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# **CONSTRUCTING EXPERIENCE**

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## Intertextual Self-Fashioning: Gould and Lewontin's Representations of the Literature

Modern scientific articles almost universally represent themselves as part of a literature through explicit citation and discussion of other texts identified as being closely related. In the last two centuries, reviews of the literature, as both self-contained syntheses and as embedded introductions of research articles, have told coherent stories about the relationship of prior work identified as relevant and thereby establishing frames of meaning for new work (Bazerman, "How Natural Philosophers"; Myers, "Stories and Styles"; Swales, *Aspects*). Thus, each new finding, argument, or claim locates itself upon its own reconstruction of an explicit intertextual field.

The constant reformulation of the prior literature is one of the mechanisms by which consensus is reached on the value and meaning of the claims of published work (Cozzens, "Comparing"; Messeri; Small) and on the standard sets of associations that comprise codified knowledge (Merton, *Sociology of Science*; Ziman). Citation studies have been used not only to identify the influence and canonical standing of various articles; they have been used to identify the cognitive and social networks of evolving research specialties (Mullins et al.).

Thus, representation of the intertext—the web of texts into which each new text is placed or places itself, explicitly or implicitly—is a strategic site of contention, for it is the site at which communal memory is sorted out and reproduced, at which current issues and communities are framed and dynamics established pushing the research front toward one future or another.<sup>1</sup> Readers who accept findings or local analysis without accepting the situating intertext accept only a limited part of an argument, rejecting the meanings that attach the findings to a dynamic of specialty knowledge. Especially if you are to convince readers of fundamentally new positions, at odds with existing thought, you

must somehow uproot the intertext upon which the current audience perceptions rest. It is not sufficient for readers to integrate a finding into their existing mental framework, but you must engage them in a radically new line of discussion by discrediting the former discussion with all its implied dynamics and intellectual freight.

In "The Spandrels of San Marco and the Panglossian Paradigm," Gould and Lewontin seek just such a disciplinary reorientation. They attempt to reconstruct the intertext against which the article will be read. They have little quarrel with any specific finding or analysis presented in the articles they discuss but only with the framework those findings are put into, a framework that keeps asserting the need for an adaptationist account of specific survival benefit of each specific feature. The weight of this framework is so strong in eliciting these stories of adaptive value, Gould and Lewontin argue, that even when the evidence falsifies existing adaptationist accounts, evolutionary biologists will go to great lengths to reassert another adaptationist story, creating a never-ending trail of ad hoc alternatives keeping the adaptationist impulse alive and undamaged.

However, as we look into the intertextual struggles set up in the text, we will find several unusual features that suggest the divisions are both not as deep and in another sense deeper than they appear to be. The divisions portrayed in the article are only intelligible in light of issues that are never explicitly brought to the surface. Only by analyzing the intertext Gould and Lewontin construct and by comparing that to other representations of the same and closely related intertexts can we see exactly how and why Gould and Lewontin are trying to persuade us of a particular view of evolution, nature, and human nature. Because the intertext is such a strategic site of contention, fighting for control of the cognitive universe within which new claims will be read, analysis of intertextual representations let us see not only the rhetorical game being played but the struggle to define what the rules and limits and stakes of the game are.

### The Rhetoric of Intertextual Struggle in "Spandrels"

From the first sentence of the abstract that prefaces "The Spandrels of San Marco and the Panglossian Paradigm," Gould and Lewontin set themselves against a literature, a body of statements, a dominant text-producing research program: "An adaptationist programme has dominated evolutionary thought in England and the United States during the past 40 years" (581).

The next few sentences characterize the common argument of this literature. By naming it and identifying its dominance, Gould and Lewontin immediately set that literature as an edifice to be discredited, uprooted, and replaced by another discourse. "We criticize this approach and attempt to reassert a competing notion (long popular in continental Europe) that organisms . . ." (581). The remainder of the abstract details their alternative, their specific criticisms of adaptationism, and the alignment of their project with the *Ur*-intent of the founding father: "We support Darwin's own pluralistic approach to identifying the agents of evolutionary change" (581). In their eyes, the literature has gone astray and they have come to set it aright.

The abstract is direct and blunt and contained within the professional discourse of evolutionary biology. The abstract is no summary of the rich counterpoint of the article that strays far beyond descriptive biology and evolutionary theory to encompass voices from the French Enlightenment, medieval Venetian art and architecture, contemporary international urban intellectual life, anthropology, forensic science, mathematical modeling, and statistical genetics. The abstract does not even begin to give a clue about the allusions or arguments of the article's primary title, although the subtitle "A Critique of the Adaptationist Program," fits precisely with the abstract.

