

Chapter 7

OVERSIMPLIFICATION

1. OVERSIMPLIFICATION

To save time, effort, or breath we often deliberately simplify matters, realizing full well that some aspect or feature of reality is being omitted from view. But this does not worry us because we have good and sufficient reason to believe that the overlooked item—whatever it is—simply does not matter for the purposes at issue. However, this sort of thing is usually mere *simplification* and not *oversimplification*. When oversimplification occurs, then it transpires, more or less by definition, that we are carrying matters too far with simplification—that what is being lost sight of is something that does indeed matter because simplification has been carried to a point where it makes a damaging difference and involves a real loss. When we calculate with 3.14 for pi or treat the earth as a sphere we not only simplify matters but presumably oversimplify them.

Oversimplification always involves errors of omission. It occurs whenever someone leaves out of account features of an item that bear upon a correct understanding of its nature. For example, to say that Rome declined because its elite was enervated by lead poisoning from the pipes of its water supply oversimplifies the issue by fixing on one single—and actually minor—causal factor to the exclusion of many others. It is inevitable for oversimple thought about anything to be incomplete, because just this is exactly what oversimplification is—the omission of significant detail through a failure to take note of various factors that are germane to the matters at hand, thereby resulting in a failure to understand the reality of things. Whenever we unwittingly oversimplify matters we have a blind-spot where some significantly issue-relevant facet of reality is concealed from our view.

Oversimplification occurs when simplification is carried to an extent that is counterproductive in relation to the aims of the enterprise at hand through the omission of issue-pertinent detail. In this regard it seems both plausible and useful to grade relevancy on a scale from 0 to 10 somewhat in line with the following array of adjectives:

- crucially (10)
- importantly/majorily (8)
- significantly/substantially (6)
- minimally/marginally (4)
- irrelevantly/immaterially (2)
- wholly beside the point (0)

And so with over-simplification the omissions at issue fall into the upper half of the preceding spectrum. On the other hand, at the bottom of the scale, simplification is not overdone. In managing our domestic budget we can saw off the pennies, or in the case of the federal budget the millions.

Oversimplification leads to error not just in matters of belief but in matters of action as well. For here oversimplification can readily engender inefficiency. Consider, for example, a road map where I has been oversimplified to II:



Clearly such an oversimplification is going to invite a loss in terms of transit efficiency and thereby engender an incorrect and misleading view of procedural optimalities.

To be sure, in practice the line between beneficial simplification and harmful over-simplification is frequently not easy to draw. Often as not it can only be discerned with the wisdom of retrospective hindsight. For whether that loss of detail has negative consequences and repercussions is generally not clear until after a good many returns are in. And of course it is going to be highly context dependent. For the neglect of certain details can matter crucially in one context and yet be irrelevant in another. It seems not so much an oversimplification as a truism to say “a dollar bill is just that—a dollar bill; it matters not whether crisp or crumpled.” And that’s true enough where paying the cashier is concerned. But in dealing with the over-sensitive parking pay-machine that insists upon new, smooth bills, the status of that bill may make a big difference.

Why do we ever oversimplify? Why don’t we simply take those ignored complications into account? The answer is that in the circumstances

we simply do not know how to do so. The situation is akin to that of the Paradox of the Preface. Recall that here the author writes:

I want to thank X., Y, and Z for their help with the material in the book. I apologize to the reader for the remaining errors, which are entirely mine.

One is, of course, tempted to object: “You silly author! Why apologize for those errors? Why not simply correct them?” But alas the reader just does not know how. *That* there are errors he realizes; what they are he does not. And the situation with oversimplification is much the same. All too often we realize *that* we oversimplify, what we do not know is *where* we oversimplify. This is, in general, something that we can discern only within the wisdom of hindsight.

Oversimplification can enter upon the scene throughout the entire range of information management—be it in inquiry (information development) or inference (information exploitation) or communication (information transmission)—often with decidedly unhappy results. When J. L. Austin remarked that “it is an occupational discourse of philosophers to oversimplify—if indeed it is not their occupation”¹ he made an observation that holds not just for the philosopher but the scientist as well.

