

Trends in American Civilization: an outline

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The Research Society

This paper will attempt to establish the existence of an underlying direction, or tendency, in the future evolution of American society. Our industrial civilization will be transformed, through its inherent dynamism, into a new and final social form which may appropriately be called a research society. The process will not be direct, nor transparent except in its later stages. The path of development will vary from region to region. There will be temporary periods of stagnation, even regression, but the underlying tendencies will assert themselves again and again.

A paper of this length can give but the sketchiest outline of the mechanisms of the process. The skeleton alone will be found here; the body is yet to be filled out, bolstered by extensive research. The argument, it should be stated, ignores a number of factors which would not be ignored in a more extended analysis (e.g. population, availability of resources, international politics.)

These reservations understood, a brief description of the end-result of this course of social evolution is in order, so that the reader will have a sense of direction in following the course of the argument. The research society will be one in which the efforts, desires, needs and aspirations of people center on the laboratory and the university, as in our industrial society they may be said to center on the factory. People will not point to refrigerators, or bathtubs, or automobiles, or production figures when asked about the progressiveness of their society, but to science and scholarship, and their fruits in human health and happiness. Prestige will be accorded to scientists and scholars, and no longer to businessmen. The goals of society, in short, will have shifted from the production of goods to the production of knowledge, and status will have been shifted from the producers of goods to the producers of knowledge.

The Economy in Transition

Industrialism and the industrial way of life have been spreading from the north-east quarter of the United States over its full geographical area. The South is undergoing an industrial revolution comparable to the post-Civil War boom in the North. The growing problem of farm surpluses indicates that the agricultural sector of the economy is hypertrophied and that the Midwest is ripe for industrialization. Agriculture itself is coming to be more and more fully mechanized.¹ Simultaneous with the geographical extension of industry, structural changes are taking place within industry itself. Most industries appear to be assuming the form known traditionally as oligopoly, in which

a few large firms supply practically the whole output.² This concentration in turn makes economically feasible the financing of large-scale industrial research laboratories to turn out the innovations needed to re-create profits. It was, in fact, the need for large-scale research which to an extent called into being the oligopolistic structure of industry. The research sector of the economy has, on the average, more than doubled every decade of the Twentieth century, expanding far more rapidly than the economy as a whole.³

While industry is assuming a nation-wide oligopolistic structure, certain developments in technology bid fair to have even more revolutionary effects. The new science of cybernetics, utilizing the principles of feedback and communication theory, has made possible the automatic factory.⁴ On a modern assembly line most routine operations are too rapid, too complex, or too delicate to be done by human hands. They are done automatically by machine, with occasional intervention by workers. The next step, now technically possible, is to have machines control the assembly line itself, eliminating completely the line worker. Original instructions are fed once into the control mechanism, and from then on . . . the factory runs itself!

Automatic devices are already in extensive use in canneries, steel-rolling mills, wire and tin-plate factories.⁵ Machines are now constructible which will replace many whitecollar operations: statistical work, recording, payrolls, accounting in general.⁶ Push-button retailing is now being contemplated.⁷ The Canadian Post Office is installing an automatic mail-sorting mechanism.⁸ Remington-Rand has produced an electronic process-control brain, described as a major advance toward automation.⁹ "We already have the automatic factory on our drawing boards," said Mr. R. E. Cross of the Cross Machine Tool Company to the American Society of Tool Engineers.¹⁰ The Ford Motor plant in Cleveland is almost completely automatized already.¹¹ The Navy has a system of automatic mass-production of electronic devices suitable for use in industry.¹² For automation to become economically feasible on a mass basis requires only the development of mass demand and the economies of mass production of the machines, and this in turn is a matter of not too many years.¹³ The growing oligopolistic structure of industry is ideal for the adoption of automation, for it combines large-scale continuous-process operations and masses of repetitive paper work with research and development laboratories to overcome any difficulties in converting to automatic machinery. Our vast system of government bureaus is likely to become at least partially automatized. Professor Wiener estimates it will take ten to twenty years for the new tools to "come into their own", unless the process is speeded up by war.¹⁴ This estimate may be too low, but we can reasonably say that over the course of the next century, most of industry will become automatized.