The article proper begins, curiously, with an architectural travelogue: "The Great Central Dome of St. Mark's Cathedral in Venice presents in its mosaic design . . ." (581). The first section then wanders far from the halls of biological meetings, which is the venue of the abstract, into realms of medieval churches and Aztec cannibalism and eighteenth-century philosophic polemic. This first section, however, has everything to do with the article's primary title. Indeed, words like *evolution* and *biology* are barely mentioned, showing up only in the cadences at the midpoint and end of the section, where the analogy between discourse about art and human action and the discourse of evolutionary biology is made.

Even as the essay moves in the second section into the domain of evolutionary biology, the ironies, alienations, and resonances set up in the first section never let the argument settle down comfortably into a purely biological discourse. The article does not even present an orderly exposition of the points outlined in the abstract. While the abstract may be said to gather together the major claims of the essay and to present those claims in an order that plausibly forms the coherent argument of their essay, the claims do not appear in the article in the same order or with the same linkages. The abstract rather is an

orientational metacommentary, a reconstruction of the argument straightforwardly placing it in battles over the evolutionary literature. The strategy of the article is more oblique: to re-place a discussion that it claims has defined the dominant discourse and project of evolutionary biology, overtly by displacing one programmatic argument and replacing it with another, but even more by repositioning the argument into broader social discourses, first by analogy, but ultimately by suggesting continuities of biology with other discourses and by hinting at darker, ideological currents within narrowed forms of biological discourse.

The present analysis will examine Gould and Lewontin's strategies of representing the intertextual field so as to identify oppositions, draw battle lines, and discredit the enemy. From there we will compare Gould and Lewontin's re-presentation of the intertext against the original texts and the surrounding literatures they are claimed to be representative of. That is, we will look at what kind of transformations Gould and Lewontin make of their literary resources. We will then examine the literary field that forms the immediate rhetorical context of the Gould and Lewontin statement to interrogate whether their historical reconstruction of the genesis of current issues seems consistent to the current debate on those issues. At this level it becomes clear that not all see the debate as they wish to see it, that they have not reached a focused joining of issues, an intersubjectively agreed-upon stasis with their colleagues. Indeed, most see the issues as much smaller and less monumentally significant, more a matter of local adjustment of claims within the existing discourse.

This will leave us with the question as to why Gould and Lewontin see their issues in such fundamental terms of total replacement, why they feel so much is at stake. The answer lies in themes buried in this text but spelled out in other publications by the coauthors, self-cited in "Spandrels." This analysis exposes the fluidity of the intertext and shows how representation of the intertext can become a resource to reconstruct the issues before a field and even the location of a field in relation to other discourse fields. There is a tension revealed in Gould and Lewontin's article, a tension between the need and desire to enclose a literature—thereby creating a communal project—and the need and desire to open the literature up to introduce new issues and arguments excluded by the enclosures.

#### *Defining the Enemy*

In the second part of "Spandrels," after the excursion into strange realms beyond the recognized borders of biology, Gould and Lewontin

get down to their overt business by announcing: "We wish to question a deeply engrained habit of thinking among students of evolution. We call it the adaptationist Programme, or the Panglossian paradigm. It is rooted in a notion popularized . . ." (584).

The questioning of course in typical academic fashion is a heavily ironized rejection, indicating that we and anyone else who looks at it sensibly (that is, through our eyes) will clearly know better.<sup>2</sup> All ironies are based on someone knowing better than someone else. Here, the misguided adaptationists are clearly the ones who know less, so much less that they can't distinguish between habit and legitimate academic argument or between popularized notions and professional thought. They lack self-knowledge and critical objectivity and thus play the fools. Their foolishness is ironized by Gould and Lewontin: the terming, fluid world is anatomized into discrete objects called *traits* (which are never defined), and then when that fracturing fails to produce an adequate account, the notion of wholeness is re-created under the idea of trade-off.<sup>3</sup>

As warrant for their critique, Gould and Lewontin characterize what they claim is the typical argumentative styles of the adaptationists. What Gould and Lewontin present, however, is not the argumentative style for positively asserting adaptationist claims but rather how adaptationists react to the apparent failure of an adaptationist argument. Gould and Lewontin construct a strategy of ad hoc repairs that they claim adaptationists pursue: replacing the failed adaptationist account with a new one; assuming a new adaptationist account must exist; claiming the lack of account is due to imperfect knowledge; and excluding data that might imply anything other than an adaptationist account. The generic expectation of adaptationist accounts is so strong, Gould and Lewontin in essence claim, that a secondary genre of explanations arises to continue respect for the genre even when it is not easily fulfilled.