2. OVERSIMPLIFICATION AND INCORRECTNESS: OMISSION LEADS TO COMMISSION

Oversimplification involves loss. The student who never progresses from Lamb’s *Tales from Shakespeare* to the works of the bard of Avon himself pays a price not just in detail of information but in the comprehension of significance. And the student who substitutes the Cliff’s Notes version for the work itself suffers a comparable impoverishment. To oversimplify a work of literature is to miss much of its very point. Whenever we oversimplify matters by neglecting potentially relevant detail we succumb to the flaw of *superficiality*. Our understanding of matters then lack depth and thereby compromises its cogency. But this is not the worst of it.

One of the salient aspects of oversimplification lies in the fundamental epistemological fact that errors of omission will generally carry errors of commission in their wake: that ignorance can and often will plunge us into actual mistakes.

Oversimplification is, at bottom, nothing but a neglect (or ignorance) of detail. Its beginnings and origination lies in errors of omission. But that is not by any means the end of the matter. For when something is described

in an oversimplified manner the implicit claim is that what is being said is a faithful characterization of the item being described. And this means that the characterization at issue is not just incomplete but actually false. For errors of omission in characterizing the modus operandi of things automatically induce errors of commission. The implicit claim carried by simplification is that the omitted detail just does not matter, and what characterizes OVER-simplification as such is exactly the fact that it does matter. To all intents and purposes, then, *oversimplification is falsification*.

Thus assume a Realty that is a random mix of x, y, a, b , as per:

$x a a y b x x a b . . .$

And suppose that we oversimplify by not distinguishing between x and y , and the same between a and b , so $Z = x\text{-or-}y$ and $C = a\text{-or-}b$. We then have

$Z C C Z C Z Z C C . . .$

This leads to such clearly false conclusion as: “The 1st and 4th places are identically occupied.”

In oversimplifying we slide into falsification. Is oversimplification thereby lying? No! And for good reason.

Lying is falsification *with the intent to deceive*. Falsity is here the aim of the enterprise. But oversimplification is falsification with the intent to convey truth. Falsity is here merely collateral damage.

And there is a further crucial difference. The liar affirms what he believes to be false: to lie is to affirm a *recognized* falsehood. In oversimplification we do indeed commit to falsehoods: but we do not realize what they are. The oversimplifier is agnostic about the falsity of which he commits. Lying in consequence is ethically reprehensible, while oversimplification is in general ethically venial.

Whenever there is a blank in our knowledge, the natural and indeed the sensible thing to do is to fill it in in the most direct standard, plausible way. We assume that the person we bump into in the street speaks English and say “oops, sorry”—even though this may well prove to be altogether unavailing. We regard the waiter in the restaurant as ours even where it is the brother who bears a family resemblance. We follow the most straightforward and familiar routes up to the point where a DETOUR sign appears. We willingly and deliberately adopt the policy of risking oversimplifica-

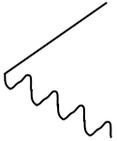
tion by allowing simplification to lead us in error because we realize it does so less frequently than the available alternatives.

3. NEED MORE OVERSIMPLIFICATION MEAN MORE ERROR?

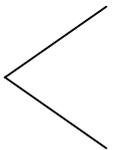
Consider the hopeful idea that: *The less the extent of oversimplification the more probable the correctness of our judgments becomes.* However, this is in fact quite false. Let it be that the reality of it is as per:



We could “simplify” this as per:



And we could carry simplification yet further by going on to:



However only this further, additional oversimplification will point us to the (actual) situation reflected in the truth that both branches are exactly alike. A *less* oversimplified model of the situation can very possibly lead our judgment away in key regards.

