

140. 'Why did we destroy Europe?', *Studium Generale*, XXIII No. 20, Oct 1970, pp. 909-16. Also in: *Knowledge in Search of Understanding: The Frensham Papers*, ed. P. Weiss, Mt Kisco (N.Y.), Futura Pub. Co., 1975, pp. 1-8.
141. 'Genius in science', *Archives de L'Institut International des Sciences Théoretiques*, 34 No. 2, 1972, pp. 593-607. Also in: *Boston Studies in the Philosophy of Science*, Vol. XIV, 1972, pp. 57-71.
142. 'Discoveries of science', *Archives de L'Institut International des Sciences Théoretiques*, 19, 'Science, Philosophie, Foi', 1974, pp. 71-6.
143. *Meaning*, with H. Prosch, Chicago, University of Chicago Press, 1975. Chap. 9, 'Truth in myths', also published in *Cross Currents*, Vol. 25 No. 2, 1975, pp. 149-63.

## Appendix II

### Summaries of Papers Not Republished Either above or in Polanyi's Books

[3]. 'USSR Economics', 1935.

Socialism is now definitely installed in the USSR and Communism has been relegated to an uncertain future. 'A picture, drawn correctly at the present time, may, therefore, possibly forecast the ultimate meaning of the Russian upheaval. A new marketing system, and open market for all consumers goods as the only channel of distribution, has made it easier to review the economic system' (p. 67). The failure of Communism, 1917-21, and the return to private capitalism in the New Economic Policy of 1921. In 1928 the first Five-Year Plan was begun and has been claimed to have been fulfilled in 1932. The second was launched in 1933.

I. The Social Body: statistics and Polanyi's estimates relating to food, housing, wages, health, education and industrial production.

II. The Economic System: No planned economy, only planned production, and even then little systematic planning, for plans are frequently changed and over-production of one commodity is taken as compensating for under-production of another. In 1931 Stalin introduced three market principles: wages to be fixed so as to ensure a sufficient supply of workers with the required qualifications; enterprises to be profitably conducted; and business managers to have personal responsibility. This economic system, 'Socialism', is in effect indistinguishable from capitalism except that ownership is not transferable by private contract, for the Government appoints the 'owners', the managers. The Central Planning Commission does not *plan*, but allocates capital for selected proposals put to it by local soviets.

III. The USSR aims to overtake and outstrip capitalist countries but is, and is likely to remain, poor and inefficient.

IV. There is a notable driving force in the USSR, the hope of personal success, of higher wages and privileges in the towns and especially in some industries, for educated workers. The economic consciousness of the workers

is unified under a common symbol of State ownership. In a reversal of capitalism, the State is the fountain of all benefits and the populace is execrated for failures. 'Medieval craftsmanship, and later, pioneer business life, in which everyone was an owner or hoped to become one, have been two forms of economic consciousness to the workers. They have passed; State management by a bureaucracy linked to the working class is a new and valid expression of economic consciousness for the workers: once more it gives a meaning to their labours. One of the tragedies of mankind seems to be that the most vivid forms of social consciousness are invariably destructive. If this destruction is to be avoided the community must be made conscious of purpose in its daily life by some other means than a social revolution. A way has to be found of clearing the sight of the citizens otherwise than by the smashing of a mechanism which they fail to comprehend' (p. 88).

[5]. 'The value of the inexact', 1936.

Polanyi's first statement of the inevitable vagueness of scientific, and especially chemical, concepts, laws and methods.

[7]. 'Congrès du palais de la découverte', 1937

An account of Polanyi's observations of the effects of totalitarian régimes upon science and scientists.

[8]. 'An outline of the working of money', 1938

A description of the film, *Money*, and the commentary which accompanied it.

[9]. 'The settling down of capital and the trade cycle', 1938

A mathematical treatment of the cycle of reinvestment elaborating the treatment presented in the diagrammatic film, *Money*.

[11]. 'Science in the USSR', 1940

Polanyi accuses J.S. Haldane and other Marxists of hushing up the evils of the USSR, demands that they state what they know about the position of the Rights of Man there, and gives his own examples of the imposition of Marxist-Leninism upon science and scientists.