Gould and Lewontin have thus described a literature that is based on a set of simplifications and reductions that distort the phenomena being studied but which resists challenges to its underlying simplifying account by a combination of obduracy and willful blindness. These characterizations of the literature are only partially substantiated by detailed critique of specific articles.<sup>4</sup>

#### Wiser Voices

Gould and Lewontin attribute the Anglo-American narrowness and reductionism to a false turn by two of the early disciples of the evolution-

ary doctrine, A. R. Wallace and A. Weismann. These false notions of false disciples were not shared by the founding father Darwin, as Gould and Lewontin assert by citing two spots (and a third by implication) where Darwin explicitly extended the bounds of legitimate discourse beyond natural selectionist accounts. Following this pluralistic lead, Gould and Lewontin suggest five alternative nonadaptationist evolutionary accounts for the literature to pursue, which they substantiate through openings already in the literature, including much of their own self-cited work.

They also identify a more satisfactory tradition of evolutionary thought pursued among Continental biologists, which accommodates their concerns with the overall interaction between all the features of the organism and the context within which the organism thrives. They cite a largely German and Austrian literature as the locus of this argument for considering an organism's *Bauplan*, which conceives of the organism as a whole rather than as an assemblage of atomized parts. By citing this central European literature, Gould and Lewontin foster a self-conscious split between misguided Anglo-Americans and wiser Europeans. They reject one literature and establish a new program, enlisting both Darwin and a contemporary tradition of truer Darwinian disciples from beyond the borders of the reviled adaptationist program.

#### A Larger Cultural Frame for the Local Stillness

To help the readers step outside the blinders of the narrowed Anglo-American discourse, Gould and Lewontin go beyond alternate, legitimate biological voices—Darwin and the Europeans—to enlist other highly legitimated cultural voices outside of biological conversation altogether. Indeed, the article opens outside biology within a great cathedral arching above it. The spandrels of San Marco, represented by picture and description, remind us of the wisdom of the original artisans who properly (from Gould and Lewontin's perspective) understood the relationship of local features to architectonic structure and constraints.

The aesthetic rightness of this understanding is echoed in the voice of the art critic that speaks in the first paragraphs of the introduction. The voice, by invoking a familiar cultural genre implies an intertext of the great body of aesthetic analysis. In the implied aesthetic, humanistic conversation, form, structure, and appearances are all given weight in assessing meaning and value. Meaning is treated as complex, and reductionism is always transparently out of place. That transparent inappropriateness of reductionism and the tendency of art to see be-

yond simple surface meanings are directly encapsulated in the comments that move the discussion from appearances to context in typical critical fashion: "The design is so elaborate, harmonious, and purposeful that we are tempted to view it as the starting point of any analysis, as the cause in some sense of the surrounding architecture. But that would invert the proper path of analysis. The system begins with an architectural constraint: the necessary four spandrels and their tapering triangular form" (582).

From analysis of architecture, the discussion proceeds to an analysis of human behavior (after a brief passage through the literary-philosophic world of *Candide*, to which we will return in a moment). Here we again start out with a reductionist account, this time of cannibalism. This account is so out of keeping with the usual gist of anthropological discussion that it immediately seems discordant and shocking: treating the cultural ritual and practice of cannibalism as simply a matter of protein. The reductionism is from culture to nutrition, from anthropology to biology. Whatever the truth might be about the claims, the emotional valences of the arguments are clear: anthropology is a respecter of human complexity and difference, a chronicler of the varieties of human spirit, creativity, and life; nutrition is a matter of chemistry that cuts across all complexities to reduce us all to the same beast. Although nutrition and chemistry are forever with us all, it strikes us as discordant and insufficiently respectful of humankind to reduce cultural practice (especially a remarkably repellent and therefore fascinating cultural practice) to a least common denominator. Gould and Lewontin's review of the ensuing anthropological literature in fact follows the path back from reduction to complexity, from nutrition back through culture, class, and conspicuous consumption. Reductionism is presented as foolishness (to be treated ironically with Gould and Lewontin's comments about poor butcher-shop management) because it is blind to the full range of facts and a reasonable assessment of the whole picture.

*Pangloss the Fool and Voltaire the Wise*

Pangloss, present as a puzzle from the beginning in the enigmatic article title, does not enter fully until a discussion of the wisdom of various approaches to interpretation of features. There he is presented as the paradigmatic fool who forgets the full range of facts and the whole picture: "Anyone who tried to argue that the structure exists because of the alternation of rose and portcullis makes so much sense in a Tudor chapel would be inviting the same kind of ridicule that

Voltaire heaped on Dr. Pangloss" (583). Pangloss becomes the leitmotif emblem of foolish reductionism and atomism throughout the article. He returns in the critique of ad hoc adaptationist explanations, as an epigram to a discussion of optimistic teleology, and as a shadow beneath all the tales of foolishness. His presence lies especially underneath Galton's anecdote about Spencer, who is overtaken by a fit of teleological a priori reasoning; Spencer is as rapidly deflated by Galton, as Pangloss is by Voltaire.

