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## COMMENTARY

THE SPANDRELS OF ST. MARX AND THE PANGLOSSIAN PARADOX:  
A CRITIQUE OF A RHETORICAL PROGRAMME

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IN 1979, Stephen Jay Gould and Richard Lewontin published a highly influential, and highly unusual, article entitled "The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme" (Gould and Lewontin, 1979). *Spandrels'* point of view is summarized by its two titular metaphors, one lovely and the other a bit nasty. Spandrels are the curved areas necessarily left between adjoining arches. Those beneath the dome of St. Mark's basilica in Venice are embellished with mosaics, each depicting one of the four evangelists. The symmetry and coherence of their design might lead one to make the silly inference that they are the reason for the whole system of arches and domes that surrounds them. Gould and Lewontin then describe (or invent) a class of biologists, called adaptationists, who always make a comparable error, atomizing organisms into parts and assigning each its own naturally selected function, when their real explanations should be sought in the complex, integrated, indivisible organism. This selectionist approach is dubbed the "Panglossian paradigm" after Voltaire's overeducated fool, Dr. Pangloss, who always finds a way to support his belief that this is the best of all possible worlds.

*Spandrels'* arguments against adaptationism have been effectively addressed by a number

of authors (e.g., Maynard Smith, 1978; Mayr, 1983; Williams, 1985). Yet its appeal lives on, for *Spandrels* is not a simple scientific article. It is an opinion piece, a polemic, a manifesto, and a rhetorical masterpiece. Though its subject is biological, the text is cleverly woven with threads from literature, history, architecture, and anthropology. The rhetoric (due primarily to Gould) is so unusual and so effective that it has recently been subjected to book-length analysis. In *Understanding Scientific Prose* (Selzer, 1993; for a review, see Borgia, 1994), each contributor dissects *Spandrels* using a different approach from the realm of literary criticism: deconstruction, cultural studies, feminism, reader response analysis, the social construction of science, structural analysis, and more.

The colorful metaphors of *Spandrels'* title are just the beginning of the fodder provided for those interested in the relations among science, culture, and language, and the contributors to this volume have a field day. They point out the power of the well-chosen image, and illustrate the multiple, sometimes unintended, readings that all texts evoke (when I spoke of "fodder" and "field day," did I intend a pastoral or a military image; is *Spandrels* life-sustaining food, or hapless cannon fodder?). In fact, *Understanding Scientific Prose* (hereafter

*USP*) itself has multiple readings. The chapter by Gragson and Selzer argues that *USP* can be read as a training manual for scientific writers. By imitating the tactics of Gould and Lewontin, inexperienced writers might be empowered. This seems plausible; reading between the lines, we're told how to maneuver a turbocharged rhetorical vehicle loaded with options: wordplay, register shifts, allusions to nonscientific culture (high and low), caricature of the opposition, wit, satire, insinuations of political motive, and emotionally loaded images.

To see if this reading as driver's manual really works, I decided to take the rhetoric-mobile out for a test drive. And what better test could there be than to challenge *Spandrels* itself, finally competing on its own terms? I think I'm feeling a little empowered already.

*Spandrels*, like every text, can only be fully understood within its political-cultural context. In the case of *Spandrels*, the context was the attempted intellectual lynching of a young science, sociobiology, which at its most uppity claimed to account for human nature in ways that were distasteful to many, not the least those with Marxist inclinations. The lynching failed and the discipline still thrives, though many sociobiologists have been forced underground, traveling under disciplinary pseudonyms (I won't blow their covers).

*Spandrels* begins with an attack on selectionism and ends with a "pluralist" menu of alternatives. These two parts are poised on the fulcrum of a middle section, where the authors attempt to use Darwin's weight to tip the balance in their favor, laboring mightily to shift him from the place he is usually assigned on the selectionist side. The title of this section, "The master's voice re-examined," elicits one those unintended readings. The "master's voice" echoes the title of the painting that served as the basis for RCA's trademark picture of a dog cocking its ear at the voice emanating from an antique gramophone, an image that fits very nicely with my own titular metaphor, *The Spaniels of St. Marx*. Of course, I do not mean to imply that Gould and Lewontin are dogs; it is their well-known devotion to Marxist thought that might be construed as spaniel-like. The placement of the object of their devotion in a sputtering old gramophone

gains a nice resonance from world events that have transpired in the years since *Spandrels'* publication. This audio-canine image also allows me to encapsulate a major theme of this essay if, risking the wrath of the mixed-metaphor gods, I add a textile layer: When a narrative is woven with political woof it is worth keeping an eye out for biological warp.