What effects will these technological developments have on employment?¹⁵

For the decades-long conversion period, automation may have an exhilarating effect. Much work will have to be done in building the automatons, installing them, scrapping obsolescent models, and so on. In the past, great technological changes have created as many jobs as they destroyed. The ferment of conversion (supplemented, if need be, by the peacetime development of atomic energy) should not raise the problem of technological unemployment in the short run.¹⁶

As much of industry becomes automatized the demand for unskilled labor, in fact the demand for any sort of simple repetitive labor, declines. The need for trained people to organize the machines—for engineers, scientists, mathematicians soars but, for the same level of production, far fewer technicians with automatic machines will be needed than workers without the machines. The possibility of mass technological unemployment in the long run, then, is not to be dismissed as easily as we have dismissed the short-run possibility. In fact, the long-run chances cannot be decided by considering merely the technological changes in industry. If the public demand for more and more goods grows *pari passu* with the expanding capacities of the industrial system, and if public tastes keep encouraging the rise of new industries making new varieties of products, then the spectre of secular mass-unemployment need not arise. Whether public demand will, in fact, behave this way in the long run is one of the questions taken up in the next section.

One result, at any rate, of automation will be the abolition of poverty. Even if we merely projected secular trends in production and distribution in the economy at the same rate of expansion, poverty would have disappeared in a few decades.¹⁷ But automation will expand productive capacities at a far greater rate than this projection would indicate. With automation, an industry practically runs itself. Machines do the routine operations. Thus, millions who now tend machines will be released for the creative, non-repetitive tasks of industry—introducing new techniques, new inventions, new modes of organization, and so on. The process of automation grows on itself. Furthermore, the human speed bottleneck can be broken at most points. The upper limit of speed of production disappears. The industrial system may be able to manufacture goods at speeds unheard of today.

At the same time there is every reason to believe that incomes will become more equally distributed. As automation proceeds, high-income technicians replace low-income unskilled or semi-skilled workers. As the demand for technicians grows, educational opportunities are opened for low-income groups: financed perhaps by management groups, or by labor unions, or by government if these sources prove insufficient, but in any case financed to meet the needs of industry. The occupations of workers, then shift more and more from low-to-high-paying jobs, and the average income of the labor force rises accordingly.

This combination of greatly increased productive capacity and greater equality of income distribution will suffice to abolish poverty. That it will probably have other, even more revolutionary, effects will be shown in the next section.

Along with the abolition of poverty will come a great increase in available leisure time. The trend toward more leisure time is already almost a century-old in the American economy.¹⁸ Accelerating this trend will be the technological changes already described. The long, repetitive tasks of industry are the ones most easily replaced by machine. The short, creative activities of technicians gain in importance, so that working long hours becomes progressively less important from an economic point of view. As incomes rise, fewer members of family group need work. This trend toward leisure is reinforced by the growing public desire for more leisure rather than more goods as the latter become more and more plentiful.

It has been mentioned already that the research sector of the economy is burgeoning much more rapidly than the economy as a whole even today. This trend will be much accelerated with the advent of automation. The actual processes of production, the assembly line, organization of operations, statistical controls, accounting procedures, and so on, become progressively rationalized and routine. The center of activity in the plant shifts gradually from these mechanical and routine processes to the laboratories, where new machines, processes, products are being planned and drafted. The laboratories become the centers of industrial progress.

This last development should herald a decisive change in the role of the businessman in production. As Schumpeter has urged, the function of the entrepreneur has been to exploit technological possibilities and put them into practice.¹⁹ As time passes this function is taken over by the research laboratory. The captain of industry becomes simply the chief technician. Daring and nerve of the old Rockefeller or Carnegie type become less important as firms grow and become bureaucratized and unwieldy. On the other hand, it becomes ever more important for the businessman to have a firm technical grasp of his industry's research problems, else he will lose control of the activities of the laboratories. The enterprising, adventuresome side of the businessman's personality atrophies, while his technical, functional, work-a-day activities come to predominate. Even today a growing portion of the ranks of management is being recruited from scientists and technicians in response to the new role of management. As the laboratory becomes the center of industrial activity the technical demands on management grow until, perhaps, virtually all of management is recruited from the scientists. At any rate, the businessman becomes increasingly merged with the scientist, and the businessman as a distinctive social type and mentality begins to disappear. The far-reaching effects of this transformation are worked out in the next section.

