Unintended Consequences

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Introduction

Many distinct applications of unintended consequence have been presented in articles and books over the last several decades.

As a result unintended consequence lacks a clear, distinctive characterization.

A general notion of unintended consequence could simply be an unplanned outcome.
► A virus infects your computer due to vulnerabilities in the operating system design.
► Developing tax evasion strategies as a result of implementing income tax laws.
► Discarding a banana peel, which causes someone to slip and fall.
► Philip K. Howard in *The Death of Common Sense* discloses a case where the Missionaries of Charity, led by Mother Teresa, attempt to construct a housing facility for homeless men, but are thwarted by building code requiring an elevator in every new and renovated building.
Introduction

► Although, the domain of unintended consequence remains well-established in sociology, the magnitude to which modern society increasingly depends on installed systems creates a particular need for further clarification.

► Technology and its effects, especially those which are unintended, have become an increasingly significant concern.
Thesis Goals

► The goal of this thesis is to survey preceding concepts of unintended consequences.
► To propose a distinction between unintended consequences arising as a result of historical contingencies.
► Further to make the distinction between a single unintended event and a continuing pattern of events which may give rise to new behavior.
The University of Canterbury’s *Glossary of Sociological Terms* defines unintended consequence as:
- Repercussions or outcomes which result from actions initiated for other purposes.
- This is thought to be a key dimension of social activity, though these social effects cannot be explained by actors' intentions.
Coined by Jeanette Wing, the National Science Foundation’s newly appointed Assistant Director for Computer & Information Science and Engineering and President's Professor and Head of the CS Department at Carnegie Mellon University's School of Computer Science (2006).

A fundamental skill that will be used by everyone in the world by the middle of the 21st Century representing a universally applicable attitude and skill set everyone, not just computer scientists, would be eager to learn and use.

A way of solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science.

- Conceptualizing, not programming
- Fundamental, not rote skill
- A way that humans, not computers think

http://www.cs.cmu.edu/afs/cs/usr/wing/www/publications/Wing06.pdf
Sociologist Robert K. Merton is credited with coining the phrase in his article, "The Unanticipated Consequences of Purposive Social Action" published in 1936.

- Merton makes the assertion that the subject of unanticipated consequences is no stranger to the history of social thought. He mentions theorists: Machiavelli, Adam Smith, Marx, Engels, etc.
- However, in spite of its widespread recognition, it remains a fundamentally unrefined concept.
- “We must examine and classify the types of social action and organization with reference to the elements here discussed and then refer our generalizations to these essentially different types.”
Possible Causes of Unanticipated Consequences

- **Ignorance** – not having “enough” knowledge.
- **Error** – incorrect assessment based on assumptions or past history.
- **Immediacy of interests** – when the desire of immediate consequence overshadows consideration of future consequences.
- **Basic values** – fundamental values preventing the consideration of consequences.
- **Self-defeating prediction** – when prediction becomes an influencing aspect on the very process it predicts.
Perverse Effects

► Raymond Boudon links social change to the unintended consequences of individual actions, and to efforts to address these consequences.

► At a societal level the sum of individual actions brings about paradoxical outcomes contrary to individual intentions.
  - The high demand for education causes a saturation serving to decrease the net worth of any given level of education for everyone.
3 General Categories

► Richard Vernon, a Professor of Political Science at University of Western Ontario, in his *Political Theory* article offers three general categories of unintended consequence.

- Unintended consequences arise as the cumulative outcome of similar actions performed simultaneously or consecutively by a number of actors.
  - Karl Popper’s *Poverty of Historicism*

- Unintended consequences arise also from the simultaneous or consecutive performance of dissimilar actions by individuals or groups.
  - Friedrich Hayek and the market system

- “Contextual change” – As context shifts, the use of various elements take on unforeseen uses and meanings.
  - In Buster Keaton's *The General*
Typology and Examples

Baert’s Dimensions and Modes of Unintended Consequences

Dimension A: what the effect refers to
- A1: individual effects, type 1  *Example:* If someone breaks his or her arm while skiing.
- A2: individual effects, type 2  *Example:* If parental divorce leaves children emotionally disturbed.
- A3: social effects
  - A31: systematic effects  *Example:* Having a meal with friends leading to intensified feelings of solidarity between us.
  - A32: aggregate effects  *Example:* Recession causes reduction of wages resulting in less consumption which worsens the recession.

Dimension B: value attached to the effect from the initial perspective
- B1: effects are desirable for the actor
- B2: undesirable
- B3: neutral

Dimension C: relationship with the initial intention
- C1: effects fulfill the initial intention
- C2: effects frustrate the initial intention
- C3: effects neither fulfill, nor frustrate the initial intention
  - C31: action has at least one other effect by which the initial intention is fulfilled
  - C32: action has no other effect by which the initial intention is fulfilled

Dimension D: modes of knowability and awareness
- D1: unanticipated effects
- D2: anticipated—but—unexpected effects
- D3: expected effects

Dimension E: temporal aspects
- E1: synchronic effects
- E2: diachronic effects
Economist Rob Norton asserts, “Economists and other social scientists have heeded its power for centuries; for just as long, politicians and popular opinion have largely ignored it.”

“The concept of unintended consequences is one of the building blocks of economics.”

He credits Adam Smith's "invisible hand," as the most famous metaphor in social science and an example of a “positive unintended consequence.”
The Invisible Hand

► By following one’s own self-interest, an individual intends only his own security and his own gain, which frequently promotes that of society more effectually than when one purposefully intends to promote it.

► The "invisible hand" represents all the social good incidentally caused by individuals pursuing their own self-interest.