[13]. 'Economics on the screen', 1940

Documentaries about economic matters favour Collectivism by being able to show only the physical and technological aspects of manufacture, and not the commercial ones. Hence their use by Russian propaganda. The diagrammatic film, *Unemployment and Money* (completed April 1940), does show the commercial aspects and the circulation of money.

[14]. 'Economics by motion symbols', 1940

An account of the contents of the six reels of the film, *Unemployment and Money*: 'Money', 'From Pictures to Symbols', 'Inflation and Reflation—the simplest version', 'Investment Campaign', 'Depreciation and Reinvestment', and 'The Trade Cycle'.

[15]. 'Cultural significance of science', 1941

Polanyi criticises the leading article in *Nature* Dec. 28th 1940, which opposed the independent pursuit of scientific research.

[17]. 'Revaluation of science', 1942.

Polanyi opposes the demand that science should recognise its social responsibilities, although it has had little effect, because it is part of a wider movement to subordinate science to the state.

[20]. 'Research and planning', 1943

A reply to a criticism of [19] in the leading article of *Nature* Aug. 7th, 1943.

[21]. 'The Hungarian opposition', 1943

A defence of the union of Hungarian democrats in the 'People's Front' in reply to the leading article of *The New Statesman* Sept. 25th.

[22]. 'The English and the Continent', 1943

The principal difference between English and Continental politics is that in the former social progress is not connected with enlightenment and anti-communism but often produced by religious sentiment. The opposite conjunction has produced the two Continental anti-moralist theories: that politics is the destruction of one group (or race or nation) by another and the exceptional individual is exempt from moral laws. The 17th century in England produced religious tolerance and the Bill of Rights, as a religious doctrine: to protect all Protestant churches against the Government, Catholicism and Atheism, in contrast to the repeal of the Edict of Nantes. When news of English liberty was taken to countries dominated by a single religion, it generated anti-clerical and anti-religious movements, again in contrast to English movements of reform. Continental admiration, in the 19th century, of English practices and manners did not include its moral restraints. Except for Byron, there was no literary treatment in England of the unrestrained individual, which enjoyed a secular Protestantism of 'manners, virtue, freedom, power' (Wordsworth). That tradition, and national self-confidence, were weakened in the First World War. National will has revived after Dunkirk. 'National feeling seems to be the only sentiment today in which that responsible devotion to a community

can be rooted, that bond of mutual confidence assured, which are needed if reason and equity are to gain acceptance as the guides of human affairs. National traditions appears as the most ample and most reliable embodiments of the principles of morality—at least so far as the guidance of popular behaviour is concerned. Germany's national traditional of political immorality appears now as an exception; as an aberration; as a break-through of the modern doctrine of group immorality in a national guise. It is an evil to be extirpated; not a valid argument against the 19th century conception of nationhood—the nation as a source of honour and as an integral element of international order' (pp. 380–1). 'People on the Continent who want to live as human beings must recognise the moral principles for which England stands and must revive the kindred elements of their own tradition. Nothing will grow from moral unbelief. The bolder our plans for the future, the deeper must they be rooted in the original ideas of our civilisation' (p. 381).

[23]. 'Science: its reality and freedom', 1944

Pure science is distinguished by its universality, systematic nature, and progressive extension and deepening of its systems. It regulates itself. Marxism and Fascism, as Social Absolutism, require the subjection of science to social control. Science has no definite programme, only its own development, advancing without forethought. Science as an integral part of our civilisation, and founded in common ideals.

[24]. 'The Socialist error', 1944

A favourable review of Hayek's book. 'Freedom and tolerance succumbed only after Europe's most generous sons withdrew their support from these ideas in favour of Socialism'.

[25]. 'Science and the decline of freedom', 1944

Freedom and tolerance have been lost, on the Continent, to totalitarianism because of the dominance of what is taken to be a scientific view of man, as an animal whose appetites are real and enduring but whose ideals are passing shadows, and because of the belief in the necessity of smashing the existing system and efficiently replacing it without being affected by moral scruples. These also apply to Nazism and Fascism. Continentals see Britain as backward in terms of class war and belief in morality and its power. We can reassert or ideals in a scientific age. For science itself is based on an act of faith—in accepting the main body of scientific tradition and its ideals which therefore testify to power of traditional ideals on which our civilisation rests. The new scientific outlook will recognise that it is only one form of truth, and so will help to recognise traditional faith in which freedom and tolerance rest.

