambivalent trends</u>
(8) resilience	(8') vulnerability	(1) knowledge (including science and technology)
(6) liberation	(6') exploitation	(2) information, communication, transportation
(7) global consciousness	(7') ethical decay	(3) global spread of ideas
	(1') spread of lies and superstition	(3') differentiations of perceptions**
	(2') obstacles to the free flow of ideas, goods, and people*	(5) decentralization
	(4') fashions, dogmas, prejudices	(5') centralization

The families of desirable trends include generally only desirable or predominantly desirable trends as members. The opposite holds for undesirable families of trends. Ambivalent trend families may include desirable, undesirable and ambivalent trends.

#### 7. Strategies as deliberate modification of trends

A strategy can be seen as a conscious human intervention to strengthen desirable trends, weaken undesirable trends, and bend the direction of ambiguous trends into more desirable directions.

\*Occasionally, an infant industry may need tariff protection. But I see any obstacles to the free exchange of ideas and movement of people as undesirable.

\*\*It is difficult, if not impossible, to prevent people from having different convictions, and they should be free to do so. All one can insist on is that they should not try to impose their convictions on others by force.

One could now consider each of the hundred or so individual trends listed in Section 2 and address the six questions of who should do what, when, where, how and why.<sup>\*</sup> But that would far exceed the limits of this already lengthy note. I will limit myself here to a few general remarks to each of these questions, which hopefully are applicable in a variety of contexts.

The question why something should be done can be dealt with very briefly. The situation in the world is very bad and dangerous, with the survival of humanity threatened by nuclear war or ecological disasters, and with widespread poverty and great injustice, when the technical knowledge and the resources exist to guarantee safety and a decent living standard for all. What apparently still lacks is the wisdom to implement this, given human psychology. There is every reason to undertake deliberate, well-thought-out moves which can increase global security, justice, welfare, equality, freedom, and give people greater identity (i.e., reduce their alienation).

What should be done? This includes the questions how much, at what expense, and for whom. How much change should be attempted depends on the power one has available. Modest and highly justified demands, which have strong and wide-ranging support, have a good chance of being successfully reached. Overambitious goals, even if they are just and highly desirable from the perspective taken here, may lead to failure, if there is not sufficiently strong support

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<sup>\*</sup>See Johan Galtung, "What is a Strategy?", International Federation for Development Alternatives (IFDA) Dossier No. 6, April 1979, Nyon, Switzerland.

for them. On the other hand, if one is excessively modest about one's goals, one may miss the opportunity of achieving things which could have been feasible. It is like shooting an arrow with a bow. The harder one spans the bow, the farther one can reach. But if one spans the bow a little too much, it breaks and one gets nowhere. Under uncertainty, it is safer to start with modest goals and through experience to gain gradually a better feeling for one's strengths and weaknesses, as well as those of potential opponents.

Two examples may illustrate this point. Allende in Chile wanted to implement highly desirable reforms. But lacking the support of middle classes and the army, and having no counterforce, he was overambitious and failed. A different strategy was recommended by Mao. In the areas controlled by the red army before the Chinese revolution, some eager leaders wanted to distribute immediately all the land that was not cultivated by its owners to poor and landless peasants. This would certainly have been highly desirable. But Mao warned that it could create a too powerful opposition by the landlords and rich peasants all at once, and might end up in failure. He proposed that a very modest step should be attempted to start with. All that was called for was a reduction of land rents from 50 and 60 percent to one third. In return, the red army would help to guarantee that all rents were paid, which previously often was impossible. This move had very wide support, even among some landlords. The whole population became involved in discussing and implementing it. That initial success opened the way for very far-reaching changes later.

When does a strategy have the greatest impact?