► For example, a businessman wanting to become a millionaire must first come up with a product that is beneficial, pleasing and desired by potential customers. By pursuing his own greed, the millionaire undoubtedaly benefits society.
Steven J. Levitt refers to an “unintended benefit” in his chapter, “Where Have all the Criminals Gone?”

- “To discover that abortion was one of the greatest crime-lowering factors in American history is, needless to say, jarring.”
- “The crime drop was, in the language of economists, an ‘unintended benefit’ of legalized abortion.
- Before *Roe v. Wade*, it was predominantly the daughters of middle or upper-class families who could arrange and afford a safe illegal abortion. Now, instead of an illegal procedure that might cost $500, any woman could easily obtain an abortion, often for less than $100.
Even when used to better the world, technology fosters unforeseen, often unpleasant consequences that Edward Tenner calls “revenge effects” in his book, *Why Things Bite Back: Technology and the Revenge of Unintended Consequences*. For example:

- Air-conditioned subways raise platform temperatures by as much as 10°F.
- Some computer users get painful, wrist-numbing carpal tunnel syndrome.
- Flood control systems encourage settlement of flood-prone areas, inviting disaster.
- 6% of all hospital patients become infected with microbes they encounter during their stay.
Proposed Characterization

- An unintended consequence occurs when an unexpected and unintended use is made of a mechanism or formalism—such as a law, a rule, a regulation, a computer program or even a custom or an accepted ethical or moral precept—that has been established in the world.

- Presumably the mechanism or formalism was established with the intent of achieving some particular positive result or reducing or eliminating something that is considered negative.

- The unintended consequence is almost always different from that end and in many cases may be contrary to it.

- Lastly, exploitation of the established mechanism undoubtedly creates a definite advantage or profit.
“Gaming the System”

One "games a system" when one acts in such a way that one gains an advantage by exploiting a mechanism or a rule that was intended for some other purpose.
“Gaming the System”

► Advertising spam is an unintended consequence of the way the email system works.

► A new SAT test preparation market is an unintended consequence of instituting the College Board SAT subject tests.

► Creating a market for dead snakes is an unintended consequence of a reward program to lower the snake population.
Evasion, Blackmail and Fraud

- Leo Katz characterizes these 3 “mysteries” in *Ill-Gotten Gains: Evasion, Blackmail, Fraud, and Kindred Puzzles of the Law*. These situations strive to circumvent the law to produce ill-gotten gains.

- He examines the letter of the law vs. the spirit or purpose of the law offering the following examples:
  - A woman visiting from a Third World country decides she wants to live in the United States so she makes up some highly provocative statements that render her persona non grata at home and applies for political asylum.
  - Law in many states seek to prevent husbands from disinheriting their wives, but determined husbands give away their money since gifts are not regulated by the “forced share” statutes.
  - U.S. Bankruptcy law provides that a debtor who has become overwhelmed with financial obligations can make a “fresh start” by declaring bankruptcy and giving up their current possessions. However, one doesn’t literally give up *everything*—you don’t give up the proverbial shirt off your back.
Historical Contingency

An unintended consequence does not include historical contingencies, the contingent sequence of events that occur, at least in part, of preceding events.

- Slipping on a discarded banana peel.
- Air-conditioned subways raise platform temperatures by ~10° F.
- A large factor in lowering crime is connected to legalization of abortion.
- Going to war incurs collateral damage.
- For want of a nail, a shoe was lost
  For want of a shoe, a horse was lost
  For want of a horse, a rider was lost
  For want of a rider, a message was lost
  For want of a message, a battle was lost
  For want of a battle, a kingdom was lost
  All for want of a nail

- *George Herbert*
Process and procedure are becoming a deterrent to the very goals they intend to accomplish.

A law enacted with the express purpose of ensuring fairness and safety to individuals is inevitably met with evasion or avoidance through loopholes.

- In the development and implementation of various types of systems, we see a common phenomena emerge.
- Loopholes—i.e., a bug in the law. Similarly, when we develop software systems we end up with bugs in our code.
- An operating system release seldom goes without ensuing issues that are fixed through software patches. In the lifetime of a software release the patch history can become quite large. However, a succeeding new release is regularly made addressing previous bugs and vulnerabilities.
Law is Suffocating America

Philip K. Howard’s *The Death of Common Sense: How Law is Suffocating America* emphasizes that responsibility, not process, is the key ingredient to action. These are examples of bugs in the law.

- The Occupational Health and Safety Act in 1970 promised to ensure safety to every worker. Since its inception, OSHA has yielded some 4,000 odd regulations. There approximately 2,000 safety inspectors to some 6 million workplaces. Several hundred billion dollars have been spent by industry towards OSHA compliance. However, the American workplace is about the same as it was in 1970.

- The Federal Aviation Administration (FAA) passed a rule authorizing a “head tax” on departing passengers to help fund mass transit to airports. The writer of the rule, trying to clarify every eventuality, wanted to make sure no city used this airport tax subsidy and explicitly requires an “exclusive” system and prohibits any “facility shared with other mass transit.” As a result, New York City, a prime candidate, can’t link its airport transport into the tracks to Penn Station and Grand Central Station where it makes most sense, because those tracks would not be “exclusive” per the rule.
Conclusion

► There exists a large body of references to unintended consequence by social, economic and political theorists.

► In particular, concerns regarding technology and its effects on the world is ever-growing.

► Computational methods provide a good way to study and analyze social phenomena, allowing us to propose a clearer, more well-defined characterization in spite of the large variation of its application.

► Although, examination of unintended consequence does not allow us to predict outcomes, observation and analysis of such occurrences and their emergent patterns is essential in making informed design and implementation decisions.
Resources

- Vromen, Suzanne. Review of Unintended Consequences-Boudon – insert citation