The effect of establishing the battle lines of the article as congruent with Voltaire's ridicule of Pangloss has a double effect. Not only does it help establish the adaptationists as narrow, blind, optimistic, reductionist, teleological fools, it also puts Gould and Lewontin in the position of Voltaire—the wise, truthful philosopher who is the scourge of fools. Biological correctness is left behind as the issue is transformed into philosophical wisdom. The humane understanding of the human world is now at stake, and the evil to be scourged is beyond silliness or error: it is the evil of bad doctrine.

The emotional weights attached to Pangloss and Voltaire come from many other features of the novel *Candide* beyond Voltaire's critique of the Panglossian doctrine that all is for the best in this best of all possible worlds and that each detail of this world has a simple, optimistic, teleological explanation. In the novel the problem with Pangloss is not that he holds a silly, simpleminded doctrine but rather that he is too clever: he is a manipulative hypocrite who uses his doctrine for self-aggrandizement, deception, oppression, moral disengagement, and a host of other wickednesses. He is ridiculed and reviled for his hypocrisy, not his simpleness. The resolution in the book is not to counter the argument for teleological optimism but rather to transcend it, as *Candide* invites both Pangloss and Steven (Pangloss's philosophically pessimistic opposite) into the modest garden. They can keep up their silly debate as long as they get on with the planting. *Candide's* journey in the book is indeed not to philosophical truth but away from it to a philosophic modesty that creates the glow of humane wisdom that attaches to Voltaire despite his cold, satiric eye.

This is not to suggest that Gould and Lewontin want to make detailed explicit connections between their critique of the adaptationists and the complex position of the novel. Quite the contrary, they simply want to label the adaptationists with a damning label of philosophic foolishness. Properly so; all analogies are incomplete and limited, for narrow purposes. On the other hand, the persuasive effect of this analogy as the leitmotif of the article, as the enriching chord beneath

the overt melody of the argument, depends precisely on the richness, ironic complexity, and humanity we associate with the novel—and by extension attribute to Gould and Lewontin.

Similarly, the affective weight of the preliminary framing of the argument through aesthetics and cultural examples is to suggest cultural wisdom warns against the reductionist strategies of the adaptationists, who are portrayed as mistaking local epiphenomena for the fundamental patterns that produce them. The wiser, more deeply human approach, which incorporates humanistic and social scientific thinking, is to understand the complexity of creativity that produces cultural rituals, universities, cathedrals, and satire.

#### The Text of the Intertext

So that is the argument, the enemies and allies in the theater of the intertext as Gould and Lewontin represent them. But not everyone may read the literature in the same fashion. Other readers, with different interests and perspectives might not select the same set of texts as the most relevant nodes of discussion, nor might they find the same stances and divisions in those texts. In order to identify the perspective through which Gould and Lewontin reconstruct the literature, I examined as many of the texts they cite as I could obtain. I was able to examine all but three of the forty-one publications on Gould and Lewontin's reference list.<sup>5</sup> I then compared Gould and Lewontin's characterization or use of each publication with my own readings of the relevant parts of the cited material. Since I am not a biologist nor do I have a detailed familiarity with the evolving evolutionary debates, my readings are obviously limited in their validity. Nonetheless, I was usually able to determine whether the issues Gould and Lewontin claim were raised were indeed specifically raised and whether the cited text's position approximated Gould and Lewontin's representation. When I was uncertain, I erred on the side of accepting Gould and Lewontin's interpretation. Although I found the articles generally conforming to the claims Gould and Lewontin suggest, I found a number of interesting variances worth noting: in implications drawn by Gould and Lewontin, in hardening ambiguous oppositions, or in revealing other underlying issues.

Of the thirty-eight source texts I examined, twenty-eight unproblematically conform to Gould and Lewontin's use or characterization,<sup>6</sup> but ten raise issues of interpretation,<sup>7</sup> almost always in determining on which side they stand on the adaptationist/anti-adaptationist border, or even whether they recognize that border as a relevant issue.

#### Unacknowledged Complexities

Several identified as fully and simply adaptationist (Coon, Garr, and Birdsell; Shea; Jerison) actually present more complex positions that take into account some of the alternative or wider-ranging accounts that Gould and Lewontin argue for. On the other side, Gould and Lewontin enlist to their cause several publications that have adaptationist leanings (Lande, "Evolutionary Mechanisms"),<sup>8</sup> are more cautious in their commitments (Waddington and Cowe),<sup>9</sup> or seem to be outside the debate altogether (Galton);<sup>10</sup> Understandably, middle cases make categorization hard. But the very point is Gould and Lewontin's creation of sharp divisions—intellectual, geographic, and temporal—to define the terms of their argument.