Of course, the master that Gould and Lewontin meant to invoke was Darwin, not Marx. This is one of two standard Darwin ploys. The better one is to claim you have one-upped the master, admittedly a tough one to pull off very often. *Spandrels* plumps for the lesser strategy, drafting Darwin for the pluralist team by noting that he allowed for modes of change other than natural selection. This is accurate up to a point, but there are quite literally multiple readings of Darwin, and Gould lays claim primarily to the older Darwin of the last edition of the *Origin*. Let me describe Gould's chosen teammate in terms of his favorite sport, baseball. This older Darwin, though not exactly past his prime, was befuddled by the new pitches developed by Fleeming Jenkin (blending inheritance) and Lord Kelvin (a young earth). These pitches were of course later ruled illegal (genes are actually particulate and the earth is actually old), but they did change Darwin's game and he took to swinging wildly in his search for answers (for example, Lamarckian inheritance). If those desperate whiffs are what Gould and Lewontin have in mind for their pluralistic team, then so be it. For my team, I'll take the younger Darwin of the first edition, when the swing of his selectionist bat was true.

Having taken the younger, fitter Darwin for the selectionist team, fairness requires me to return Dr. Pangloss to Gould's team, where he belongs for reasons of both style and substance. But first, it is instructive to note the devious way in which Pangloss was settled on the adaptationists. Gould, whose first-person voice is ever-present in *Spandrels*, distances himself from the dirty work and actually manages to introduce Pangloss at three removes from himself. The Panglossian charge is first used in one of Gould's architectural examples (remove number 1), and even there, we are only told that it "invites (remove number 2) the same ridicule that Voltaire (remove number

3) heaped on Pangloss." This Candide coating makes it easy for the reader to accept the "invitation" to swallow the pill, only to discover later what biologically active stuff is hidden inside. I have no such clever device, and can only point out the illogic of Pangloss's placement, for he is far from an atomizing adaptationist. Instead he is a pluralist switch hitter. Consider Pangloss's explanation for his own venereal disease. He claims to have come by his infection via a long line leading back to Columbus, who caught it in the West Indies; it is therefore the price paid that we might enjoy the fruits of the New World, such as chocolate. Gould and Lewontin know this example and try to preempt it, arguing that the functionality of chocolate makes this an adaptationist analysis. But this won't do. The example perfectly matches the second of their five *alternatives* to adaptationism: no adaptation or selection on the part at issue. The "part" at issue for Pangloss is venereal disease, and he does not treat it as isolated trait, nor as adaptive in its own right. Instead, its meaning is to be found only in the context of a complex, rich, organic, syphilo-chololatic relationship. The reassignment of Pangloss to Gould's team also works stylistically. Pangloss, whose name can be translated either as "every language" or "all tongue," should feel right at home among the *bon mots* of *Spandrels*. He might even argue that they are *le meilleur des mots possibles*, the best of all possible words.

Metaphors aside, the charge against adaptationism would not have been treated seriously if there had there not been some truth behind it (this is a rhetorical device used to make yourself look reasonable, called throwing your opponents a bone — whoops, there's that canine metaphor again). In sociobiology in particular, the 1970s had seen what looked like a furious rush to present adaptationist hypotheses, sometimes without much of a bow towards the evidence. There is an irony here, because sociobiology gained much of its impetus from George Williams's 1966 book, *Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought*, which was deeply skeptical on the subject of adaptation. Williams demolished a whole mode of sloppy adaptationist thought based on group selection. While this might seem an unlikely start for an adapta-

tionist gold rush, the exclusion of group selection thinking made it clear how the evolution of social behavior should be explored: through individual selection (including kin selection). What followed is a normal part of science, a rush to put valuable new tools to work. These tools turned up the nuggets so fast, and the prospectors were so busy staking claims, that careful testing sometimes waited until the dust settled a bit. Hence the appearance of unbridled "storytelling" (*Spandrels*' term) or hypothesis generation (the more conventional one).