There is a saying "strike the iron while it is hot." Before it is hot enough, it is very hard to shape it. After it has cooled down again, efforts come too late. Someone who has a good strategy may have to wait until the time is ripe for it, but then he or she should act before the opportunity has slipped away again. For example, in Poland there was widespread unhappiness about the rule of what has been called the "red bourgeoisie", and the privileges they enjoyed. But a call for a strike to press for reforms at an arbitrary moment would probably have had limited following, because of people's general apathy and fear. The day after the government's announcement of food price increases, when this topic was on everybody's mind, was an ideal moment to press for a list of demands, which went far beyond the immediate issue of food price increases. If the strike had been delayed for too long, people's excitement would probably have cooled down again to some extent, and the success of the strike could have been more doubtful.

A well-known analogy is that of the spark which can start a prairie fire. But it can do so only if the prairie is sufficiently dry. Before the season, or after the next rain, a spark has no effect. And no matter how dry the prairie is, if there is no spark, no fire will start. This analogy can also shed some light on the role of individuals in history. If the situation is not ripe, and people are not ready to undertake a change, then no individual effort can reach very far. On the other hand, if a situation exists in which a change would be possible and widely desired, but nobody takes the initiative to help bring it about, it will not take place either. Both conditions have to be fulfilled simultaneously. The debate whether it is the masses of people or "outstanding individuals" who are the makers of history is as moot a question as whether a prairie fire is caused by the spark, or by the dryness of the prairie.

While a fire tends to have the connotation of something destructive, perhaps a better analogy is that of a seed, which can develop into a great and beautiful plant. if it is sown at the right time in the right environment. but dies if it is sown too early, too late, or in the wrong place.

An example which shows the role of timing in strategy may be that of OPEC. It was founded in 1960, but did not manage to increase the oil price until 1973, when it temporarily embargoed the United States during the Mideast war, and oil auctioned in the open market fetched very high prices. A similar attempt by the six main banana-exporting countries to levy a modest export tax failed, because the president of Honduras, the largest banana exporter, was bribed by the United Brands corporation not to participate in the scheme. When this scandal broke into the open and the president of Honduras was overthrown in a coup because he had accepted that bribe, the time could have been ideal to make a new and more successful attempt to raise the producers' price of bananas. But no one seized the initiative.

Often, the earlier some intervention in a trend is made, the easier it is to change its course. For example, if a weed begins to spread, at an early stage it may be sufficient to remove a few plants to contain or eradicate it. If one watches passively for too long, it may be very difficult to get rid of it. Similarly, it has been said that if Hitler's aggressive desires had been stopped earlier, the Second World War might not have reached the disastrous proportions it did.

It is usually easier to prevent an ecological disaster before it happens than to try to restore things afterwards, as has been pointed out in Section 4.6. The ultimate ecological catastrophe, a nuclear war, may be something from which humanity can never recover. Efforts to prevent it before it happens, no matter how difficult and hopeless they may seem, are incomparably easier than any potential attempt for recovery after it has happened.

Who should carry out a strategy? If it is to be successful, it must be supported by a group of people who have the power to implement it and are also interested in its outcome. "Interest" does not have to mean narrow self-interest. People often make personal sacrifices to serve a cause which they see as important. But one cannot expect people to work for a goal in which they have no interest, whether such interest is based on material or moral reasons.

For example, Johan Galtung experienced that the government and military establishment in Norway had no interest in non-military defense, even though they were the actors who could have most easily and naturally implemented such plans. They were afraid that citizens would use methods of passive resistance not only against a foreign occupation force but also against unpopular measures by the government, and make the country ungovernable. Therefore it is necessary to win the people's support for such measures, through a long process of education, so as to bring popular pressure on the government to permit and encourage preparations for non-military defense.

Another example is that of a Swiss member of parliament who fights for progressive causes, but does not have enough power and support to bring them success. He has too often and too openly criticized his colleagues for their conservative stance and the ways in which they enrich themselves, and can therefore not count on their support for his initiatives, whatever they are. But sometimes, such support is indispensable. To be successful, one must concentrate one's efforts on a few issues where the need for improvement is most obvious, issues which enjoy sufficiently wide support, and try to isolate the most backward elements.