Not only is it the case that mere oversimplification can lead us from truth to falsity. But—as the preceding example shows—it is also true (and no doubt to some extent regrettable) that in various circumstances further, *additional* oversimplification can lead from falsity back to truth

But how is it that oversimplification is so important a factor on the larger scheme of things?

4. WHY OVERSIMPLIFICATION? SCIENTIFIC PROGRESS AND COGNITIVE COMPLEXITY

One of the most fundamental and far-reaching facts about natural science as we have it is that it oversimplifies our understanding of reality.

But why does oversimplification occur in science. Why is it effectively inevitable here?

The reality of it is that in scientific theorizing we proceed along the lines of least resistance, seeking to economize our cognitive effort by using the most direct workable means to our ends. Whenever possible, we analogize the present case to other similar ones, because the introduction of new patterns complicates our cognitive repertoire. And we use the least cumbersome viable formulations because they are easier to remember and more convenient to use.

The other-things-equal preference of simpler solutions over more complex ones is sensible enough. Simpler solutions are less cumbersome to store, easier to take hold of, and less difficult to work with cognitive rationality combines the commonsensical precept, “Try the simplest thing first,” with a principle of burden of proof: “Maintain your cognitive commitments until there is good reason to abandon them.”

And so oversimplification of the real is inherent in the very nature of cognitive rationality as it functions in scientific inquiry. It roots in the very nature of the venture as a project human inquiry as a matter of rational economy in the exploiting data to ground our inferences and conjectures regarding Reality. Empirical science is a matter of drawing universal conclusion (“theories” they are usually called) from the perceived facts of observation and experiment. But observation and experimentation is ongoingly enhanced by technological advance in the devices used to monitor and manipulate nature. And our theories must be minimalistic: they must fit the existing data tightly. And so the web of theory that is woven about a given manifold of data will not—and effectively cannot—be adequate to the situation that obtains subsequently, after our body of information has become enhanced. It is—inevitably—oversimple. This means that as our data are amplified through new observations and experiments the previously prevailing theories will almost invariably become destabilized. Those old theories oversimplified matters: new conditions call for new measures, new data for more complex theories. It lies in the rational economy of sensible inquiry that the history of science is an ongoing litany of oversimple old theories giving way to more sophisticated new ones that

correct their oversimplification of the old. There is no fact about the history of science that is established more decidedly than this: that new technology (be it material or conceptual) puts new data at our disposal and that new data manifest the oversimplification of earlier theories.

The ancient Greeks had four elements; in the nineteenth century Mendeleev had some sixty; by the 1900's this had gone to eighty, and nowadays we have a vast series of elemental stability states. Aristotle's cosmos had only spheres; Ptolemy's added epicycles; ours has a virtually endless proliferation of complex orbits that only supercomputers can approximate. Greek science was contained on a single shelf of books; that of the Newtonian age required a roomful; ours requires vast storage structures filled not only with books and journals but with photographs, tapes, floppy disks, and so on. Of the quantities currently recognized as the fundamental constants of physics, only one was contemplated in Newton's physics: the universal gravitational constant. A second was added in the nineteenth century, Avogadro's constant. The remaining six are all creatures of twentieth century physics: the speed of light (the velocity of electromagnetic radiation in free space), the elementary charge, the rest mass of the electron, the rest mass of the proton, Planck's constant, and Boltzmann's constant.²

The taxonomy of physics provides a further illustration. In the 11th (1911) edition of the *Encyclopedia Britannica*, physics is described as a discipline composed of 9 constituent branches (e.g., "Acoustics" or "Electricity and Magnetism") which were themselves partitioned into 20 further specialties (e.g., "Thermo-electricity: of "Celestial Mechanics"). The 15th (1974) version of the *Britannica* divides physics into 12 branches whose subfields are—seemingly—too numerous for listing. (However the 14th 1960's edition carried a special article entitled "Physics, Articles on " which surveyed more than 130 special topics in the field.) When the National Science Foundation launched its inventory of physical specialties with the National Register of Scientific and Technical Personnel in 1954, it divided physics into 12 areas with 90 specialties. By 1970 these figures had increased to 16 and 210, respectively. And the process continues unabated to the point where people are increasingly reluctant to embark on this classifying project at all.