[26]. 'Reflections on John Dalton', 1944

Dalton was not inhibited, in forming and maintaining his theory of atoms, by the modern proscription of questions about the nature of things, which also threatens to turn each study into an isolated specialism.

[27]. 'Patent reform', 1944

Patents encourage inventions but incur costs to the general public by restricting their applications. Instead the Government should pay patentees, for leasing their rights on demand, a fixed proportion of the value created by each invention during the previous year. Reform is also needed of the provisions of patent law with respect to Utility, Novelty and Invention.

[28]. 'The universities and the modern crisis', 1945

Totalitarianism in Russia and Fascism elsewhere arise from common sources: both have hard-headed materialist view of politics and contempt for ideals of 19th century liberal civilisation. The origins of the modern crisis go back to the emergence of the secular authority of the State which replaced feudalism. Hobbes, the father of modern materialism, based on it a theory of the State as absolute master with full and undivided power, and denied the claims of religion, morality and science against the State, as in modern totalitarianism. But that was bookish speculation, and religion and ideals of justice, morality and truth constrained power in fact. But in France, because of the decline of religious belief, demands arose for purely secular political reform. Rousseau modified Hobbes: the ruler is truly sovereign only if power emanates from people, and then it can do no wrong. Jacobinism was the practical application of Hobbes. But the ideals of justice, humanity and truth still restrained it by revolting against it. But, while these ideals spread throughout Europe, so also did the naturalistic doctrine of man. Marx burned with humanitarian ideals which he explicitly denied and made it possible for others to do likewise by identifying them with the material forces which he supposed to govern man and history. This led to modern fanatical ruthlessness and enabled Hobbes' supreme secular power to be established in a perfect form. Fascism based itself on patriotic feeling, narrower than the desire for universal justice in Marxism, but also transformed patriotism into a purely materialist force. The logic of Hobbes was suspended in Britain because of the dominance of religion and lack of belief in scientific materialism, though the influence of the latter has been increasing.

[29]. 'Reform of the patent law in Britain', 1945

A reply to a criticism of [27]

[33]. 'Soviets and capitalism', 1946

The Soviet government only pretends to practise planning. Instead it practises forecasting, and its central plan is a only compilation of the plans of individual enterprises. It is guided by a commercial network, which it despises, and it conceals its dependence upon it.

[34]. 'Social capitalism', 1946

Socialism and Capitalism have both adopted the errors of Bentham, Ricardo and Malthus: that men are ruled by self-interest, that the laws of supply and demand apply to all spheres of society, and that labour's share of wealth tends towards the minimum needed for subsistence. Both take the capitalist system to be a mere mechanism of interlocking appetites which cannot be reformed, and must either be accepted or set aside at the Millennium. But while Marx wrote about it, it was being reformed. As for unemployment, Russia has reduced it by inflation, not planning, and the same Keynesian policies should be applied here, though they have their dangers which could lead to the control of wages, prices and labour. The market is a mechanism but it need not overrule respect for humanity and social justice, and we must dispel the monstrous callousness of Marxism.

[35]. 'Can science bring peace?' 1946

Polanyi's youthful enthusiasm for H.G. Wells. But he no longer believes that science can solve the problems of the age, which are political and not technical. Atomic power creates a need for world control by the free co-operation of states. Free government rests upon mutual trust, and therefore trust is also needed among nations, and likewise a shared belief in mutual obligations and that people can be relied upon to observe them. A suggestion for a Declaration of the Duties of Men—to respect truth, keep promises and observe justice, equity and general decency. From these, rights follow—freedom to act according to conscience and to the support and protection of free institutions. The chief obstacle to this is the materialist philosophy which takes man to be only a bundle of appetites to which it reduces, and thereby debunks, moral ideals. We need a new enlightenment to reassert the spiritual life of man and to release great moral forces of our time which have been led astray by false and degrading theories. This will bring men back to Christianity. The foundations of freedom are akin to those of religion.

[36]. 'Rededication of science in Germany', 1946

A commemoration of Fritz Haber, who was discredited by the Nazis, and remarks on the current difficulties of German scientists.