Where is the best place to work for change? This does not only refer to geographical space, but also to "social space", whether at the micro-level (individual, family or small group), at the macro-level (the nation-state), or at the global level. Johan Galtung further distinguishes between territorial actors (national and local governments and international governmental organizations) and non-territorial actors (professional and volunteer organizations etc., at all levels).\* Even though the most formidable power is located with national governments, he suggests that this may also be the most difficult place to bring about change. He recommends to "surround" national governments by working through governmental bodies at the local and international level, and through non-governmental organizations at all three levels. By bringing simultaneous pressure from many sides on one point, one has a good chance to succeed. This resembles a strategic principle of Mao, which may have contributed to the communists' victory,\*\* even though they were initially outnumbered by Kuo-Min-Tang troops 5:1. He recommended not to spread forces thin and fight against too many enemies at the same time, but to concentrate forces from all sides onto one point, where victory would be certain. The same principle can be applied equally well or better in non-military strategies.

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\*See for example Johan Galtung (1975), "Nonterritorial Actors and the Problem of Peace", On the Creation of a Just World Order, ed. by Saul H. Mendlovitz, New York: The Free Press, and Johan Galtung (1980), The True Worlds: A Transnational Perspective. New York: The Free Press.

\*\*Probably even more important for the red army's victory was its popularity, moving among the people and receiving their support, "like fish in the water".



Another principle in choosing where to direct one's efforts is to analyze which variables in a system are the most sensitive, in the sense that a change in them will have the greatest impact on the behavior of the rest of the system. For example, if one would like to influence people's value system, to emphasize more the values of peaceful cooperation and selfless service than personal gains at the expense of others, then it will be best to begin working with children at an early age, who still have an open mind, rather than with adolescents and adults, whose value system is essentially established and hard to change.

In a system in which several variables interact causally, one may be able to isolate a few key variables which affect a whole range of other variables and in that sense represent "points of leverage". If it is possible to influence such a key variable, one may be able to bring about greater improvements in the system than by trying to redirect individually all the other variables that depend on that key variable. A few examples may illustrate this principle.

Example 1: In old China, women were heavily oppressed. One might have attempted to reform that situation by passing a whole range of separate decrees. For example, a husband might have been prohibited from beating his wife and required to feed and clothe her adequately, etc. But it would have been very difficult to enforce and supervise all these prescriptions, and probably some subtler forms of cruelty might have been overlooked in the law. A much simpler and more effective measure to protect women was the passage of the marriage law in China in 1950, which gave a woman the right to divorce her

husband and keep half of the property, if he treated her badly. This law, which can be easily enforced without a great police apparatus, took care of all of the above prescriptions, and many more, at a single stroke.

Example 2: Andrei Sakharov has made the right to emigrate a key issue of his campaign for human rights in the Soviet Union, with good reasons. If this right is implemented, it puts an effective limit on all other forms of human rights violations by a government. For if people are repressed too much, they will simply leave the country.

Example\* 3: A British industrialist in the 19th century moved with his machinery and all his workers and their families to the United States, to take advantage of cheaper raw materials. But after a short period, none of the workers showed up at the new factory any more. They had found land to cultivate from which to support their families. The opportunity to become self-reliant spared them from exploitation. No legal code could possibly have prevented exploitation as simply, thoroughly and effectively as the possibility for workers to become independent.

