NICHOLAS RESCHER COLLECTED PAPERS

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Nicholas Rescher

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PREFACE

I have been preoccupied in the mid-1970s since working on my book *Scientific Progress* with exploring the scope and limits of human knowledge from various points of view. Overall this project has also resulted in such later books as *Limits of Science*, *Epistemic Logic*, and *Epistemetrics*.[1] Gradually this preoccupation with various different aspects of the problem has led me to contemplate a systemic integration of my ideas on this important theme. The aim of the present book is to weave these diverse threads into a unified treatment of this overall terrain. Accordingly, the present discussion unites in systemic coordination various perspectives and aspects of our cognitive finitude. The result is, I hope, a cohesive and perspicuous account of significant aspects of this critical feature of our cognitive condition.

Nicholas Rescher
Pittsburgh, PA
November 2005

[1] The works at issue are *Scientific Progress* (Oxford: Blackwell, 1978); *Limits of Science* (Berkeley and Los Angeles: University of California Press, 1984); *Epistemic Logic* (Pittsburgh: University of Pittsburgh Press, 2005), and *Epistemetrics* (Cambridge: Cambridge University Press, 2006).

Chapter 1

FINITUDE AND LIMITATIONS (ON UNREALIZABLE ASPIRATIONS)

SYNOPSIS

(1)The idea of limits and limitations pivots on the concept of impossibility. (2) Some historic impossibilities in mathematics and physics illustrate this situation—as do various impossibility demonstration that have constituted a major theme in 20th century thought. The sources of finitude and bases of limitations that are at work here preeminently include the following five: (3) necessity, (4) incapacity, (5) scarcity, (6) uncontrollability, and (7) imperfectability. (8) Limits are often manifested by diminishing returns and resistance barriers. (9) The rational reaction to finitude is one either of curtailing aspirations or of resignation to the inevitable. (10) Some theoretical issues regarding limits, finitude, and incapacity can take very different forms and can address very different issues. And in principle one sort of limitedness need not necessarily spread over to another.

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1. FINITUDE AND UNREALIZABLE ASPIRATIONS

There is a significant difference between limits and limitations. Limits, inhere in outright impossibilities—conditions that simply cannot be realized in the very nature of things. Limitations, by contrast, have a sociological aspect: they relate to things that intelligent agents would like to do—if only they could, which is not the case.

Every law of nature sets a limit. Take “Acids turn blue litmus paper red.” This is correlative with the impossibility of finding some acid-immersed blue litmus paper that take on a color other than red. But of course no limitation is involved. Nobody hankers after an acid that turns blue litmus paper black. So no limitation is involved here.

Limits belong primarily to the natural sciences; limitations by contrast, have a whiff of the social sciences about them. Even as “it takes two to tango”, so it takes two parties to create a limitation—a reality that sets

limits and an agent who aspires to transcend them. A being of whose aspiration-horizon is narrow—confined entirely within the range of what is well within its powers—encounters no limitation in the presently operative sense of the term (notwithstanding the fact that all those limits that nonetheless confront it will reflect its status as a finite being). To be sure, there are some things that are impossible for this or that particular individual (as, for example, my succeeding as a Sumo wrestler), while others are impossible for all members of the species (as, for example, outrunning gazelles is for humans). Limitation, however, is a matter of generic infeasibility in realizing something that people in general might ideally want to do.

We humans, accordingly, are prey to both finitude and limitations. We are limited in what we can do with our bodies—we cannot, for example, turn them into bronze. But this hardly qualifies as a limitation—nobody in their senses wants to transform themselves into a statue. Actual limitations represent limits we would ideally like to transcend if we could have things in our own way. And there are, of course, a great many of them: our wishes and aspirations outrun the reach of our capabilities and capacities.

It is a characteristic feature of our condition in this regard that we humans are all too clearly limited in matters of knowledge, power, beauty, and many other desiderata. And this salient aspect of our condition deserves scrutiny and clarification.