In fact, these adaptationist stories, these *hypotheses*, are testable, though testing takes time. The mighty physicists have trouble keeping up with just a few quarks, so perhaps biologists should be cut a little slack with their millions of species. Even so, as the dust settles on the sociobiological gold rush, the nuggets are getting carried back to town for testing and, as expected, though not all that glitters is gold, much of it appears genuine.

Gould and Lewontin offer their own alternative, the *Bauplan* approach from continental Europe. The reader, having just heard the yapping at adaptationists and the snarling over possession of Darwin's bones, might be forgiven for chuckling over the change in tone to a kinder, gentler bow-wow plan (he might also be tempted to send Gould and Lewontin to the Bauhaus, for some remedial schooling in form and function). The real test is whether the *Bauplan* approach has triggered its own gold rush, perhaps showing some of those adaptationist nuggets to contain still richer stuff. However, Winsor's chapter in *USP* suggests that this has not happened. Although *Spandrels* has been widely cited, a large fraction of citations come in papers that note the non-adaptationist alternatives offered by Gould and Lewontin, explain why they do not work for their particular case, and settle on an adaptationist explanation. To be fair, I believe there is now more attention given to nonadaptive explanation, and this may be due in part to *Spandrels*, but it may just be a natural consequence of the playing out of the richest seams accessible to the new adaptationist tools, and a return to some of the older tools, set aside but never forgotten. There is also an interesting trend in the opposite direction. Adaptationist thinking, including sociobiology, is on the

upswing in the European homeland of the *Bauplan*.

The disparagement of storytelling in *Spandrels* is the source for multiple ironies. Gould and Lewontin have in other contexts been champions of historical science and of the importance of narrative in sciences that deal with unique events in the past. In criticizing storytelling, aren't they criticizing their own approach? It's also good fun to imagine the contributors to *USP*, with their roots in literary criticism, squirming a bit with this denunciation of their academic *raison d'être*. And of course *Spandrels* was chosen for analysis precisely because of how far it departs from the usual scientific paper in its willingness to use stories from outside of science, and its skill in telling them. In fact, the word "lyrical" is used by several contributors to *USP*, as if one could sing *Spandrels'* prose. Come to think of it, I believe I can (with apologies to Gilbert and Sullivan):

I am the very model of a science intellectual,  
I've information lexical, political, and cultural;  
I know the themes of Voltaire, and I quote  
the sites historical,  
From San Marco to Mexico in order allegorical;  
I'm very well acquainted too with matters architectural,  
I understand all ornaments, on fan vault or  
on spandrel;  
About adaptationism I am teeming with a lot  
o' news,  
With many cheerful whacks at it I sanction my  
apostate views.

Equating scientific knowledge with storytelling carries two perils. The first is that it may contribute to an impression that scientific knowledge is no more reliable than the stories from cultural analysis or even literature. Taken to the postmodern extreme, we get a view that scientific knowledge is, like everything else, *just* a text to be deciphered, and that all interpretations are equally valid (i.e. equally invalid). This view is even sillier than the opposite extreme, which holds that science operates in a cultural vacuum. Even the most dedicated postmodernist, when she descends from her ivory tower after a hard day of denying reality, suspends her disbelief long enough to choose the stairs instead of the quicker way down afforded by her window.