Example 4: This is perhaps the least important in terms of human welfare, but the basic structure of the problem is essentially the same. A natural monopoly (e.g., an electric utility) needs to be regulated to prevent it from making excess profits. This can either be done through detailed supervision by a regulatory agency that must approve prices, investment plans, etc., or through

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\*I heard this story from Johan Galtung.

a complete government takeover. Or it can be done, in some cases, by removing barriers to free entry by other firms into the industry. The constant threat of another firm taking over the market if the incumbent firm makes excess profits, or produces inefficiently, keeps prices at the lowest feasible level, just as atomistic competition would do in a competitive market, but without the need to break up the firm and thereby forego economies of scale.\* Such a natural form of regulation, where it can be applied, seems to be much simpler, more flexible, more effective, incorruptible and ever present, unlike any bureaucratic supervision by a government agency.

How is a strategy to be implemented? This question can refer to ways as well as means. Regarding means, it is ideal if they can be used without being used up. Such a function is performed, for example, by a catalyst in a chemical reaction. It facilitates a reaction between other elements to take place, but is itself not being used up in the process. A similar function is performed by information of any kind. It may help to bring about changes and facilitate certain processes, but it is of course not being destroyed through this. Unlike material resources, it can be duplicated an unlimited number of times. For this reason, the sharing of information of all types, including the results of scientific research, technological know-how, as well as good or bad learning experiences, may play a potentially much more significant role for development than the exchange of material products. Of course, if information is to

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\*See Baumol, William J., John Panzar and Robert D. Willig (1981), Contestable Markets and the Theory of Industry Structure (forthcoming).

be useful to the recipient, it has to be complete, so that the user is able to master it and develop it further. If certain key elements are withheld, as is often the case with the export of modern technology, then this creates only greater dependency.

Concerning the ways in which a goal is to be achieved, there are strong reasons in favor of non-violence. Violence will only breed counter-violence, and will lead to ever-growing oscillations in a field between opposing forces, possibly resulting in a total breakdown. On the other hand, patience and moderation will tend to correct wrongs without degenerating into the opposite extreme. One should try patiently to persuade adversaries, helping them to see by themselves where they went wrong. At the same time one should be prepared to be persuaded, if the other side has better reasons. Being open-minded is not a sign of weakness but of confidence and strength. To make a first friendly gesture can sometimes help to resolve a conflict. One should not seek to destroy opponents, but to win them over, to help them improve and to let them save their face, even though this often looks very hard. Johan Galtung has pointed out that any plan for disarmament that is to work must have a better answer to the question of what to do with the generals than simply sending them into retirement. They must be given a challenging task in peace-building, otherwise they will conspire to win back their positions of power. Similarly, Mao has suggested that if one criticizes some people, one should always offer them a chance to show that they can do better, so that they can regain their self-respect.

#### 8. Concluding remarks

This note represents a subjective view of what the major trends in the world are, how they interact, what laws determine their shape, what trends are desirable for whom, and what interventions may change their course. Other classifications of trends into families and other groupings of trends within the same set of families can be considered. Many trends have elements of several of the families listed here. For example, the liberation of women from stereotyped sex roles, which was listed here under the breakdown of traditional stereotypes and prejudices, could also have been listed under trends of liberation from oppression. Or the spread of technocracy, which was listed under centralization, and the spread of autocracy, which was included under exploitation, both have some elements of each of these two trend families. Nevertheless, I hope this or a similar framework can be useful in organizing one's thoughts on how to strengthen desirable and weaken undesirable trends. For such a framework to develop and become more useful, it is necessary (1) to do empirical studies to obtain a more accurate picture of various trends and the laws which influence their course, and (2) to tap the experience and ideas of many people by having them formulate such frameworks, independently at first, and then by comparing their views, and discussing the reasons for them (e.g. through a Delphi study). The second type of information is "softer" than quantitative data series, but it is much richer in scope, and should not be entirely discarded.

