

Man, Machines, and Modern Times

Chapters 1 - 5

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SE3910, 2014



Outline

- 1 Chapter 1: Introductory Observations, Personal and Otherwise
 - Introduction
 - The Role Of Power
 - The Narratives
 - Modern Times
- 2 Chapter 2: Gunfire at Sea: A Case Study of Innovation
- 3 Chapter 3: Data Processing in a Bureau Drawer
- 4 Chapter 4: The Pertinence of the Past in Computing the Future
- 5 Chapter 5: A Little More on the Computer



Introductory Observations

Date Of Publication

Copyright: 1966

This is worth mentioning only because some of the information in the text seems a little bit dated, albeit not altogether incorrect.



Introductory Observations

Defining Factors

Tools defined the character of the early periods

- fire
- bows and arrows
- pottery
- domesticated animals
- ironworking
- alphabet



Introductory Observations

A New Epoch

The ability to manufacture power opened up a new epoch for mankind.

- manufacture power
- distribute power to where it was needed

“[T]he power generated in a modern steamship in a single voyage across the Atlantic was more than enough to raise from the Nile and set in place every stone of the great Egyptian pyramid.”



Introductory Observations

Theodore Roosevelt

Morrison credits Roosevelt with great insight into “the nature of the times,”

- He did not avoid the difficult questions regarding the manufacture of power.
- He offered opinions when none were forthcoming.
- He believed that “great care” was necessary to prevent catastrophe.
 - economic
 - social
 - technological



Introductory Observations

Changing Machinery

What happend when you change machinery?

- Why change?
- Who changes?
- What design problems?
- What capital requirements?
- What institutional modification?
- Who gets hurt?
- Who profits?



Introductory Observations

Approach To the Narratives

“This time I tried to organize it to emphasize, without undue distortion, what happened when there were changes in the mechanical systems men worked with.”

This seemed to reveal “a set of rather interesting connections between certain causes and effects,” which are laid out in the first essay (Chapter 2).



Introductory Observations

Maxims

- It is difficult to rise too far above the thresholds of existing knowledge.
- Great advances in one area require corresponding advances in “other related arts.”
- The same forces that can inhibit change can also foster it.
- The act of invention may simply be a process by which the routine is formalized.



Introductory Observations

Inventors

Character

“A surprising number [of inventors] turned out to be people with little formal education, who drank a good deal, who were careless with money, and who had trouble with wives or other women.”

Like Artists

“And it is quite probable that the inventor who is also something of an engineer is, like all great engineers, an artist and therefore shares in what is assumed to be the artistic or creative temperament.”



Introductory Observations

Opposition To Change

People have a tendency to, “continue the patterns of behavior developed in earlier conditions into the new.”



Introductory Observations

Changing Character Of Invention

Nineteenth Century

The process of inventing was very often the work of a single person.

Twentieth Century

This introduces what Whitehead termed, “the greatest invention of the last part of the nineteenth century: the invention of the method of invention.”

This is characterized by the differences between Mr. Goodyear’s discovery of vulcanized rubber and Bell Lab’s development of the transistor.



Introductory Observations

Predictions

- A global increase in education will put an end to barbarism.
- A little knowledge will be a dangerous thing.
- Destructive changes will outpace new development, creating a technological gap.



Introductory Observations

Looking Ahead

- “We are well on the way, in our timeless effort to bring the natural environment under control, to replacing it by an artificial environment of our own contriving.”
- Can we continue to manage the system we have created to control our natural environment? (The Frankenstein question)



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Old Habits

“The tendency is apparently involuntary and immediate to protect oneself against the shock of change by continuing in the presence of altered situations the familiar habits, however incongruous, of the past.”

This is representative of the message of this chapter, illustrated through a case-study describing the introduction of continuous-aim firing in the United States Navy.



Why This Case Study?

- ① Approximates laboratory conditions.
 - Dimensionally limited
 - Well ordered
 - Relatively isolated
 - Easier to control for change
- ② Focuses on a mechanical device.
 - It is objective.
 - It is measurable.
 - It is not distorted by prejudice.



Problem Description

Process:

- Gun pointer (person) estimates the target range.
- Gun is elevated once per the estimated range.

Difficulties:

- The gun is mounted on a moving platform.
- No easy way to compensate for the pitch of the sea.
- Firing interval is affected by weather.
- Gunner must anticipate target to account for firing lag (which tends to differ for each gun).

This results in knowledge which is acquired over a long period of time and is not easily transferred.



British Improvement

- 1 Change elevation gearing to allow real time compensation by the gunner.
- 2 Improve gun sights (fixed mount telescope sights).