The second danger is that cultural stories might be considered to be just as reliable as the scientific "stories" they comment on. It is undeniable that science and culture affect each other. Still, it's a tricky business trying to read those stories, and it is tempting to read them according to our biases. For example, there is a genre—I call them "So-Just Stories"—in which the storyteller justifies his own views by denigration of an alternative said to derive from tainted cultural roots or to promote undesirable social ends. My personal favorite is "How the sociobiologist got his spots." It tells us that sociobiologists read their brutish, capitalist, male-dominated culture into their biology, and then use this debased biology to justify the culture (this is a version of an old tale dating to Marx, who put the spots on Darwin). While we should be alert to such connections, they are unlikely to be so simple. For example, my own sociobiological work on social insects emphasizes altruistic behavior, focuses on females rather than the males, and suggests that collective worker interests are crucial determinants of advanced insect societies. Does this make me a good guy, a nurturing feminist, and a stalwart of the working class? Gould's own research, on the other hand, focuses on stasis and structural constraints, and the change that he allows is rarely progressive. Does this betray conservative cultural biases, and do we need to man the barricades lest reactionaries use his research to assert the natural rightness of stasis?

A final irony is that the whole brouhaha of which *Spandrels* was a part wasn't really necessary to address the excesses of human sociobiology. There was no need to flog sociobiology as a whole, or to vilify adaptive explanations in general. For there is a ready answer to these excesses: cultural evolution. Even the most ardent human sociobiologists have learned this lesson: Biology can sometimes be overwhelmed by culture. Curiously, these same words teach a different lesson that the more ardent scientific writers should bear in mind in practicing their craft.

So, how did I like my test drive in the supercharged rhetoric-mobile? It's certainly been good fun, and maybe I turned some heads with a flashy maneuver or two, but it's pretty hard to keep the damned thing on the

road. Hard-driving rhetoric might make arguments persuasive, but it doesn't necessarily keep the passengers on a true course. I hope I've done no violence to the biology, but that's a risk (OK, so the RCA dog isn't a spaniel; that's only Madison Avenue biology). For all their real faults, I can see the value of the more boring, stripped-down, passionless vehicles that scientists usually use to drive their points home. What do we really get by surrounding science with a Joycean mix of one-liners and double entendres (other than Joycean Double-liners, I mean)? Moreover, keeping the passengers on a true course is only one of the problems; there is also the risk of collisions and mayhem. Readers might conclude, falsely, that the motivations of Gould and Lewontin were entirely political or that political beliefs must necessarily distort science. And my little parody of Gilbert and Sullivan's modern Major General, who knows about everything but matters military, might induce an uninformed reader to conclude that Gould knows about everything but matters biological. But this is exactly the complaint that many biologists would level at *Spandrels* — that colorful use of language can mislead as well as inform. I have simply tried to illustrate this point, utilizing the paradox that the articulate Panglosses who most readily deploy the weapons of language are also the most vulnerable to being hoist by their own rhetorical petard (petard *n* 1: a case containing an explosive to break down a door or gate or to breach a wall; 2: a firework that explodes with a

large report [from the Middle French *peter* to break wind]).

But perhaps I have been pursuing the wrong reading of *Understanding Scientific Prose*. Its real use might be as a training manual for readers, rather than for writers. It helps us to recognize rhetorical devices for what they are, the spandrels of scientific argument. They are a necessary part of a scientific edifice, and it is to them we look to see evangelists strutting their stuff, but they are secondary to the more fundamental architecture of ideas. Gould embellishes his spandrels with mosaics that, like the originals in St. Mark's, are colorful, coherent, and satisfying (though perhaps a bit Byzantine for some tastes). But they aren't what's holding up the building. Let me push the metaphor one step deeper, for in science, as in architecture, the whole structure must be anchored in the good solid earth of the natural world. I've been to St. Mark's, too. I appreciated the spandrels, and I marveled at the arches and the domes, but I also noticed those buckled floors, and remembered the uneasy ground beneath. I will continue to admire Gould's spandrels, and will even encourage my students to do so, but I will also admonish them to watch their step.

Candide arrived at quite a similar conclusion, and it is only fitting to let him have the last words. They are the same wise last words he used to voice his hard-won immunity to the rhetorical seductions of Pangloss:

*"Cela est bien dit, mais il faut cultiver notre jardin"* or, loosely translated,

"That's well said, but let's get back to our field work."

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