[38]. 'Policy of atomic science', 1946

Pure science cannot be directed by any government. Any attempt to keep secret basic research would stultify science. Liberty is to be supported by force of arms, including atomic ones, but not at the expense of the principles of liberty and the freedom of science. To do so would cause a decline into servitude, obscurity and corruption. We must hope for the eventual conversion of the USSR to liberalism.

[39]. 'Science: academic and industrial', 1947

Mostly an account of an advanced course at Manchester for scientists in industry, which was intended to cultivate their love of science.

[40]. 'Free trade through full employment', 1946

[No details: I have been unable to trace any copy.]

[43]. 'Old tasks and new hopes', 1947

Woodrow Wilson's Liberalism and Lenin's revolutionary Marxism. The former was defeated between the wars but there are new hopes for it now and time to resume its task. Soviet Marxism is now less violent than it used to be, and it should be possible to establish international confidence with Russia.

[45]. 'Organisation of universities', 1947

Universities need to be independent, although funded by governments, and scientists free to choose their own lines of research, in order to safeguard and promote systematic research without which teaching stultifies stagnates

[46]. 'What kind of crisis?', 1947.

The current inflation, and the low level of unemployment, are both the result of monetary expansion. Control of the former means acceptance of more unemployment but politicians will not face this consequence for fear of popular resentment based on reckless expectations. 'Planning' is no answer for it is logically impossible. Throughout Europe the workers are using inflationary pressure in a revolt against all management, private and public. Freedom is under threat by this questioning of the agreed coherence of society. The bourgeoisie must willingly give up its unjustified privileges, reconcile the workers and reassert its leadership.

[47]. 'The universities today', 1948

The universities foster creative dissent, seeing for oneself and not relying on authority. This method of doubt has proved enormously fruitful in science and scholarship. But it has also resulted in universal doubt, nihilism and totalitarianism. Scepticism cannot discover anything new but can only re-

lease our powers of discovery, which stem from belief and presuppositions about the nature of things. The universities now need to profess faith, not just in hard facts and the evidence of the senses, but also in the truths of the mind, ideals, and allegiance to transcendent powers. They need to be conscious of these their true foundations.

[54]. 'Scientific beliefs', 1950.

Science is supposed to be positive and mathematically exact and demonstrable, and therefore quite different from religious and moral beliefs. But the schism between Western and Soviet genetics disproves this. Science in fact has a fiduciary basis in 'scientific beliefs'. For no series of measurements can prove any generalisation; conversely the fulfillment of a prediction cannot validate a scientific statement for it be the result of chance. Nor can scientific generalisations be always strictly disproved: e.g. the Copernican theory of cycles and epicycles and Dalton's law of simple chemical proportions. No scientist does or could discard an hypothesis immediately it conflicts with experience, nor is there any fixed rule for distinguishing anomalies from genuine refutations. Attempts to minimise the claims of science, as merely 'probable' or as the 'simplest' description of observations, are verbal smoke-screens behind which we hide the fact that we believe scientific statements to be true, out of fear of offending an empiricist and sceptical philosophy which discredits our transcendent faculties and obligations. We need openly to admit our beliefs and that we acquire them uncritically. The most general of them is the naturalistic view of the universe, which we acquire against our native inclination to a magical view. Modern education, and the necessarily acritical learning of our mother tongue, break down the latter and instil the former. We are fully committed to our beliefs and pass them on to the next generation. Science is not an external power but a set of obligations: to seek a truth which is unambiguous and universal, even though we recognise this as impossible and strictly meaningless. In science, as in everything else, we have to commit ourselves in our concrete circumstances and on grounds that seem deficient on reflection. Examples of more specific scientific presuppositions and changes in them. The Positivist view of science tries to construct a machine that would produce universal results, but universal validity cannot apply outside a situation of personal commitment, of submission to an ultimate obligation which can appear only in a fiduciary declaration. Science is a body of beliefs, reasonably adopted with a view to evidence, which necessarily rests upon ultimate commitments personally and acritically held. Consequently, we can acknowledge that other have different commitments, such as to dialectical materialism. Our objections to what Lysenko has done rest upon the affirmation of our own beliefs.

[55]. 'Die Freiheit der Wissenschaft', 1951

The common goal of scientific research is best achieved when each researcher is free to work at what he thinks best. Science is a self-co-ordinating task, resting upon common beliefs and rules which cannot be exactly specified and can be transmitted only implicitly in traditions and by learning by example, within a scientific community.