The fact of it is that scientific progress is a matter of complexification because over-simple theories invariably prove untenable in a complex world. The natural dialectic of scientific inquiry ongoingly impels us into ever deeper levels of sophistication.³

An inherent impetus towards greater complexity pervades the entire realm of human creative effort. We find it in art; we find it in technology; and we certainly find it in the cognitive domain as well.⁴ And so we have no alternative to deeming science-as-we-have-it to afford an oversimplified model of reality. And in consequence we have no real alternative to becoming enmeshed in the same shortcomings that beset oversimplification in general.

5. COGNITIVE MYOPIA—MODES OF OVERSIMPLIFICATION: CONFUSION AND CONFLATION AND THEIR CONSEQUENCES

To this point we have addressed the questions of the what, where, and why of oversimplification. But now consider the question of what follows from it, and specifically: What are the implications of the fact that the science we have in hand oversimplifies the reality of things?

Let us begin by going back to basics. It happens that *confusion* and *conflation* are two prime modes of oversimplification. The key ideas at issue here are to be understood as follows:

1. *X confuses* items *x* and *y* within the question-manifold *Q* iff in answering the questions within this manifold *X* fails to distinguish between *x* and *y*.
2. *X conflates* items *x* and *y* within the question-manifold *Q* iff in answering the question within the manifold *X* sees both *x* and *y* as one selfsame *z*.

It is clear on this basis that cognitive myopia can take two forms:

- *Mild version*: this involves an *occasional confusion* between two distinct sorts of items. (As for example when there is an occasional mix-up in construing *h* as *k*, or conversely.)
- *Strong version*: this involves a *systemic conflation* (As for example when both *h* and *k* appear simply as a fuzzy and indistinguishable blurred complex).

For the sake of illustration consider someone whose visual myopia is such that he has is incompetent with regard to telling 5 and 6 apart. As a

result of such an inability to distinguish 5 from 6 the individual may well through *conflation* and failure to distinguish:

envision 56 as **.

Or again, the individual may through *confusion* and failure to discern:

envision 56 as 65.

Such modes forms of cognitive myopia have very different ramifications for our grasp of the world's lawful comportment.

Suppose that we are in reality dealing with the perfectly regular series

$R: 6\ 5\ 6\ 5\ 6\ 5\ 6\ 5\ 6\ 5\ \dots$

but due to the occasional confusion of a mild cognitive myopia we may then actually “see” this (be it by way of observation or conceptualization) as

$M: 6\ 5\ 5\ 5\ 6\ 5\ 5\ 5\ 6\ 5\ \dots$

But observe that our inability to distinguish has here effectively transmuted a lawful regularity into a random disorder. It is then clear (via “Mill’s Methods of Agreement and Difference”) that there is no causal correlation between R and M . The supposition of (mild) myopia thus induces a drastic disconnection between the two levels of consideration at issue, with the lawful order of R giving way to lawlessness in regard to its model M .

Thus even so crude an example suffices to show that lawful order can unravel and be destroyed by the confusion engendered by an occasional inability to discern differences. And this relatively rudimentary observation has far-reaching implications. In specific, it means that if even if the world is possessed of a highly lawful order, this feature of reality may well fail to be captured in even a mildly myopic representation of it.

6. MORE EXAMPLES

Consider an example, if you do not distinguish a from A then you will be wanted between a to and from Aa . In consequence if the former produces an effect different from the latter, you can obtain no explanation for it. The difference in effect now looks to be a matter of pure chance. And so, given myopia, the world-view presented in our world-modeling may well be no more than loosely coupled to the underlying reality of things, thanks to the oversimplification that is almost inevitably involved.