Effect Of Improvement

- 25-fold decrease (improvement) in time (speed).
- > 7 -fold increase (improvement) in the number of hits (accuracy).

The increase in accuracy was highlighted by the fact that half of the rounds were tightly grouped in a 50-inch square.



Scott's Contribution

- Scott combined the necessary elements appropriately to make continuous aim firing possible.
- He did not create any of the elements.
- This involved elements of
 - chance
 - intellectual climate
 - Scott's disposition



Serendipity

- In looking for a way to improve target practice, Scott found a solution by accident through observation.
- This does not necessarily discount the “contribution of the adequately prepared mind.”



The American

Sims' Conviction

"I am perfectly willing that those holding views differing from mine should continue to live, but with every fibre of my being I loathe indirection and shiftiness, and where it occurs in high place, and is used to save face at the expense of the vital interests of our great service (in which silly people place such a childlike trust), I want that man's blood and I will have it no matter what it costs me personally."



Affecting Change

Sims' efforts to affect change took on a three-pronged approach

- ① He relied on and cited data recorded by Scott,
- ② He described the “mechanisms and procedures” set up by Scott, and
- ③ He laid out a case that changes were necessary in order to meet new demands.



Responses From Washington

The responses from Washington fell into three categories (stages)

- 1 No response.
- 2 Attempts to discredit Scott's data and prove the continuous aim firing was not possible.
- 3 Argumentative name-calling.



Summation of Events

- ① Chance, environment, and a fertile mind conspired to spark the idea for change.
- ② All of the elements existed (gun, gear, and sight).
- ③ The idea for change had champions who were not invested in the technology of the day, rather in its improvement.
- ④ Opposition rested on
 - Honest disbelief,
 - Protection of existing devices and mechanisms, and
 - Maintenance of their existing society.
- ⑤ Ultimately, the forcing function for change had to come from outside.



Generalization

Mahan's Great Generalization

No military service should or can undertake to reform itself. It must seek assistance from outside.

Extrapolation

No society can reform itself.

Is this a logical tautology?



Lesson

New Societal View

We should place a greater emphasis on *process* of living in a society and less emphasis on any specific *product* of that society.

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- 3 Chapter 3: Data Processing in a Bureau Drawer
 - Thinking About Bureaucracy
 - Characterization
 - Impressions
 - Conclusions
- 4 Chapter 4: The Pertinence of the Past in Computing the Future
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Definition

Bureaucracy

Bureaucracy is much more a state of mind or atmosphere than as an administrative system.

Examples

Examples are mostly drawn from the military because

- There is inherent clarity in the situations not present in civilian life.
- During peacetime, the military provides almost lab-like conditions.
- We can better study and understand the effects of experiment.



The Essence of Bureaucracy

Joke

“Take these papers, file them alphabetically, and then burn them.”

- The joke is intended to characterize the essence of bureaucracy.
- The joke is often exceeded by real life examples.



Paper

Paper is one of the vehicles of bureaucracy and has the following effects:

- Paper may become ultimately self-important.
- Paper fails to capture some important information.
- Paper can become depersonalizing.
- Paper helps to keep procedures entrenched long after they are useful.



Red Tape

The terms *red tape* and *regulation* are used interchangeably by Morison.

- Regulations are easier to create than to abolish.
- Regulations are easier to conform to than to, even when inappropriate to do so.
- Regulations tend to multiply.



Executive vs. Bureaucrat

- **Executive:** exists to make sensible exceptions to the rules.
- **Bureaucrat:** exists to make rules.

Exceptions are made to help the rules conform to reality. To not do so runs the risk of losing touch with reality for the sake of the rules.



They Say A Lot

Who are *they*?

- *They* are often hard to find.
- *They* can lose themselves in a struggle to improve their position in the bureaucracy.



Impression #1

Bureaucracy is an attempt to:

- Provide a justification for rationalization action
- Provide some structure out of observation and data
- Provide a framework for hypothesis and action
- Expression of our desire to work cooperatively within a framework of rules
- Desire to protect organized society from the diliterious effects of randomness



Impression #2

- We are simultaneously rational and biological and emotional.
- We seek order and safety but thrive on inconsistency.
- Out of disorder come some of the greatest inventions and ideas.
- Bureaucracy works against this spirit.
- Disdain for bureaucracy grows from this conflict.



Impression #3

- A program or plan may lose its responsiveness.
- This results from internal struggles borne out of bureaucracy.
- Power may reside in the hands of people who are either ignorant of or ambivalent toward the people the program originally intended to help.