Besides the trends listed here, which change at a more or less rapid pace, there are also some trends which change so slowly that

they can be regarded as constants for a given purpose, and others which are of such a short duration that we like to think of them as "events", taking place at a single point in time. History is shaped by constants, trends and events.\* What is to be regarded as a constant or as an event depends on the type of question to be investigated, and the time perspective taken in consequence. While for a historian, for example, the shape of continents that influences human settlements and migration can be regarded as given and constant, a geologist may want to study the forces which change the shape and location of continents. And while from a historical viewpoint the attack on Pearl Harbor will be a point-like event, a military analyst may study it as a series of unfolding and coordinated actions. Thus classification as constant, trend or event is not exclusive but depends on the focus of attention.

If there has been an acceleration of human developments in recent decades, as I believe there has, this may be attributed to both an acceleration of processes of mutation and selection, to use a biological analogy. Through the widespread access to information, more new ideas and inventions are being generated than in the past. Communication and transportation, which make possible a global competition between new ideas, also help to eliminate more rapidly those ideas which are factually incorrect (but not necessarily those which are harmful to others, i.e. which we would tend to call morally wrong).

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\*This trichotomy has been suggested by Johan Galtung.

The most crucial question we have to ask ourselves is what we, as individuals, can do to help people change trends in directions they consider more desirable. (It is for people themselves to decide what they want, and not for anybody to prescribe them what they ought to strive for.) It is clear that we can accomplish more if we join forces with groups of likeminded people, if we stress what we can agree on, and try to solve disagreements, or, if we are not able to do that, acknowledge disagreements and put them aside, without using up our energy in less important quarrels. A next question is whether our energy should be directed at changing people's values and behavior or at changing social structures, which will automatically lead people to behave in new ways. The choice will depend on which of the two approaches is more easily feasible in a given situation. If success depends on all people changing their value priorities, then the problem is difficult. But if it is sufficient to motivate a few people, who can then bring about a change, then there is more hope. For example, an attempt to convince all scientists to stop research on new weapons systems is unlikely to succeed, and unless essentially all scientists participate in such a boycott, some new weapons will continue to be developed. On the other hand, if a few dedicated people can develop a working peace system that makes the need for national armies obsolete, that approach is more promising. Here it is not absolutely necessary that everybody participate. Of course, the best is to work from both sides.

The structure-oriented and actor-oriented approaches must be used in combination (according to the principle of surrounding an enemy from all sides). Structures are ultimately changed by people who are motivated to do so, and changes in structures will motivate more people to change their behavior and to seek further structural changes. The two trends can mutually reinforce each other, starting small and growing gradually bigger. The process is similar to the untying of a tight knot, or the building of a fire: when it is small, one has to feed it with fine chips. As it grows bigger, one can add heavier logs, which in turn make it burn stronger. Dropping a heavy log on a small fire would quench it, and feeding a big fire with only straw would let it die. Or, as mentioned before, if one tries to accomplish too much at once, one will fail, and if one strives for too little, one will let opportunities go by unused. It takes a good sense for what is feasible at any given moment to have the greatest impact.



Appendix: A tentative list of indicators, and hypothetical shapes  
of trends

Much has been said about processes (trends) and their mutual interaction, a few words about goals, and something about strategies to reach these goals. What is still lacking are indicators\*, which permit intersubjective measurement of the trends described above and the empirical testing of hypotheses. Below is a list of indicators which may serve as proxy for many of the trends listed in Section 2. For some other trends, one must rely on the subjective impression of many individuals, and quantitative indicators are hard to come by (e.g. for the spread of oriental cosmology to the inner occident). The curves shown indicate my personal hypothesis of what each trend may look like, and where we are currently located. For some trends, two possible future developments are shown. Better insight into the likely future shape of various trends can be gained if the Delphi method is used to integrate the views of many people.

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\*Indicators are variables that are relatively easily observed, and which show a high correlation with the trends for which they serve as indicators, even though they may be different from the trends they describe. In that sense, they resemble external symptoms of a disease, i.e., observable phenomena that indicate the presence of a certain disease, even though it may not be possible to observe directly the micro-organisms or poisonous substances that cause the disease.