The character of research conducted in industrial laboratories has been changing from a narrowly utilitarian type having direct application to current production to a wider, more theoretical, type which might be called "fundamental" research.²⁰ This is a natural result of the growing scale and oligopolistic structure of industry. The relation between fundamental and applied research is analogous to the relation between long-range capital investment and returns. The returns to applied research are based on the results of previous fundamental research, just as current returns are the fruit of previous capital investment.²¹ Hence, just as large firms make more and more long-range capital investments, it pays for them also to invest in fundamental research, which will bring returns in the future. Industrial laboratories gradually take on much of the fundamental research formerly conducted only by the universities and research institutes. There is no definite limit to the scope of these activities, since important practical applications may come from the most unexpected corners of fundamental research.²²

Thus, industry and the universities draw closer together in their activities. It may well become profitable for certain industries to encourage some kinds of fundamental research on the campus, and this in turn may lead to large-scale financing by industry of the universities. This point will be taken up again in the second section where the role of education in this story is discussed in detail.

So far, this study has been confined to changes within the industrial system. It was necessary to study industry first of all, because where industry is the focus of social life, as it is over most of America, it will also be the backbone of basic social change. We should next attempt to trace the wider aspects of these changes, both material and non-material; to place them in a total social context, the trend and direction of which we will then be in a better position to ascertain.

Values in Transition

A study which treats of material changes only, which deals solely with objective things and life activities, is at best half complete. To round out the study of material changes which was undertaken in the preceding section of this paper, we must examine the changes in the ideas and values of people which are taking place concurrently with the objective changes about them. This section will take up and follow out the threads which were left hanging, and will try to show how all the trends outlined fall into a coherent pattern with an underlying direction and end-result.

All the trends we have discovered so far conspire to diminish the importance of material wealth. The desire for wealth springs from two sources, which may be labeled the biological and the social: from the satisfaction of physiological needs, the convenience and ease of living, and from the needs to maintain symbols of status, to get recognition and deference from one's fellows.

Now poverty, we have argued, will disappear, and with it will go one of the

biological components of the desire for wealth. Furthermore, we have argued that productive capacity will rise to unprecedented heights, so that people's desires for additional conveniences will be in large measure satisfied. With the automation of industry it is more likely that much of the daily drudgery of housework will become automatic also. This is not to say that the desire for additional conveniences will disappear: there is always room for improvement. It is to say that additional convenience loses its glitter, becomes one of the minor motives of life.

Wealth also loses its function as status symbol. As the general standard of living rises, it becomes progressively more difficult to find things to exhibit that other people cannot also afford to exhibit. The possession of Cadillacs no longer differentiates status when everyone can afford them.

Furthermore, it becomes less important to differentiate one's wealth status. The growing equality of income tends to blur class distinctions based on differences of wealth. Social distinctions that accompany differences of wealth, e.g. the superior educational level of the rich, also tend to blur as everyone comes to afford them. In addition, the patterns of life of various groups become much more similar than they are today. The primitive unmechanized farmer, the drudging unskilled worker, the predatory businessman all disappear as extreme social types; instead, everyone has a certain degree of technical competence, learns to live and work among effort-saving machines, in short lives somewhat as a white-collar worker lives today. This common mode of life also contributes to the blurring of class distinctions. Finally, the exposure of everyone to the same instruments of mass-communications, by this time perfected and ubiquitous, will tend to give everyone a common outlook on life, and so accentuate the blurring of distinctions.

To summarize: The growing equalization of incomes, common mode of living, and exposure to mass communications all contribute to the breakdown of class distinctions. It therefore becomes increasingly unnecessary to advertise one's class status by symbols of wealth. At the same time it becomes harder to utilize one's wealth to differentiate one's status. Again, this is not to say that differences of status will disappear: these differences have existed in all societies at all times and will no doubt continue in our own. This argument does show that status will cease to be based on class, and, most important for us at this stage of the inquiry, that status will cease to depend on wealth.