The most revealing and significant neatening of battle lines concerns Gould's four earliest self-cited publications, which discuss size and timing of maturation of individuals of a species (allometry and heterochrony). In the "Spandrels" article, he sees allometry as supporting alternative evolutionary mechanisms that go beyond adaptationism. In his cited 1966 article ("Allometry and Size"), however, Gould treats allometry simply as a subtopic of adaptationism. The article in fact explicitly announces its task as to provide an adaptationist account of size variation. The 1971 self-cited article ("D'Arcy Thompson") also argues that allometry is within adaptationism but just is a more complex version of it. The 1974 article ("Allometry in Primates") is a comprehensive review of allometry, including errors and misapplications, pointing out evolutionary implications, but without ever taking an explicit stand on adaptationism. The cited 1977 book, *Ontogeny and Phylogeny*, complicates allometry by adding the heterochronic issue of retardation of development, which allows for education and family bonding in human development. Although the "Spandrels" article sees just these cultural issues as going beyond adaptationism, this 1977 book still sees this opening to culture and cumulative achievement as part of adaptation. In 1977 Gould approvingly quotes Krogman: "Man is programmed to learn to behave, rather than to react via an imprinted determinative instructional code" (401), and Alexander Pope: "A longer care man's helpless kind demands, / That longer care contracts more lasting bands" (404). Although two years later in "Spandrels," Gould labels learning and bonding as outside adaptationism, in the 1977 book he still repeatedly refers to the "adaptive significance of retarded development."

Apparently, Gould, as he looked more deeply into development issues of allometry and the related timing of development, came to an

increasingly open-ended and creative version of adaptationism. Eventually, he changed his mind altogether about whether his evolutionary accounts were fully adaptationist at all. That is fine. He is allowed to change his mind. What is curious is that in the "Spandrels" article, even while self-citing his earlier discussions, he does not reveal that change nor renounce his earlier positions. He simply enlists his earlier articles into his current position to keep sides neatly divided. He, in effect, rewrites those articles after the fact by quietly assimilating them into an opposite position.

#### The Intertext of the Current Debate: Symposium

Divisions may be kept neat not only by the way individual texts are represented but also by selectivity of the literature cited. A more comprehensive examination of the literature may not support the representation of direct opposition drawn from a carefully selected subset of texts. Not being widely read in the evolutionary literature, however, I cannot begin to pass judgment as to whether Gould and Lewontin's characterization of the hard-core adaptationist program plausibly reflects Anglo-American publications on evolution or whether researchers define themselves explicitly along the divisions that Gould and Lewontin point toward.

The Royal Society symposium in which Gould and Lewontin's argument was first presented does, nonetheless, provide a limited sample of the evolutionary literature into which Gould and Lewontin are injecting their argument. Of course, the symposium is not a random sample of the literature; it was a planned, shaped event.

Given the range of the ten primary papers and one commentary presented in the symposium entitled "The Evolution of Adaptation Through Natural Selection" and given that the organizers J. Maynard Smith and R. Holliday are responsible for two of the most self-avowedly adaptationist papers in the meeting, the panel seems intended to show the wide range and power of work developed under the agenda of adaptationism. Moreover, the placement of the Gould and Lewontin paper at the end of the session suggests that their paper was intended by the organizers as the critical or cautionary voice that frequently caps such occasions, while not undermining the generally positive implications of the papers overall.

Yet, although all the papers fall within an adaptationist symposium and all except Gould and Lewontin's propose adaptationist arguments,

they do not uniformly reflect the narrow adaptationism excoriated by Gould and Lewontin. In fact, examination of the papers indicate that only two of the ten primary papers fall into Gould and Lewontin's characterization of adaptationism. The remainder move across the spectrum, some ultimately adopting positions rather close to Gould and Lewontin's, although still remaining under the banner of adaptationism.

The two papers that most closely fit Gould and Lewontin's characterization of adaptationism are those of the symposium organizers. J. M. Smith's article "Game Theory and the Evolution of Behaviour" argues that game theory gives a functional account of fighting behavior consistent with an evolutionary selection of that behavior. This argument closely parallels the cannibalism-nutrition argument. A behavior, which depends on the coordination of many physical features and is usually thought of as a complex causal entity, is identified as a single evolutionary feature and through analysis (nutritional or game-theoretical) characterized as adaptive.

R. Holliday is coauthor with T. B. L. Kirkwood of "The Evolution of Ageing and Longevity," which argues that even such an apparently nonadaptive quality such as aging can be seen as adaptive. An account of accumulating cell deterioration through genetic variation over time suggests that aging provides a mechanism for balancing between the flexibility needed for genetic diversity and the consequences of genetic deterioration. Both these articles provide what Gould might categorize as just-so stories to bring even apparently nonadaptive, nonfeatures under adaptationist accounts.

