Full House - The Spread of Excellence from Plato to Darwin
by Stephen Jay Gould
Reviewed by John Allen Paulos in the Washington Post

Bacteria and baseball. Few authors besides Steven Jay Gould could write convincingly about both. He begins his latest book with Freud's famous observation that the Copernican, Darwinian, and Freudian revolutions each moved man from a position of centrality and importance to a decidedly more peripheral position. In response to these dethronements, Gould argues that we try to smuggle a feeling of specialness through the back door. We subscribe to a notion of global evolution-driven progress of which we humans are the necessary outcome. In his effort to close this back door Gould employs a number of disparate vignettes and mathematically flavored arguments.

Consider his explanation for the disappearance of the .400 hitter in baseball. Gould engagingly demonstrates that the absence of such hitters in recent decades is not due to any decline in baseball ability but rather to a decrease in the disparity between the worst and best players (both pitchers and hitters). When almost all players are athletically gifted as they are now, the distribution of batting averages shows less variability than it did and hence .400 averages are rare. Interestingly the average of all batting averages has remained relatively constant over the decades (sometimes through fiddlings with the rules). Players' athletic prowess is close to the "right wall" of ultimate human excellence in baseball; there is much less room for improvement than there was in the sport's early days.

Another example concerns an imaginary country in which initially every adult receives an annual salary of $100. Assume that every year each person's salary is, with a certain probability, adjusted either upward or downward by $100 with the proviso that no one's salary ever declines below $100, the minimum wage. After a few generations the largest salary in the country will likely be quite a bit larger than $100 and the average will rise somewhat as well. This is because there is, at first, only one direction for salaries to grow; there is a "left wall" below which salaries can't decline. Although the $100 salary becomes less common over time, it nonetheless remains the most common salary.

Gould even discusses his bout with a rare form of cancer (of which he's now cured) whose median survival time is eight months - half live longer, half less - in order to distinguish the median

from the mean or average survival time and to provide another example of a skewed, or non-bell-shaped, distribution.

With these mathematical prolegomena out of the way, Gould proclaims the principal theme of the book: we should be more concerned with variation in a system (with the Full House of possible values), and less concerned with the system's average value or with its largest value. Focusing on the movement of these latter specific values often gives rise to talk of spurious trends such as the seeming decline in baseball ability or, as we shall see, global biological progress. This is an insightful point, but Gould goes on to overstate it by characterizing this foible as a widespread legacy of Platonism. What is indisputable is that the whole distribution of values is more useful than a mere average. (OMITTABLE: A humorous illustration of the way that an emphasis on averages can lead one to postulate a phony trend is provided by a demographic statistic I heard recently: The average resident of Dade County, Florida is born Hispanic and dies Jewish.)

The question remains: How do we reconcile the obvious growth in the complexity of biological organisms over time with the denial of the doctrine of global progress that Darwinism, which insists merely on local adaptation, seems to require?

The resolution is the following. Bacteria, the first life form on Earth, have minimal complexity. (They also are more numerous, ubiquitous, ancient, indestructible, and may even have more biomass than plants; a wonderful little chapter on them reads almost as a paean to this simple life form.) Although a tricky notion, biological complexity can to an extent be quantified, and these quantitative measures are roughly analogous to money in the example of the imaginary country above. The apparent trend in complexity growth is an indirect consequence of the fact that no life forms are simpler than bacteria, just as a rise in average salary follows from the fact that no one can make less than the $100 minimum wage in said country. Any random changes in biological complexity can initially be in only one direction. As recent research has indicated, however, in lineages of more developed species decreases in complexity are just as likely to occur as increases. Evolution provides no inherent drive toward complexity; global progress is a chimera.

Although Gould has argued elsewhere that computer simulations of evolution are irrelevant to real life, these ideas, it seems to me, cry out for further exploration using some of the techniques of

artificial life. Allowing bits of code and short algorithms to mutate and compete for space might even shed light on his oft-expressed claim that if the tape of life were rewound, the outcomes at the tiny, but complex right end of the distribution would be unimaginably different from us.

Of necessity I've glossed over many biological details to concentrate on the logical beams and girders of Full House here. Wandering about its well-decorated rooms, nooks, and attics is a pleasure left to the reader.

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