Thus, both the biological and the social sources of the desire for wealth gradually lose their efficacy. Goods are plentiful; they have no special symbolic importance; life is full of material conveniences. Wealth, in short, is taken for granted. America, by stages, loses its driving incentive for ever higher levels of material prosperity. What new goals, if any, will have arisen by this time to take the place of material incentives is the question that will occupy the latter part of this section.

The producer as well as the consumer gradually loses his material incentives. We have already stressed that production becomes increasingly mechanized, automatized, and reduced to routine. Schumpeter has argued that, with increasing mechanization and scale of industry, bureaucracy and committee work supplant individual initiative; business loses its aura of romance; no one takes the Horatio Alger dream seriously any more; enterprise becomes superfluous.²³ Production, too, becomes routinized and taken for granted.

Accompanying the routinization of industry is what might be called a disenchantment with profits. The progressive separation of ownership from control of industry was noticed as early as the 1930's.²⁴ This separation of stockholders from manager, which became inevitable with the rise of big business and mass stockholding, serves in the long run to weaken the profit-seeking initiative of both. The stockholder is isolated from the daily operation of the business. As industry after industry settles down into a stable oligopolistic pattern, profits arrive steadily, without violent fluctuation, from year to year. Wall Street, too, loses its romance: stocks become sources of steady income, no longer hold out possibilities of fortune. The stockholder becomes disenchanted with profits.

The manager, for his part, has less and less direct pecuniary interest in making profits. He does retain at first the desire for personal advancement within the organization, the sense of camaraderie with other members of the firms in achieving the goals of the firm. We have seen, however, that with the passage of time the manager becomes more and more a technician and scientist, while the adventurous entrepreneur in him becomes unromantic and stifled in the impersonal routine of the organization. Through this change in his mode of living, and through his increasing contact with scientists, the manager acquires some of the professional attitudes of the scientist: a valuation of research and innovation for its own sake, and a work-a-day attitude which does not take too much account of immediate profit possibilities. As the firm becomes more bureaucratized the attention of all employees, from top management to line worker, turns from the pecuniary end of production to everyday methods of work. The producers, too, become disenchanted with profits.

As both consumers and producers lose their material incentives by degrees, the two trends interact, reinforce and accelerate each other. To the reasons already given we can add a few more for the decline in consumer incentive. As the economy settles down it becomes ever more difficult to make fortunes, a phenomenon we have already noticed in the case of stock returns. The margin of return for individual initiative declines. In an economy of abundance people do not have to worry about personal finance. Goods come speedily and steadily out of the productive system. The material side of life seems to take care of itself.

For their part, whatever incentives remain with producers will be blunted

by growing consumer indifference. The entrepreneur is no longer a leading prestige figure, in part because his function of producing goods becomes progressively less important, in part because the impersonal productive system allows less room for personal initiative and makes it difficult to credit productive achievement to a specific group within the system. The manager is thus encouraged to forsake his entrepreneurial role entirely, to give himself over to his scientific and technical role, and to forget about producing for profit.

We are now in a position to answer the question of long-range unemployment which was raised in the previous section and deferred to this one. It is clear that public demand for greater quantities and varieties of goods will *not*, in the long run, keep pace with the expanding capacities of the industrial system. And this falling off of consumer demand will, as indicated, make for eventual unemployment, since progressively fewer producers are needed to run the automatized productive system.

The prospect of unemployment is, however, one for the distant future, after all the trends discovered so far have had a chance to assert themselves, and in this distant future unemployment will not have the grim connotation it has today. As Schumpeter has pointed out, unemployment is a social evil only if the private life of the unemployed is seriously disturbed.²⁵ In our society at present so many values are bound up with one's participation in the productive system that unemployment is necessarily tragic. But we have already argued that there is a trend toward increasing leisure, that an ever smaller fraction of people's lives is spent on the job, and that leisure comes to be valued for its own sake. Unemployment is then not such a complete break with normal life as it would be today, nor as demoralizing.

Most important of all in resolving the unemployment problem is the growing indifference to wealth which we have been trying to establish in this section. For the unemployment in question is confined to lack of participation in the industrial system. As the industrial system absorbs less of people's energies and declines in importance, other, non economic, institutions arise in its place. These institutions are sufficient to take up the employment slack of the industrial system. This long-range prospect of unemployment thus becomes still another agency of transformation, changing our society and undermining the institutional foundations of industrialism.