2. SOME SALIENT IMPOSSIBILITIES, PAST AND PRESENT

Certain infeasibilities have been on the agenda for a long time. In mathematics, for example, the project of "squaring the circle"—of using ruler and compass for the construction of a circle—was demonstrated to be impossible by J. H. Lambert in the middle of the eighteenth century.[1] Again, in physics, the idea of a perpetual motion machine, which has intrigued theorists ever since the middle ages, came to grief with the demonstration of its infeasibility during the rise of thermodynamics in the middle years of the nineteenth century.[2] And yet again in physics, we have

[1] See Eugen Beutel, *Die Quadratur des Kreises* (Leipzig/Berlin: B. G. Teubner, 1913; 5th ed. 1951); C. H. Edwards, Jr., *The Historical Development of the Calculus* (New York-Heidelberg-Berlin: Springer-Verlag, 1979).

[2] See A. W. J. G., Ord-Hume, *Perpetual Motion: The History of an Obsession* (New York: St. Martin's Press, 1977).

the long recognized idea of the impossibility of achieving a perfect vacuum.[3] All of these impossibilities—these insuperable limits to goal achievement—betoken limitations exactly because those infeasible achievements have been a focus of aspiration. But with advances in mathematical and physical science, these longstanding aspirations ended up on the scrap-heap of demonstrated impossibility. And this is only the beginning.

The demonstration of impossibilities is among the most strikingly characteristic features of twentieth century science.[4] A handful of salient instances that illustrate this fact is given in Display 1. All of these milestone achievements of the era share the common feature of demonstrating the inherent infeasibility of achieving some desideratum to which practitioners of the discipline at issue had long and often aspired. Such findings had the effect of derailing unreasonable aspirations by bringing significant limitations to light. In this regard, the twentieth century has proven itself to be an era of dis-illusion where time and again the discovery of limits has thrown a bright, and often unwelcome light on our insuperable limitations.

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[3] See Mary Hesse, "Vacuum and Void," *The Encyclopedia of Philosophy* (New York: Macmillan and Free Press), Vol. VII (1967), pp. 217-18.

[4] For an instructive discussion of relevant issues see John P. Barrow, *Impossibility* (Oxford: Oxford University Press, 1998).

Display 1

IMPOSSIBILITY DEMONSTRATIONS IN TWENTIETH CENTURY SCIENCE

- *Physics*/*Relativity*: Albert Einstein's demonstration of the impossibility of physical transmissions faster than the speed of light.

- *Physics/Quantum Theory*: Niels Bohr's demonstration of the Principle of Complementarity inherent in the infeasibility of a conjointly precise specification of certain physically descriptive parameter (i.e., position and velocity) of physical micro-entities.

- *Psychology*: Sigmund Freud's insistence on the impossibility of self-mastery on grounds of there being no way for our rational conscious deliberation to gain complete control of our psychological processes.

- *Thermodynamics/Cryogenics*: Max Plank's demonstration of the effective impossibility of reaching absolute zero in experimental situations.

- *Cybernetics*: Claude Shannon's demonstration of the impossibility of a flawless (loss-free) transmission of information, any channel having a level beneath which noise cannot be reduced.

- *Mathematics*: Kurt Gödel's demonstration of the impossibility of axiomatizing arithmetic.

- *Social Theory/Economics*: Kenneth Arrow's theorem establishing the impossibility of reconciling social preferability with individual preferences.

It is one of the ironies of twentieth century science that, as its achievements have pushed ever further the frontiers of science and technology, this has at the same time brought various insuperable limits more sharply to view. Accordingly, the twentieth century has witnessed an

ever more emphatic awareness of limits. For despite the vast new vistas of possibility and opportunity that modern science and technology have opened up, there has emerged an ever clearer and decidedly sobering recognition that the region beyond those new horizons is finite—that progress in many directions—be it material or cognitive—has its limits and that we can go only so far in realizing our desires. And this has constrained a realistically modest sensibility—a growing awareness of human finitude thanks to the limits and limitations that confront us.

3. SOURCES OF FINITUDE: NECESSITY

There is nothing eccentric or anomalous about all of those manifold impossibilities. They root in certain fundamental features of reality. And this prominence of limitations in reality's larger scheme of things calls for a closer look at the underlying grounds of such a state of affairs. And here it emerges that the etiology of limits—the systematic study of this topic—brings to light the operation of certain very general and fundamental processes that account for a wide variety of particular cases. In particular, the following five figure among the prime sources of finitude:

- Necessity
- Incapacity
- Scarcity (of resources or time)
- Uncontrollability
  - — Fate
  - — Chance
- Imperfectability
  - — via desiderata conflicts
  - — via resistance barriers