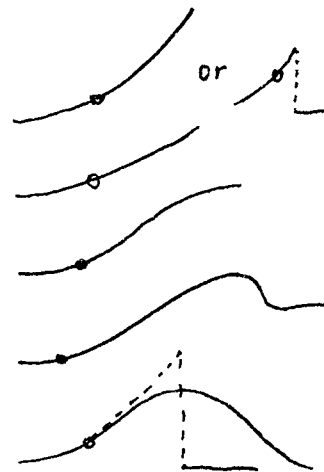
Trends\*

Indicators

Hypothetical  
Trend Lines\*\*

(1) The growth of knowledge

development of natural and social sciences	number of scientists and engineers; scientific publi- cations (nr. of works, nr. of copies)
new forms of art	
mechanization, automation	labor productivity
micro-processors	nr. of processors and their computing capacity
run-away technology	nr. of disasters due to new technologies, nr. of people affected




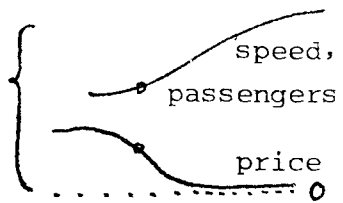






(1') Superstitions and lies

superstition	proportion of newspapers carrying horoscopes; number of people taking them serious- ly
political lies and propaganda	proportion of factually incorrect and tendentious statements in the media
selective perception of facts	relative news coverage given to the same events by adverse groups



\*Only a few keywords are given here. For a fuller characterization of these trends, see Section 2.

\*\*Johan Galtung has pointed out that the shapes of trend lines may be used to classify trends, as sorts of "indicators of trends", in a similar way as unidimensional indicators measure the variables described by a trend.

<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
<u>(2) Information, communication, transportation</u>		
information and communication technology	nr. of radios, TV sets, hours listened and watched; newspapers, periodicals, books, telephones, study and teaching abroad, tourism	
transportation	nr. of passenger km, by type of carrier, speed, price	
emergence of world market	trade volumes; average size of economic cycles; degree of economic dependence on imports	
factor mobility	labor migration; foreign investments;	
de-industrialization	closings of factories, compared to new openings	
<u>(2') Impediments to the flow of goods, ideas, people</u>		
trade barriers	size of tariff walls; quotas compared to free trade volume	
censorship	nr. of censored publications, confiscation of publications, films, tapes, TV programs, suppression of theatre plays, arrests for violation of censorship laws, jamming of foreign and clandestine broadcasts, nr. of independent publications, broadcasters, theatre groups, foreign publications	
migration laws	nr. of people allowed to travel abroad; nr. of refugees; nr. of expulsions of "illegal aliens"	

Trends

Indicators

Hypothetical trend lines

(3) The global spread of ideas

access to information and ideas

same as for information and communication



bourgeois way of life as a goal

opinion surveys



spread of occidental cosmology

carriers, such as language, science, technology, social structure



spread of oriental cosmology

dissemination of literature on oriental cultures



dialogue between civilizations

cultural and scientific exchanges



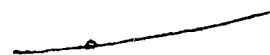
spread of capitalist mode of production

nr. of people doing wage labor; size of firms



spread of trend predictions

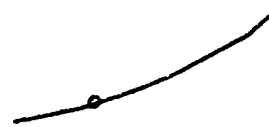
nr. of predictions; nr. of copies sold



(3') Differentiation of perceptions

scientific specialization

growing number of scientific societies and journals; decreasing overlap of members and subscribers



(4) Breakdown of traditions and prejudices

liberation from sex roles






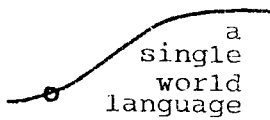



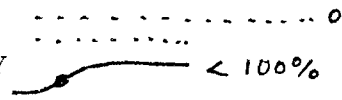


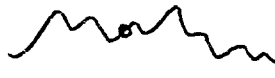
nr. of women working; nr. of women in jobs traditionally held by men (incl. elected office); nr. of men taking care of children and/or household













liberation from age group roles and other forms of discrimination

voting age (min, max); access to higher education, elected office, higher income by minority groups (race etc.)