To prove these last contentions we must now turn our attention to the development of certain key non-economic institutions. A truly massive development of our educational system is in prospect, for practically every trend we have discovered points in that direction. There is, first of all, an indigenous, century old movement among educators for expanding and universalizing education.²⁶ As the country satisfies its more pressing material needs it can begin to pay serious attention to this movement. We have seen, also, that prospective

technological changes will create a vastly augmented demand for technically skilled labor together with a declining demand for unskilled labor, and that in consequence educational aid will be forthcoming from management, labor unions or government for these unskilled groups to meet the new needs of industry. We have seen that industries come to appreciate the fundamental research being conducted in universities and may find it profitable to subsidize this university research.

Education reaches up to all age groups in the population. Our growing adult education movement is in part a reflection of prosperity, enabling people to afford indulging their natural curiosity, and in part a response to increased leisure time. We may expect this movement to grow as our wealth and leisure both become more abundant.

Education becomes for more and more people a source of status. Even today the virtues of "college education" have impressed themselves on the popular consciousness. "For the new middle class (of managers, intellectuals, scientists, technicians, office workers,) education has replaced property as the insurance of social position."²⁷ We may reasonably expect, then, an ever-increasing stream of applications for the colleges as, with greater income and educational assistance, more people will be able to afford higher education. Having qualified by income to enter the middle class they are quick to use that income to raise the education of their families to middle class levels. We have stated that eventually this very universalizing of education tends to break down class distinctions, but before it does so, the status-striving that is so characteristic of American life will have helped to elevate education to a point far beyond its present expanse.

We may expect from all this education that intellectuals in general, and teachers in particular, will come to make up a sizeable proportion of the total population. Everyone will be under their tutelage in his youth at least (and the period of universal compulsory education may extend well past today's teen-age limit). With the development of adult education many will be in close contact with intellectuals for long periods of their lives. Mass communications (whose quality may have risen by this time in response to the higher educational level of the public) will reach into every home. In short, the intellectuals, if they be mainly of one mind, are in a position to exert enormous influence on people's opinions and values. The significance of this influence will soon become clear.

We now come to the last and most important trend of all, the one which binds together the strands of this somewhat rambling discussion: the development of research. Research activities mushroom out from a number of centers. We have already spoken of the precipitous growth in industry of research and development laboratories, which, in fact, eventually grow to overshadow the purely productive side of industry. Government research is expanding; the suc-

cess of such research in war has created a rising demand for a permanent government-sponsored research program.²⁸ As the universities grow to major proportions, the amount of fundamental research carried out in them grows concomitantly. In addition, research organizations, such as the ones now existing for combatting specific diseases, expand their activities, and new ones spring up. Thousands, eventually millions, of people become drawn into research or connected with research organizations. The universities will be turning out an ever growing number of graduates whose profession is research of one kind or another, and the proliferation of research will encourage this tendency.

This flowering of research is not an autonomous growth, but a response to a rising demand for the fruits of research by industry and by the public at large. We have already discussed the increasing dependence of industry on research. The relation of the public to research is of even more significance in the long run and deserves some discussion at this point.

The needs of subsistence, the problems of earning a living are problems that become less immediate and pressing as time goes on. As economic wants recede, others come to the fore. On the material side, economic prosperity still leaves us with disease, natural calamities, accidents, and death itself. The wastefulness and tragedy of these stand out sharply in contrast to the general prosperity. If we examine, for instance, the extraordinary mass campaigns now being conducted in our country against cancer, heart disease, tuberculosis and poliomyelitis, we find that their success is not due to the prevalence of disease—the American public was never healthier—but to other factors: Our prosperity enables people to look up from their daily tasks and attend to broader problems. Men are well enough off to spare time and money for the problems of the community. The very fact that we are prosperous, that we have already conquered typhoid and diphtheria, spurs us on to greater achievement. The surest guarantee of the elimination of evils is the knowledge that they can be overcome, and the knowledge that evils can be overcome in the future arises from the knowledge that similar evils have been overcome in the past.