[56]. 'Autorität und Freiheit in der Wissenschaft', 1951

Scientific value includes significance for science as whole and genuine human interest as well as demonstrability. Scientific opinion must be trusted to select what is important, and be supplemented by the 'guild system' of scientific recruitment. How then can the genius of an Einstein or Pasteur be cherished? Firstly such people are never totally revolutionary, and secondly, all scientists are trained in respect for the ideal of truth and will not presuppose that they already possess it. The newcomer is not challenging scientific opinion as such, only its contemporary form. Scientific opinion is not a matter of decision but grows. We can trust in the reality and effectiveness of this system only from within it. The conditions and consequences of intellectual freedom.

[57]. 'Contemporary scientific mythology', 1951

Toulmin was wrong to argue that problems about the interpretation and application of the Second Law of Thermodynamics can be settled by linguistic analysis.

[59]. 'Totalitarianism', 1951

Hannah Arendt's account, unlike others, does apply to more than one form of totalitarianism. But she is wrong in saying that it arose amid ruthless competition, for the latter did not prevail in the semi-feudal states of Russia, Hungary and China. She is more correct in saying that it was established by Bohemian groups who had never participated in civic life and who gained the support of the previously indifferent masses, newly liberated from feudalism or absolutism, by infecting them with their own bookish nihilism. The intelligentsia's destructive analyses of man and society converted the masses to régimes of violence, but had little effect in the older democracies where the restraints of Liberal tradition were more effective.

[63]. 'Science and faith', 1952

The weakening of religious belief began in the Renaissance before the rise of modern science, and turned the moral passions generated by Christianity into demands for unlimited progress in this world, with firstly constructive and then destructive consequences. Science, as the current model of knowledge

and sanction of all claims, has led to the neglect of men's moral responsibilities in a mistaken pursuit of intellectual honesty. Communism is a radical attempt to carry out in practice these tendencies of modern thought. The error of eliminating what can be doubted. Moral beliefs cannot be proved. 'We must resolutely teach ourselves once more openly to hold these beliefs as an act of faith'.

[64]. 'Social illusions', 1953

Two illusions which arose with modern political thought: Say's Law, that there never could be an over-supply of all goods and therefore no general depressions; and the Socialist, Nihilist and Marxist total rejection of existing society. Keynes showed that budgetary deficits can correct depressions, which obviously do occur, and so Socialist planning is not required to restore full employment, not that it did in Russia. Although there are still some errors current about employment and the supply of money, the above illusions and passions are now weaker though rising in Asia. Can we accept our limitations without falling into apathy?

[65]. 'Protests and problems', 1953

The struggle for the freedom of science and scholarship under Communist totalitarianism requires a reassertion of the value of knowledge for its own sake and for public respect for it. Otherwise democratic as well as Marxist governments will direct science towards welfare. Likewise, the freedom of science is the exercise of an authority within science and requires a political authority for its protection.

[66]. 'Pure and applied science and their appropriate forms of organisation', 1953

The Neo-Marxist theory of science. The differences among science, empirical technology, systematic technology and technically justified science. Two forms of order, corporate (co-ordinated from above) and spontaneous (spontaneously co-ordinated by the mutual adjustments of the members). The former applies to technological research in commercial firms and public services (but not by independent inventors), but not to scientific research, including systematic technology, which has to be guided spontaneously by its own unofficial government of leading experts.

[67]. 'On the introduction of science into moral subjects', 1954

[This is the first publication in which Polanyi presents his distinction between subsidiary and focal awareness.]

Hume's unfulfilled intention to introduce experimental methods into moral subjects. Behaviourist psychology, positivism in jurisprudence and anthro-