Two further articles, although overtly adaptationist, do not fully fit Gould and Lewontin's characterization of a reductionist program. "Selection *in Vitro*" by L. E. Orgel brings adaptationism down to the molecular level, by identifying adaptive chemical features at the binding site in prebiotic RNA proteins. This, while clearly making an adaptationist argument, does so at so fundamentally biochemical a level that it is difficult to distinguish between isolatable features and the *Bauplan*. The adaptive feature here examined is not an evolved, mature feature so much as a structural element that then has consequences for later complex organisms. Thus, even though the argument is overtly adaptationist, because the adaptation concerns the very character of the genetic material, the consequences can hardly be maintained at the level of isolatable surface feature. "The Evolutionary Genetics of Sexual Systems in Flowering Plants" by D. and B. Charlesworth, while attempting to

explain complex sexual systems in adaptationist terms, admits difficulties without proposing easy solutions or ad hoc accounts to preserve a neat, adaptationist story.

*More Friends Than Acknowledged*

Two other articles, while following general adaptationist lines, move even more to the kinds of considerations that Gould and Lewontin wish were better attended to. "The Evolution of Enzyme Structure" by B. S. Hartley finds adaptation occurring as the result of multiple forces and complex contexts, not as a result of simple, isolatable selection of single, independent features. "The Evolution of Genetic Diversity" by B. C. Clarke, even while wishing to provide adaptationist accounts of diversity, nonetheless moves away from a single feature/single creature explanation into one of a species-wide *Bauplan*. The existence of genetic variety, the paper argues, reduces predation by decreasing density of individual species.

The last three primary articles (other than Gould and Lewontin's) accept much of Gould and Lewontin's argument, although not in all cases seeing the consequence as a rejection of adaptationism. R. Dawkins and J. Krebs in "Arms Races Between and Within Species" present adaptive evolution occurring in a complex, interactive environment of intra- and inter-species pressures, driving complexity expressed at the *Bauplan* level. Also, Dawkins and Krebs do not rule out rapid punctuated evolution, nor do they claim to argue for a naive perfectionism: evolution works when it is good enough. T. H. Clutton-Brock and P. H. Harvey in "Comparison and Adaptation" argue that the definition of adaptationism should shift from causal explanations to explanations of consequences, opening the way as well for nonadaptive changes and interactive constraints of varying features. Although their final account of variation closely mirrors Gould and Lewontin's, they claim their account only modifies, but does not reject, the adaptationist program. In "The Question of Adaptive Sex Ratio in Outcrossed Vertebrates," G. C. Williams, after much effort, cannot find adaptive causes for sex ratios, which he identifies finally as random. Nonetheless, he remains puzzled by the lack of a viable adaptive explanatory alternative.

*Who Accepts the Boundary?*

Thus, if the symposium is any indication of the field of Anglo-American evolutionary research and thought (indeed eight articles are British-authored and the last—other than Gould and Lewontin's—is

American), then the field is much more varied with fewer hard boundaries than Gould and Lewontin represent. The adaptationist/anti-adaptationist boundary seems to exist only when someone wants to make an issue of it. In the primary symposium papers, only Clarke does this, by trying to take the issue of genetic diversity from the anti-adaptationist by arguing for diversity's adaptive value.

A. J. Cain's discussion paper at the end of the symposium, however, does mount a direct adaptationist attack on Lewontin. The first half of the discussion paper praises with minor caveats the growing knowledge gained by adaptationism. Midway, however, the discussion curiously turns to an adaptationist account of the survival value of emotionalism and an irrational confidence in one's own power to control one's destiny. Such overestimates of one's ability to overcome obstacles gives the adolescents of a species the necessary courage to face the rigors of a threatening environment. The same attributes of emotionalism and unwarranted confidence Cain finds in one of Lewontin's earlier publications. Lamarckism, he quotes G. B. Shaw as noting, while not necessarily correct, is more human. Objectivity is only adaptive for the mature of the species, who embody the true spirit of science. Beyond the clever ironies of this *ad hominem* attack, it is worth noting how Cain counteracts Gould and Lewontin's privileging of humanistic creativity by raising the humanistic stakes onto the moral planes of dispassionate understanding and maturity. Science, characterized as the realm of mature contemplation, displaces art, characterized as adolescent emotionality, as the pinnacle of human wisdom.

The great variety of actual positions expressed in the symposium suggests that Gould and Lewontin's characterization of the battle is overdrawn, but the last response by Cain, who redraws the same battle lines, suggests that there is something more at stake in observing those lines. That issue is one's belief about human nature and the proper moral stance to the human condition. Cain's argument is sociobiological. Rationality and irrationality are only sociobiological consequences of the need to survive. Cain implies that the nominally adult Lewontin would be acting more adaptively if he left his adolescence behind him and accepted the sociobiological reality that we have little control over our fate. "Spandrels" rejects implicitly, however, just that quietist position, which denies creativity, will, and action.