Research thrives on its own success. The prestige of medical research, for instance, soars with the conquest of each new disease. The falling death rate *intensifies*, as has been indicated, the attack on remaining diseases. Medical research, in fact, generates a unique stimulus in that it enables to survive an ever-increasing number of older people, a group well acquainted with chronic diseases and the imminence of death, and hence a group giving whole-hearted support to further medical research.

Similarly, research in the physical sciences and technology finds itself supported by growing public demand. Man's increasing control over the forces of nature and his taming of natural calamities—floods, droughts, earthquakes—encourages the quest for even more control. Accidents create a growing demand

for research to achieve perfect safety in transportation, in the home, in public works, in industry. During the long transition period when material wealth remains highly valued, the activities of industrial research laboratories to produce more and better products are similarly encouraged.

The success of research in any one field tends to increase public respect for all research. As problem after problem of the most diverse types yields to the methods of science, these methods come to be viewed as generally applicable to the whole range of human problems. The rising prestige of the natural sciences spills over eventually on the social sciences, a tendency reinforced by the modest successes these disciplines may have scored by suggesting acceptable solutions to some psychological, social and economic problems.

This tendency to consider research as all of a piece is reinforced by the tendency we have already noted for research to branch out from narrow applications to broad fundamentals. It is only natural that, as knowledge grows, the walls between disciplines begin to crumble; the several sciences were convenient categories set up by men in their ignorance. We are coming to learn that knowledge, like peace, is indivisible. The concourse among disciplines in the great universities will also encourage the synthesis of knowledge and this tendency to consider research as a unity.

All the factors making for social transformation have now been accounted for. It remains for us to describe how they interact in this, the final stage of the process. We have seen the productive apparatus of the country become automatized, routinized, and taken for granted. We have seen research activities proliferate throughout the country, springing up from industry, from government, from the universities. We have seen a comparable expansion of education. And we have seen the intellectuals come into a position of great influence.

America is a country of diverse cultures, but if we recall that most of the country has yet to feel the full impact of industrialism, we may reasonably take the industrialized section of the land as representative of the whole country a few decades hence. Even in industrial America the people have not too much in common; but a desire for physical well-being, a belief in and advocacy of "progress", a respect for the man who gets things done, and a strong sense of status and desire to maintain one's social position seem to be ideas characteristic of the great majority of inhabitants. These are ideas central to the very way of thinking of a people, the kind of ideas that outlast even radical social change.

We have already suggested how some of these ideas will be reinterpreted with the passage of time. The desire for physical well-being no longer means the pursuit of personal wealth and convenience, but takes the form of public support for research against disease and natural calamities. The idea of progress no longer centers on the industrial system but on research and the fruits of research. As a consequence the mantle of prestige falls from the shoulders of the

businessman and descends upon the scientist; the scientist becomes the man who gets things done. Research acquires that adventurous and romantic quality that once made business so attractive. Young people of ambition and enterprise look forward to careers in research. The great scientist is the new Horatio Alger. In short, the analogy between the two ways of life, the one with wealth as the central value, the other with knowledge, is perfect. The habits of thought of the people do not retard the transition. The transformation from industrial to research society requires no basic change in people's outlook on life.

The process of transition is accelerated and prepared through the influence of that group of teachers, scientists and others who collectively may be called the intellectuals—the ones who deal primarily with ideas rather than with people or things. This group, especially the scientists among them, will probably be the first to feel the trend of changing values which will later sweep through all segments of the population. The mode of life of the intellectual is more completely divorced from the industrial system than that of any other major group; he is professionally committed to explore new ideas. The values engendered by industrialism are not deeply ingrained in the intellectuals as a group and can be dislodged by a strong new current of thought. Even today one popular stereotype of the intellectual is the "radical," i.e. one who is alienated from traditional values.

The intellectuals, relatively the most disaffected group in the population, are also the group most able to appreciate at once the values of the research society: the pursuit of knowledge for its own sake, free inquiry, the application of scientific methods to all problems. Again, this statement applies particularly to the growing proportion of scientists among them. Eventually, an awareness of the trends of the time sweeps through the ranks of the intellectuals, aided by the increasing obviousness of the process in its later stages.