pology, as attempts to study man and society in a detached manner supposedly like that of natural science. Logical positivism rejects moral utterances as meaningless for similar reasons. But science itself cannot meet the ideal of detached objectivity. The errors of Laplace's ideal of universal knowledge. Personal participation is required to establish a correspondence between a scientific formula and the experience to which it applies, which is an unspecifiable art, transmissible only by apprenticeship. Exact science rests upon and has meaning only in relation to a pre-scientific personal knowledge. Skills and connoisseurship are valid and indispensable forms of knowledge. Two forms of awareness in skills: subsidiary and focal. We incorporate into ourselves the tools and interpretative frameworks on which we rely. Subsidiary awareness of parts and focal awareness of wholes. Personal participation involved in all sciences but to varying degrees according to the degree of unspecifiability. We employ and appraise our skilful performances and acts of recognition and understanding by standards we take to be universal. We apply standards of health in biology and intelligence in psychology. Understanding another involves entering his situation and judging his actions from his point of view as an intelligent and morally responsible person. That applies also to ourselves and the historical situation in which we are placed. Science requires us to study man and society, not as detached observers, but as members of a human society. Crystallography is a system of appraisal within exact science which like morality, jurisprudence and artistic criticism, says nothing true or false about experience. Human concerns—ethics, law, religion—cannot be regarded as 'unscientific' in a bad sense, for science itself makes similar valuations.

[68]. 'A letter from the Chairman', 1954

The themes and aims of the Hamburg Conference, July 1953, and preparation for the Congress on Science and Freedom.

[72]. 'Preface' to Science and Freedom, 1955

Reflections on the Hamburg Congress: the division, in opposition to totalitarianism, between those who continue the rationalism of the Enlightenment and those who think that totalitarianism has resulted from scepticism.

[73]. 'This age of discovery', 1956

The modern age, begun in 1917, has been one of discovery, by Socialism that a centrally planned economy is impossible, and, by Liberalism, of Keynes' cure for mass unemployment. The more sober mood of the present. We again know liberty and its value, and recent experience may protect us from future delusions and disasters.

[76]. 'Ethics and the scientist', 1956

Citing the examples of scientists who intervened in politics in relation to the possibility, the use and the further development of the atomic bomb, Polanyi argues that scientists, as scientists and not just as citizens, have a duty to intervene when they alone have specialist knowledge, about applied science, which they cannot make public. Likewise those who spoke up to defend universities and freedom of research. Marxist proposals for directing science specifically to general welfare have come to nothing. Pure science can be pursued only for its own sake, and is to be appreciated as such.

[77]. 'The next stage of history', 1956.

The task for the next stage of history is to restore the balance between our critical powers and moral demands. The struggles of writers in Communist countries to speak the truth. Not the vote but respect for law and dignity of independent thought make men free. Not differences of economic systems but the ambition totally to transform society, separates the Communist world from the West. Desire to co-operate with intellectuals in Communist countries, and to see them have same inner and institutional liberties as we enjoy.

[79]. 'Scientific outlook: its sickness and its cure', 1957

The compulsion exercised by the model of science as detached observation. Bentham, Marx and other examples of 'moral inversion'. Detached observation destroys meanings. Moral passions therefore seek a covert and supposedly neutral expression. The same inversion in 'scientific' anthropology and sociology. Biology and technology deal with achievements, beyond the explanations provided by physics and chemistry. Behaviourism fails to distinguish focal observation of the workings of a mind and convivial reading them as signs of its working, but inevitably practises the latter which it denies. Science itself is a human commitment.

[82]. 'Oscar Jászi and Hungarian Liberalism', 1957

A tribute, on his death, to the leading Hungarian Liberal of the 20th century.

[83]. 'On biased coins and related problems', 1958

*The Summary given at the end reads:* 'The repeated flipping of an unbiased coin would result in a sequence which corresponds to the a priori probability of  $\frac{1}{2}$  for each side of the coin. If the coin is biased there will be a deviation from this in the direction of the bias. Take now a model in which the flipping is done by the Brownian motion of the coins. The probable distribution for biased dice will then be seen to depend on the temperature. At  $T=0$  the bias will predominate to 100%, while at high temperatures the bias will vanish. It

follows more generally that the probability of biased systems, (coin, die, etc.) is indeterminate; it depends on the *intensity* of the random impacts to which the system is subject'. Polanyi also points out that random impacts do not generally produce random results, for they invariably release ordering forces which will counter act the disordering effects of random impacts.

[84]. 'The Committee on Science and Freedom and apartheid', 1958

A statement of the aims and 'campaigns' of the Committee on Science and Freedom. Apartheid violates the freedom required by the duty of universities to transmit the intellectual heritage of modern man.