Again let the actually real situation be:

FFG	FG
FG	FFG

Suppose however, that your limited, oversimplifying perspective only permits looking at only two adjacent compartments. You would then have at our disposal the following two views of the situation:

FFFGG	FFFGG
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FFFGG
FFFGG

A conjectural reconstitution of the four-compartment situation will then, likely as not, lead you to conjecture the simplest, most uniform resolution of the issue, and thereby to arrive at the following model of the reality at hand:

FFF	GG
GG	FFF

Here your conjectural reasoning will lead to some correct results as “Uniformity along diagonals” as well as the erroneous “All compartments are

homogeneous.” Cognitive myopia need not be informatively harmful; but it certainly can be.

Again, suppose a system consisting of three types of objects A , B , and C , with an initial state of two items of type A and one each of types B and C . And let it be that this system develops through successive stages or phases that see these types of objects formed according to the following three rules

- $A \rightarrow B$
- $B \rightarrow C$
- $C \rightarrow A$

The result in point of their classification will then be as per the following perfectly regular series:

	(1)	(2)	(3)	(4)	→
A	2	1	1	} cyclic repetition of	
B	1	2	1		
C	1	1	2		

But now suppose that owing to oversimplification that A 's and B 's are not distinguished but seen as one uniform types, A^* . We then have

	(1)	(2)	(3)	(4)	
A^*	3	3	2	} cyclic repetition	
C	1	1	2		

Now every third period one-third of the earlier A^* (one can't say which) will mysteriously migrate to the C 's, with half of the C 's (again, no saying which) switching to A^* in the succeeding period. What is in actuality a simple and deterministic situation is transmuted through oversimplification

into an indeterministic mysterium whose modus operandi is ruled by stochastic variation.

7. OVERALL LESSONS

Confusion and conflation can cause us to lose sight of laws. But the reverse can happen as well. Thus let it be that the reality that confronts us has the random structure:

6 5 5 6 6 6 5 5 5 6 5 5 6 6 5 . . .

But let it also be that in representing this reality in our observations and/or conceptualization our vision of the matter is so myopic that we cannot readily distinguish between 5 and 6: both simply look like a blurring (5-or-6) to us. Then the above chaotic series is representatively transmitted into the elegant uniformity of the series

(5-or-6)(5-or-6)(5-or-6)(5-or-6) . . .

In this situation where reality is in fact random and discordant, its representation in our cognitive field of vision is the quintessence of lawful elegance.

And so under the conditions at issue we will have it that a world whose physical comportment is in certain respect random and lawless may well be seen by its cognitively myopic observers as having a phenomenology that is deterministically lawful.

As these considerations indicate, oversimplification can readily distort our view of the lawful structure of the world. It can either lead to a nomic deficit that reflects the loss of various actual laws or to a nomic surfeit that gives the illusion of loss when there are none.

By its very nature as a process of cognitive omission, oversimplification conceals certain actual regularities from our view. And moreover, insofar as it makes matters appear more uniform than they actually are, it is virtually bound to lead to spurious regularities.

The point is that there are not only the *optical* illusions of bodily vision but also the analogous *cognitive* illusions that afflict our efforts to grasp the ways of the world. Our oversimplified models of reality can distort our view of its modes of operation in ways that not only block various lawful

regularities from our view but which can also lead to the acceptance of spurious regularities.

8. THE MORAL OF THE STORY

While the oversimplification at issue with conflation and confusion differ significantly, they both conspire to raise the prospect of a significant decoupling between the order of reality (R) and our cognitive modelling (M) of it of it—between the lawful order of nature (N) and its representation in the law-manifold encapsulated in the science of the day (S).

We would, ideally, love to have it that reality and our view of it are duly aligned, so that $M = R$ and $S = N$. But in view of the effectively inevitable presence of cognitive myopia we can neither claim nor expect this.

As such deliberations indicate, oversimplification has significant consequences, and we have little alternative but to accept that science as we actually have it affords us with an oversimplified model of Reality. And in consequence we have little alternative but to accept that what holds for oversimplification in general will apply in this particular case as well.