In the long run, there will probably be no important opposition to these new ideas among the intellectuals. As we have noted, the intellectuals are ripe, by situation and by temperament, for receiving these ideas and the values implicit in them. There is reason to believe, furthermore, that the intellectuals will be less disunited by ideological and political disputes than they are at present. The bulk of our contemporary political issues center about the productive system and the way material wealth is to be distributed among various groups in the country. As time passes wealth and the productive system decline in importance, and these issues lose much of their heat. It is not that these problems disappear: usually there are very real problems beneath the display of mutual greed. But as people become less emotionally involved in them, as the burning doctrinal issues recede, the problems are approached in a spirit of icy reasonableness. At any rate, we may tentatively assume that these issues cease to divide people to the extent that they do today. Furthermore, the intellectuals of coming

years will come from less diverse backgrounds, because of the breakdown of class distinctions and the disappearance of extreme types to which we have already referred. There will be closer contact among them than ever at the great educational centers of the future. For all these reasons it is likely that these new ideas of the research society will win over in time the vast majority of intellectuals.

And with the conversion of the intellectuals will come the conversion of the public at large not too long afterwards. For this will be a time of decaying values, when the new forces that have swept up the intellectuals will by that time be affecting large sections of the public as well. The intellectuals, we have already pointed out, will have enormous influence through their growing numbers, their strategic position in society and, we may add now, through the high prestige of the scientists among them.

Returning for the last time to that long-run threat of mass unemployment to which we have alluded repeatedly, we can now fathom its true significance. The rising tide of unemployment, when it comes, will be the death-rattle of industrialism. For these people will be fully prepared by education, by inclination, and by the new institutional structure of the country, to take their places in the laboratories and seminars of the research society.

FOOTNOTES

1. "The Machine and the Farm," *Fortune*, 38:97-105, October, 1948.
2. Galbraith, J. K., *American Capitalism* (Boston, Houghton Mifflin, 1952). Dr. Galbraith demonstrates that this development need have none of the sinister consequences associated with monopoly. A new mechanism of control, the market power of the organized consumer, "countervailing power," arises to replace the traditional regulation of competition.
3. "The Scientist," *Fortune*, 38:106-112+, October, 1948, p. 108.
4. See Wiener, Norbert, *The Human Use of Human Beings* (Boston, Houghton Mifflin, 1950), for a discussion of the theory and social implications of cybernetics. See the September, 1952, issue of *Scientific American*, complete, for a discussion of all phases of the problems raised by automation.
5. Wiener, p. 184.
6. *Ibid.*, p. 185-6.
7. *New York Times*, March 21, 1954.
8. *Ibid.*, April 17, 1954.
9. *Ibid.*, February 5, 1953.
10. *Ibid.*, March 20, 1953.
11. *Ibid.*, January 5, 1953.
12. *Ibid.*, September 20, 1953.
13. Wiener, p. 181-2.
14. *Ibid.*, p. 187.
15. See Leontief, W., "Machines and Man," *Scientific American*, 187: 150-160, September, 1952, for an excellent discussion of this problem.
16. Leontief, p. 156, believes the danger of technological unemployment to be smaller than it was at the end of the 19th Century, since capital has become more efficient.

17. See the discussion of this point in Schumpeter, J. A., *Capitalism, Socialism, and Democracy*, 2nd ed. (New York, Harper, 1947), p. 63ff.
18. Leontief, p. 156.
19. Schumpeter, p. 132.
20. Du Pont's work on polymerization is an example. See Cohen, I. Bernard, *Science, Servant of Man* (Boston, Little, Brown & Co., 1948), p. 119ff.
21. Cohen, *Science, Servant of Man*, is organized around a fundamental-applied research framework. The last two chapters contain an excellent discussion of the relationship between the two types.
22. Cohen, *passim*, is full of such examples.
23. Schumpeter, p. 131ff.
24. Berle, A. A., and Means, G. C., *The Modern Corporation and Private Property* (New York, Macmillan, 1932).
25. Schumpeter, p. 70.
26. For an example of the present status of this movement, see the report of the President's Commission on Higher Education, *Higher Education for American Democracy* (Washington, D.C., U. S. Government Printing Office, 1947).
27. Mills, C. Wright, *White Collar* (New York, Oxford University Press, 1953), p. 245.
28. See, for example, Bush, Vannevar, *Science, the Endless Frontier*. Report of the Office of Scientific Research and Development (Washington, 1945).