

1963 gives us minute improvements in telephony, hundreds- or thousands-fold more numerous and inventor-consuming, and likely more valuable as a whole, but worth much less per invention, and not impressing us, unless we take the statistical view of things, that view which enables us to feel the combined weight of a vast number of trifles. In one's unmathematical, common sense view of history all decades seem equally inventive, as we found anent the attempts to measure the progress of invention by counting the "great inventions" of each decade (§ 52, 53).

[101] Two minor defects may be found in our statistical procedure. The indices for the earlier years are (unavoidably) rather few, only three for 1880 and four for 1885. Secondly, in the counts of abstracts only, other than chemical, the author being obliged to do his own counting, chose volumes at intervals of 5-10 years, and avoided the periods of war and the Great Depression. This should not affect the general slopes, nor the maximum heights arrived at, but it presents a slightly false picture in not showing all the slumps that probably occurred in depressions and wars. We see such in the yearly or biennial data available for the other indices, although the slumps did not occur in all cases.¹¹⁷ The end result is a small overstatement of the amount of invention and research accomplished, though not, it would seem, of the overall rates of progress, our main concern.

[102] For all our argument and displayed evidence in the graphs, some readers are probably still gritting their teeth and saying: It just can't be true that American invention has increased anything like 105-fold in the last 80 years! For there is the evidence (forsooth!) of patents, and of the lists of great inventions, which show no advance even for population growth, and there is our general impression that some advance has occurred, but no vast change in the invention situation.

[103] How can we answer this obstinate feeling that our new statistics must be wrong and the patent and great-invention statistics about right? Only by recalling our previous arguments. First the population factor, whereby the increase of invention may have been only 29-fold per pertinent capita (§ 85). Next recall (§ 53) that the usual, almost inevitable impression of recent history, i.e., the informal and unstatistical (and therefore unscientific) impression, is that each generation had its outstanding achievements, great in comparison with their minor and obscure coeval ones, and therefore seeming great in an absolute sense; so the leading achievements of one generation look as numerous and great as those of another. But this conclusion is completely unwarranted by logic, and by the statistical evidence like our graphs which are *not* dependent on a changeable vogue of patenting, nor on the subjective impressions of off-hand thinkers appraising the inventions of recent decades. If the periods had been all distant, say of the Middle Ages, we could compare them with more objectivity, but still not with much, and far less than with our statistics based on con-

¹¹⁷ The discrepancy between this minority of our graphs and what were desirable, is the difference, e.g., between an index of the progress of steelmaking capacity, and an index of steel production. The peaks and general slopes of the two graphs would be the same, but the graph of production would show various slumps caused by strikes and depressions. Many of our graphs are essentially measures of *capacity* to produce inventions and discoveries: but sometimes the actual production fell below capacity for a year or several, due to depression or war. But invention is not greatly checked by depression, and is stimulated in certain fields by modern war.