Overall, then one must adopt a fallibilism which accept that our science is involved not merely with errors of omission but with errors of commission as well—that nature’s lawful *modus operandi* is not adequately and accurately depicted through the resources of science as we have it. We have to be fallibilistic and modest about it. We do and must expect that the natural science of the day—any day—will be not only incomplete in its characterization of reality, but will in some respects be incorrect as well.

Given that what is involved with oversimplification is a matter of errors not just of omission but almost inevitably of commission as well, we cannot warrantably see the relationship of M to R to be a matter of approximation but had best confine our claims to the language of estimation. For science doubtless affords our best-available estimates regarding the ways of the world, nevertheless as regards the actual truth about Reality, we cannot but accept that neither does science give us the whole of it nor even does it give us nothing but. Here, as elsewhere, the prospect of error—alike of omission and commission—is uneliminable for finite intelligences who operate under conditions of imperfect information.

* * *

The cognitive intractability of things is accordingly something about which, in principle, we cannot delude ourselves, since such delusion would vindicate rather than deny a reality of facts independent of ourselves. As long as we are fallibilists we must be realistic as well. It is the very limitation of our knowledge of things—our recognition that reality extends beyond the horizons of what we can possibly know about it—that perhaps best betokens the mind-transcendence of the real. The very inadequacy of our knowledge militates towards philosophical realism because it clearly betokens that there is of a reality out there that lies beyond the inadequate gropings of mind.

* * *

Admittedly, any general claim about a complex and many-sided issue—and our knowledge of nature's ways certainly qualifies here—is pretty well bound to oversimplify matters. And the present treatment of oversimplification is itself at once a consequence and an illustration of this circumstance.

APPENDIX

Observe that, as a consequence of oversimplification, even an elegant physical order (ϕ) may well be reflected confusedly at the cognitive/psychological level (ψ)—and in such a way that its representation involves a substantially random and disordered phenomenology at the cognitive/psychological level in the realm of thought. With cognitive myopia our modality of reality may well become estranged from the actualities.

And given that rational agents with themselves act within nature on the basis of their *understanding* of things it will transpire that even in an otherwise lawful and deterministic world this order will break down once imperfectly intelligent agents evolve and cognitive myopia deconstructs the worlds lawful order. Thus let it be in specific that such an agent is programmed to respond according to the *rule of behavior* (be it internally or externally mandated):

Wherever you see a 5, do *A* but otherwise do not.

OVERSIMPLIFICATION

But now reconsider our prior hypothetical example of 5-6 confusion. We will then have it that the agent will produce the following behavior sequence

A - - A A A - A - - - . . .

Given this situation, our myopic agent has thus inserted into physical reality an essentially random sequence that transmutes an otherwise lawful and deterministic world into one that is (in at least one respect) lawless and random—even at the level of its physical comportment. Myopic perception at the level of appearance has introduced a randomness-productive disconnection between the actual physical phenomenology and the realm of psychic operations.⁵

NOTES FOR CHAPTER 8

- ¹ Quoted in G. E. L. Owen, *Aristotle: Logic Science and Dialectic* (London: Duckworth, 1986), p. 218.
- ² See B. W. Petley, *The Fundamental Physical Constants and the Frontiers of Measurement* (Bristol and Boston: Hilger, 1985).
- ³ On the structure of dialectical reasoning see the author's *Dialectics* (Albany NY: State University of New York Press, 1977), and for the analogous role of such reasoning in philosophy see *The Strife of Systems* (Pittsburgh: University of Pittsburgh Press, 1985).
- ⁴ An interesting illustration of the extent to which lessons in the school of bitter experience have accustomed us to expect complexity is provided by the contrast between the pairs: rudimentary/nuanced; unsophisticated/sophisticated; plain/ elaborate; simple/intricate. Note that in each case the second, complexity-reflective alternative has a distinctly more positive (or less negative) connotation than its opposite counterpart.
- ⁵ This chapter is to be published under the same title in *Epistemologica* in 2007.