[85]. 'Tyranny and freedom: ancient and modern', 1958

The modern demand for self-determination and for reshaping society as the people, or those acting for them, think fit, has taken two forms: gradual and piece-meal reform, extending legal order and liberty, and revolutionary totalitarianism, aiming at an immediate perfection of society and destroying legality. Both emerged in the French Revolution, the Civil Code and Jacobinism, respectively. Revolutionary dynamism embodies a materialist conception of man which denies the reality of moral motives and results in fanatical ruthlessness. A liberal, dynamic society requires shared a belief in truth and fairness, mutual trust, and the validity of those ideals. A static order is based on an authoritarian teaching of explicit doctrines, assures each his birthright of traditional duties and privileges, and upholds a belief in the power of truth and the moral responsibility of man. A liberal, dynamic society is based on beliefs in reason and justice, which are not self-evident as formerly thought, and offers wide scope for independent thought. A totalitarian society imposes its orthodoxy as scientific fact not faith, suppresses doctrinal faiths and liberal convictions, and denies the very existence of the spontaneous powers of the mind. Reformist dynamism works by persuasion and parliamentary institutions but toleration was spread on the Continent by enlightened absolutism. A free society requires dedication to intellectual and moral ideals. Electoral procedures can extend or abridge them. The contemporary disenchantment with revolutionary Socialism has often left a void. The rebellious Communists of Hungary and Poland returned to the idealistic form of the principles of the French Revolution and 1848. Elective self-government is the final and most difficult achievement if democracy, not its first step. A free society cannot be defined by rules if procedure for a popularly elected government could uphold Stalinism if everyone believed in it. We must acknowledge our own beliefs which would reject such a result. We can uphold a demand to establish a free society only on the ground that it flows from man's nature as the only morally responsible creature in the world.

[86]. 'Editorial', *Science and Freedom*, 1958

A comment upon a series of addresses on Freedom and Responsibility given in Paris in August 1956.

[87]. 'The impact of science', 1958

The hopes that were placed in science and their disappointment. The materialist interpretation of man, stemming from the misapplication of an ideal of exact science, at first resulted in humanitarian reforms. But it has also resulted in the inhuman fanaticism of modern nihilism, whose moral passions are not susceptible to argument.

[89]. 'A philosophy of perception', 1959

Brain suggests that sensory experiences, located in the brain, are experienced as symbols of external objects. But that also requires an active personal centre to make sense of them.

[90]. 'Darwin and his evolution', 1959

The author reveals incongruities in Darwin's thought and character. The triumph of Darwinism: the theories of evolution and of natural selection (as the only conceivable explanation on mechanical principles) reinforced one another.

[92]. 'The organisation of science and the claim to academic freedom', 1959

The value and proper organisation of scientific research, and the freedom required for it, in contrast to the value and organisation of technology.

[94]. 'An epic theory of evolution', 1960

Teilhard de Chardin is really a poet and his book has attracted great attention because of widespread dissatisfaction with the scientific denaturing of man. But his work is too vague and does not solve the important problems which it raises.

[96]. 'Acceptance speech: Le Comte du Noily Award' (1959)

The importance of interest in the whole of reality. Scientific rationalism has resulted in progress, but it is also obscurantist in its reductionism. The Le Comte du Noily Foundation is helping to form a nucleus of a reformed scientific outlook.

[97]. 'Morals a product of evolution', 1960

Polanyi appreciates Waddington's clarification of the philosophical issues but doubts if he has solved them. His revised view of evolution can serve as a

moral inspiration but he has only marginally modified the 'mechanical' account of evolution as the product of random mutations; and while he is right to say that health is both a value and a scientific fact, this does not mean that we can observe a fact as morally binding on ourselves: we can only bear witness to and uphold our own moral beliefs.

[99]. 'The study of man', 1961

The destructive consequences, for man's image of himself, of Objectivism and scientific naturalism; the need for personal involvement and judgment in science; knowledge as personal knowledge; tacit integration in knowing and action; knowledge as indwelling; personal knowing as setting standards for itself; appraisals in knowing plants, animals and our fellow men; understanding men as intelligent and morally responsible as legitimate extension of scientific knowledge; likewise acceptance of the situation in which we find ourselves.

[102]. 'Science, academic and industrial', 1961

A longer restatement of the case for the value and free pursuit of pure science, its self-organisation, and its connections with but differences from technology, technological sciences and technically justified sciences.