<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
rejection of prejudices	surveys of differences in attitudes between generations	
rejection of traditions	abolition of slavery, monarchy, human sacrifices; (torture, death penalty, war?)	
increasing social mobility	intergenerational comparisons of professional class	
crisis of legitimacy	decisions (on marriage, job etc.) made by parents	
homogeneous world "culture"	foreign vs. local popular music, dances, dresses, food	
spread of world languages and extinction of some small local languages	statistics on spoken and written languages used	
global standardization	spread of metric system, Christian calendar, Latin alphabet etc.	
splitting up of nuclear family	legal separation and divorces (splitting between parents/ children and siblings is usually not recorded)	
joint and extended family	size of households	
spread of peer networks	membership in clubs; time spent outside of family	
fundamentalist religiosity	membership of new religious movements	
spread of atheism	church attendance; records on religious denomination	
<u>(4') Dogmas, fashions, Prejudices</u>		
fashion	value of goods (clothes, cars et.) discarded because of changing fashions, even though they could still serve their real function	




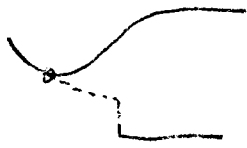


<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
schools of thought	scientific papers with minor extensions of an existing theory vs. original contributions (may be hard to judge)	
dogmatism	absence of fruitful dialogue; cooperation between people who formerly held different beliefs being rare	
<u>(5) Decentralization</u>		
appropriate technology	small scale of operation; low use of scarce inputs; creativity and participation.	
technologies for self-reliance	size of informal sector; size of economic cycles.	
capital and skills for appropriate technologies	capital and employment of small firms relative to medium and large firms	
<u>(5') centralization</u>		
spread of western technology	capital and labor intensity etc.	
accumulation and concentration of capital in large corporations	indices of industrial concentration(monopoly and oligopoly); value of assets held by banks and large corporations; foreign ownership in developing countries	
spread of technocracy	concentration of political and economic power, and of education administrators/workers ratio	
intervention of state governments into people's daily lives	amount of taxes paid; public services received	
increasing role of large organizations	comparison of choices that used to be made by the individual and are made for him or her today	

<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
large-scale planning	number of people employed in planning and model building	
<u>(6) Liberation</u>		
alternative ways of life	nr. of AWL groups; membership; activities	
cooperatives as mode of production	nr. of cooperatives, communes	
subnational autonomy movements	struggles for autonomy; cases in which it was achieved	
formation of new classes	coalition formations between groups with similar interests	
delinking/relinking	new alliances	
decolonization	UN membership	
nationalism, in search of identity	attitude surveys	
new international economic order	terms of trade; Third World control over productive assets; TW interaction; counterpenetration; TW voting rights in international organizations	
<u>(6') Exploitation</u>		
autocracy	military governments; political prisoners; torture; size of army, police.	
authoritarian personality structures	lack of democratic rights of workers on the job, etc.	"
power balance towards macro-level	shifts in areas of competence	"
rightist reaction against liberation	membership in private police forces, paramilitary; political assassinations	"
appropriation of surplus by national governments and military	size of government budgets (as fraction of GNP), taxes, arms expenditures	"