*Sociobiology—The Real Stake*

That rejection becomes clearer through examination of Gould and Lewontin's most recent (from 1978 and 1979) publications self-cited in



"Spandrels." These three articles (Gould, "Sociobiology"; Lewontin, "Adaptation," "Sociobiology") are unproblematically consistent with the positions taken in the "Spandrels" article, but they place the issues directly within the sociobiology controversy. None is directly within the evolutionary biology literature or closely related disciplinary literature, suggesting that Gould and Lewontin were not prepared to wage a full-scale attack on sociobiology within the evolutionary literature. Rather the attack on adaptationism aims at the technical underpinnings, the explanatory mechanism by which sociobiological accounts gain the appearance of plausibility. Only as they remove themselves from the overt disciplinary biological literature were Gould and Lewontin ready to tip their hand in a more direct way. The two 1978 articles are from semipopular journals, *The New Scientist* and *Scientific American*. Both adopt genres (the book review and the expository overview) that allow a more direct discussion of general issues, rather than a focused technical debate. The last article is from a social science journal, allowing Lewontin to take on the role of general expositor, interpreter, and critic of an outside disciplinary perspective.

Each of these three articles is cited only as the source of specific pieces of evidence, and no hint is given of their broader arguments. Lewontin's "Adaptation" is cited only as the source of the chin example, but in fact it presents the full set of complaints about adaptationism, winding up with the same list of five alternatives to adaptationism. Gould's "Sociobiology" is cited as the primary source for a critique of Barash's studies of aggression in mountain bluebirds. Although Gould and Lewontin do not mention it, "Sociobiology" rehearses much of the critique of adaptationism as telling just-so stories open to frequent ad hoc revisions. The article then goes one step further to link this adaptationist explanatory style with sociobiology—that is, the account of behavior as biologically and genetically determined. In fact, the critique of Barash is used exactly as a transition between the critique of adaptationist accounts and the critique of sociobiology. Gould goes on to argue that genetic adaptationism breaks down with human beings who adapt through cultural evolution, and therefore sociobiological accounts are inappropriate. Gould asserts that the "grandest goal . . . of human sociobiology . . . the reduction of the behavioral sciences to Darwinian theory" ("Sociobiology" 533) must fail in recognition of the impact of cultural evolution, which is faster, more modifiable, and more easily transmitted. He argues that cultural history and Darwinian theory must stand beside each other as two independent disciplines.

Lewontin's "Sociobiology" is also cited in "Spandrels" just as a source

of a specific example, but it too in fact gives an extensive critique of adaptationism as a preliminary to opposing sociobiology as an inappropriate extension. After pointing out that adaptationism is an a priori explanatory strategy, and thus not a testable theory, Lewontin presents sociobiology as "one manifestation of the adaptationist program, concentrating on the behavioral aspect of the phenotype" (6). Sociobiology is undermined by the argument that no specific genetic grounds or mechanisms have been identified for the claimed behavioral adaptations.

After listing the now familiar five alternatives to adaptationism, Lewontin further argues that sociobiology makes four errors: arbitrary agglomeration, reification, conflation, and confusion of levels. Each of these errors according to Lewontin is based on an inadequate understanding of human creativity and culture. Arbitrary agglomeration refers to the problem of identifying what are the natural suture lines between features, especially troublesome when dealing with human mind, memory, and culture. The problem of reifying mental or conceptual categories is the second error. Mental constructs, Lewontin argues, are created in human minds and are not directly heritable traits. The third, conflation, again refers to the mistake of taking culturally created categories and attributing them to animal behavior when the animals themselves are not operating with those explicit categories. Lewontin's last critique of the confusion of levels points out that sociobiologists have no real concept of the nature or influence of human culture but really only describe individual behavior. Aggression is treated, for example, only as a programmed individual behavior rather than the product of complex social forces. "Educational and political systems and the creation of ideologies become nothing but the collective manifestation of individual drives for conformity and indoctrinability" (Lewontin, "Sociobiology" 9). As Gould argued in his 1978 review ("Sociobiology"), creativity and culture are the very human things that sociobiologists do not give any honor or place to.

#### *Creativity and Culture in "Spandrels"*

Culture and creativity are precisely what are given honor in "Spandrels," and the fools like Pangloss who are blind to humans' abilities to intervene creatively within the constraints of history, architecture, and other structures are precisely those who are rejected in the article. Indeed, the first quotation from Pangloss exhibits confusion between human cultural creativity and natural determinism. "Our noses were made to carry spectacles, so we have spectacles. Legs were clearly

intended for breeches, and we wear them" (583). Throughout the article the favored mode of explanation is creative response to circumstances adding complexity that confounds reductionist explanations. The arguments presented throughout "Spandrels" gain more specificity and force when read as rejections of sociology and not just complaints about some methodological difficulties in evolutionary research and debate.