[103]. 'Commentary on "The genesis of the special theory of relativity" by Prof. Grünbaum', 1961

A reply to Grünbaum's comments on Polanyi's account, in *PK*, of Einstein's discovery of relativity.

[108]. 'Clues to an understanding of mind and body', 1962

The application of the ontology and epistemology of tacit integration to the relation between body and mind. Knowledge of our own and other minds by means of indwelling. The impossibility of explaining machines in merely chemical and physical terms, and of consciousness in mechanical terms.

[109]. 'Commentary on "The uses of dogmatism in science" by Thomas Kuhn', 1962

Polanyi endorses the main points of Kuhn's paper, refines them with his own examples, and states that it raises, but does not supply, the need for a radical revision of the theory of scientific knowledge.

[112]. 'Science and Religion: Separate dimensions or common ground?' 1963  
Tillich is wrong to take religion and science as by-passing each other. Science is not detached observation. The theory of tacit integration and indwelling. Comprehensive entities and the emergence of new and higher levels of exist-



ence. The errors of reductionism. The hierarchy of comprehensive entities and levels of existence. The transition from I-It to I-Thou relations. The emergence of man. The Pauline scheme of an obligation to strive for the impossible in the hope of achieving it by divine grace. This new view of science and the Christian view of man reinforce each other. The impossibility of Existentialist self-determination. Acceptance of our limitations and our tasks as a calling.

[114]. 'Science and man's place in the universe', 1964

*The first third was included in TD as pp. 54-7. The remainder contains:* Indwelling of one's own body, subsidiary details of objects known, and intellectual tools. Increasing depth of indwelling in knowledge of physical objects, living beings and minds. Denial of indwelling by the false ideal of scientific detachment. Hierarchy of levels of comprehensive entities. Application to evolution and emergence of higher from lower beings: a creative power inherent in the universe, and man's own creative powers.

[115]. 'The feelings of machines', 1964

The proposition that computers simulating personal responses have feelings, rests on the false assumption that the meanings of words can be defined in specifiable tests.

[116]. 'On the modern mind', 1965

Scepticism and the mechanistic world-view. The tacit integration of levels in machines and living beings. What is most tangible has the least meaning and reality. Knowing as tacit integration and indwelling. Indwelling another's mind. The moral nihilism of neutral sociology. The union of scepticism and moral perfectionism in moral inversion, individualist or totalitarian. The need to recognise the power of ideas and the reality of intangible things.

[122]. 'Autobiographical note', 1966

[No details. I have not been able to trace any copy.]

[128]. 'Logic and psychology', 1968

Science rests on nonstrict rules of inference which have hitherto been neglected. Scientific knowledge is indeterminable in its content, the coherences which it establishes and its data. Tacit integration and inference in all knowledge, including science. The tacit dimensions of knowledge of other minds, universal terms, principles of explanation and empirical generalisations. Tacit integration in perception, language, and scientific investigation. Logic is the rules for reaching valid conclusions from premises assumed to be true, and

not, as is currently assumed, for reaching strict conclusions from strict premises.

[129]. 'Conversation with Michael Polanyi', 1968

Polanyi restates his case against scientific positivism and behaviourism, and his accounts of moral inversion, tacit integration, personal knowing and responsibility, language and evolution.

[133]. 'On body and mind', 1969

The impossibility of an exact specification of mental acts and behaviour; tacit integration and indwelling; the subsidiary role of neural processes.

[136]. 'Foreword' to M. Pirenne's *Optics, Painting and Photography*, 1970

The role of the tacit integration of incompatibles in the viewing of paintings. Subsidiary awareness of the flat canvas makes the seeing of a perspectival painting immune to distortion when viewed at varying angles.

[137]. 'Transcendence and self-transcendence', 1970

The ontology of tacit integration versus the mechanistic world-view.

[139]. 'Science and man', 1970

The mechanistic world-view; scientific liberalism and the destruction of moral principles and liberal ideals by the scientific outlook; moral inversion; a new theory of knowledge, tacit integration; indwelling versus impersonal detachment and strict objectivity.

[142]. 'Discoveries of science', 1974

The power of imagination in scientific discovery, metaphor, art and symbols, and the dangers of a mechanical analysis of man.