<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
imperialism and neocolonialism	national governments representing foreign interests	
gaps in living standards	per capita income distribution (within and between nations); satisfaction of basic needs	"
massive poverties in non-socialist South	hunger, illiteracy, morbidity/mortality	"
spread of "socialism" in poor capitalist countries	BWL as goal, occidental cosmology, technocracy, autocracy, monopoly state capitalism	"
power of trans-national corporations	proportion of the total economic cycle they control; financial assets	
rise of the Orient as hegemonial econ. power	GNP, exports, foreign investments (of Japan, China, SE Asia)	
decline of inner occident, culmination of second occ., expansion of outer occident	same as above, for respective group of countries	
<u>(7) Global consciousness</u>		
awareness of dangers	warning voices in media, publications	
interest in non-military defense	number of countries and people in those countries preparing for some forms of non-military defense	"
non-violent political movements	size of membership; activities	"
peace research	number and size of conferences, nr. of researchers, publications	"
peace movements	demonstrations; teach-ins; writers and speakers; voting; referenda	"












<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
ecology movements	demonstrations, legal suits, public information, voter initiatives	
development thinking	research activities, volunteer groups	"
social justice movements	politically motivated strikes and demonstrations	"
preservation and enhancement of the environment	pollution abatement; prevention of natural disasters (floods, droughts, avalanches etc.)	"
disintegration of nation-states	economic and political integration (number of countries involved, degree of involvement)	"
triumph of eclecticism over dogmatism	nr. of intellectuals who do not adhere to one particular dogma	"
<u>(7') Ethical decay</u>		
decline of ethical qualities	selfishness, self-conceitedness, laziness	
spread in the First World of a sense of desperation		"
spread of militarist/hawkish ideology and approach to conflict	hawkish rhetoric and behavior	"
<u>(8) Resilience</u>		
emergence of adaptable and resilient societies	equality with diversity; experimentation; self-correcting mechanisms	
new forms of representation and control at various levels		
new forms of federalism	distribution of competences between levels of government	
economic diversification	contribution of major commodities to export earnings; import substitution	


<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
reserves; redundance	size of food reserves etc., duplicate production systems	
welfare state	amount of basic goods and services provided for free	
people's access to information	accessibility of public information	
pollution abatement and conservation	fraction of pollutants abated; amounts of pollutants emitted; recycling; consumption of primary resources per capita, per dollar of GNP	
increasing capacity for material production	output of food, housing, transportation etc.; access to schooling, medicine	
negative population growth in First World	birth and death rates	

world population

(8') Vulnerability

approaching of limits, increasing complexity of systems, with lack of sufficient redundance	nr. of systems breakdowns and catastrophes	
population growth	population statistics, census figures	
unemployment	unemployment rates (scientific samples will be more accurate than official government figures)	
growth of economic cycles, interdependence and unilateral dependence	size of import components by industry	
tension in networks	international transmission of inflation; chain effects of supply bottlenecks	

<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
economic specialization	contribution of major commodities to export earnings	
adaptation at the expense of adaptability	an example is the US car industry's inability to meet the recent demand for smaller, more fuel-efficient cars, where Japan succeeded	
environmental degradation	pollution, depletion of exhaustible resources (minerals), extinction of plant and animal species, deforestation, soil erosion etc.	
parallel accumulation of crises, danger of war	exchange of threats	
separation of military, political and economic hegemony	size of military forces; support by other countries on issues (e.g. before the UN); total and per capita GNP.	"
nuclear proliferation	number of nuclear powers, and countries having access to nuclear weapons technology	"
conventional and nuclear arms races	size of military forces; arms expenditures	"
spread of credible targets		"
vulnerability of computer-based systems	catastrophes and near-catastrophes caused by computer errors	"
interest in mind/spirit destructive technologies	subliminal advertizing (zapping?)	"
terrorism	acts of violence	"

<u>Trends</u>	<u>Indicators</u>	<u>Hypothetical trend lines</u>
spread of crime	statistics on arrests and convictions for various types of crime	
gap between BWL goal and delivery capacity	comparison between real living standards and aspirations	"
somatic "civilization" pathologies	cardiovascular diseases; malignant tumors; various forms of addiction	"
mental "civilization" pathologies	statistics on neuroses, psychoses, schizophrenia, suicide	"
spiritual "civilization" pathologies	meaninglessness (opinion surveys)	"