Final Observations

- John Stuart Mill's Circle of Independence is being diminished.
- Morison makes an ominous reference to Orwell's *1984*.
- Bureaucracy thrives best in static environments.
- Morison suggests we might find relief from the constant change of technology.

Question:

Do you see evidence that the pace of technological change helps balance the state of bureaucracy in your organization?



Remedies

Means to fend off the fate of bureaucracy:

- Remain mindful of our individual freedoms
- Value liberal education
- Be watchful of the emerging possibilities around us
- Value the *self* as something worth perpetuating

‘Whether we do or not depends, I think, in large part on how frightened we get, and more, on how much we allow our fears to govern ourselves. And that is something, fortunately, I think we can determine for ourselves.’



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 - Preface
 - The Computer
 - Humanity
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Goal

“It is a poor sort of past that only deals with what has happened.”

Goal:

To try and recall some of the future.



Warming Up

Morison presents the U-Boat defense problem: convoy vs. search & attack.

- Well defined and limited problem
- Presented an opportunity to apply reason
- Reason was not applied and argumentation ensued
- Convoy won the war of attrition



U-Boat Resolution

“The problem presented was one filled with measurable, quantifiable data susceptible of analysis and the drawing of reasonable conclusions. The argument did not proceed in an orderly way, however; it did not, ordinarily, take account of the data that had been supplied, and it was not resolved as an exercise in pure reason.”



Why So Irrational?

- 1 Current sentiment is clouded by experience
- 2 The Army was advocating for air search and attack (loss of sovereignty)
- 3 Doctrinally untenable to the Navy because it relied on land based planes

The plane was not supplemental, rather the principle weapon. This threatened Naval cultural values.



The Question

“What may happen to the affections in the time of the computer?”



Computing Power

According to Morison, computers can (or will be able to):

- remember
- learn
- discern patterns in loose data
- make novel combinations of old information
- introduce surprise into an intellectual situation

“None of the processes involved in human creativity appear to lie beyond the reach of computers.”



Question

“How large a part and what kind of part do we want the computer, with its overriding skill in the rational analysis of the measurable data, to take in the decisions that determine the way [industrial] energy will be organized?”



Shortcomings

- The computer is no better than its program.
- We determine its program.

“If we put the wrong things into it, if we select the wrong problems or state the right problems incorrectly, we will get unsatisfactory solutions.”

Maxim:

Man will get the answers he deserves to get.



Our Failing

“On the record [we] have been luckier in giving answers than in asking the right questions, or at least [we] have been more skillful in making up half answers [we] can live with than in putting the full questions accurately framed.”

“We will find ourselves in grave difficulties, I think, if we persist in such sloppy definitions of the problems we wish to solve.”



Balancing Needs

- The society that does not value the trained intelligence will die.
- The society that does not value the educated heart will also die.

Human Condition

We *are* because we think and because we feel. The human condition results from the interaction between these energies.



Proposition

- We should learn to be honest about our desires.
- Knowing how to ask the right questions is predicated on knowing what we want.
- We should learn to accept who we are.

“We can write satisfying programs for the computers when, and only when, we have learned to write satisfying programs for ourselves.”



Admonition

Since the machine can only simulate, the work of creating the future is still in our hands. If we fail, if we misuse the machine, then in simulation it will misuse us in exactly the same way.



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Men & Machines

“One of the things you can learn from history is that we have lived with machinery at least as well as, and probably a good deal better than, we have yet learned to live with one another.”



Apprehensions

- Tendency toward closed decisions
 - Cultural influences will direct how we use computers, not the other way around.
- The computer as a fascinating gadget
 - It may only appear so for a limited period of time.

Rumble Seats

“...I do not believe that the rumble seat of automobiles increased the incidence, it merely changed the locus, of experiment in physical relations between boys and girls in the age of F. Scott Fitzgerald.”



Dangerous Computing

Exploring the full limits of the computer may prove more dangerous than previous inventions.

The Fool

“Used in ignorance or stupidity, asked a foolish question, it does not collapse; it goes on to answer a fool according to his folly. And the questioner being a fool will go on to act on the reply.”

Mitch Ratcliffe

“A computer lets you make more mistakes faster than any other invention with the possible exceptions of handguns and Tequila.”



Right Questions, Right Answers

“My culture says, in other words, that it is much harder to ask the right question than to find the right answer and even the right answer to the wrong question isn’t worth much.”

The Objective and the Subjective

The really interesting questions involve a combination of objective and subjective data.

Uniqueness Of the Situation

“This is our first encounter outside of ourselves with something that is exactly like some inside part of ourself.”

Moral Dilemma

Does this pose a moral dilemma for us?