Biological constraints are shown as delimiting pathways and structuring development rather than as determining individual choice, whether of the mosaicist of San Marco or the mollusc elaborating its shell. Creations of powerful art and spirit are shown to be responses to constraints rather than the simple determined result of constraint. Not only architecture but also cannibalism are best understood by not "imposing biological biases." Even more, biology is shown as best understood by not imposing biological biases, as plants and animals are shown to exhibit complex creative responses to environment, experience, and genetic constraint. The gist of the *Bauplan* argument is the total response of the organism to the complex environment. Even the tyrannosaur's use of its small hands is a creative response to needs and opportunities, whether for sexual foreplay or the desire to get up from a prone position—neither task easy for a tyrannosaur.

Panglossian determinism becomes an especially delusive evil in light of this pervasive creative response that Gould and Lewontin find among all creatures and humans, for Pangloss's philosophy leads to a quietism, an acceptance of the way things are in this best of all possible worlds. Thus, as Gould and Lewontin recall, Pangloss accepts his own venereal disease because Columbus's adventure into the New World brought chocolate as well as syphilis. The later quotation concerning the Lisbon earthquake appears in the novel as a rationalization for Pangloss not saving a drowning sailor. Gould and Lewontin might say that the objectivity that Pangloss displays is precisely that displayed by Cain when he calls Lewontin's sense of control over life an unavoidable adolescent adaptation to the overwhelming difficulties of the world.

The implied moral argument against sociobiology comes closest to the surface in the cannibalism example, marked by the reference to E. O. Wilson as one person who has taken up the nutritional explanation of cannibalism. Although sociobiology is not overtly discussed, Wilson is so associated with the sociobiology movement that it would be foolish to mention him if Gould and Lewontin did not want to raise the specter. Wilson's attempted reduction of cannibalism from complex cultural behavior to protein source removes the moral stigma from a socially

repellent custom. By reasserting the cultural explanation, Gould and Lewontin recuperate the moral responsibility for individual and social choice. Participants of a culture are held responsible for their choices. They could have done otherwise. Moreover, the social waste and lack of nutritional necessity that Gould and Lewontin cite again categorize the activity as needless killing and savagery. Evil is not biologically determined but is a real social ill for which individuals are responsible. Even more, we should note that Gould and Lewontin counter the sociobiological account of the behavior with a Marxist account of classes, power, and conspicuous consumption. Evil here is done precisely as a form of dominance, oppression, and selfishness.

The critique of adaptationism in the first half of the article presents many examples of overt behavior, for which adaptationists are presented as foolishly missing the point of choice, creativity and responsibility within structured circumstances; the latter half of the article, however, presents few behavioral examples as attention turns to the structural frameworks within which evolutionary opportunities are elaborated. The research program suggested by Gould and Lewontin thus turns away from individual characteristics to a concern for *Bauplan* and structure as providing opportunities for response. We are reminded of the now-familiar statement of Marx that humans make their own history but not in conditions of their own making.

The Marxian theme of constrained responsibility and creativity comes once more, in the form of the final anecdote reprising the Panglossian fool in the person of the social Darwinist Herbert Spencer (even though, as with Wilson, the target ideology is not mentioned). Social Darwinism as the ideological justification for late nineteenth-century *laissez-faire*, competitive capitalism, red in tooth and claw, is presented as the radically individualist and quietist teleological optimism that jumps to reductionist conclusions with little close attention to the complexity of details.

Conclusion: Levels of Intertext and the Strategies of Knowledge Containment

In "The Spandrels of San Marco and the Panglossian Paradigm," Gould and Lewontin have created an intertextual drama that makes most sense in terms of another submerged intertextual struggle over sociobiology. In that struggle the control over representation of the intertext is a crucial strategic weapon, for whoever controls the intersubjective intertext (that is, the widely accepted representation of the in-

tertext) controls the communal memory and thereby the framework of knowledge. If Gould and Lewontin can construct the history of evolutionary discourse as a struggle between foolish adaptationism and a wiser pluralism, they can knock the communal underpinnings out from sociobiology, which they consider morally, politically, and intellectually repellent. Beneath the overtly scientific discussion of appropriate investigatory method and explanation lies a struggle of philosophical ideas and human commitments. It is on those most fundamental human conversations the representations of the scientific intertext are built.

It is a standard strategy of disciplinary debate to reach back into the history of a field to open up questions that were thought to be settled years ago, just as Gould and Lewontin reach back to identify what they consider a false turn in the movement of the evolutionary word from Darwin to the disciple Wallace. But Gould and Lewontin implicitly reach back even further to question the enclosure of biology itself by setting biological explanation side by side with aesthetic and cultural explanation. Ultimately, they do this because their cause reaches beyond biology. They must remove the protection of biology from the sociobiology they believe is wrapping itself in untenable biological reductions. To wean us the readers from sociobiology, they must first wean us from "our biological prejudices." These prejudices have led us down a path that denies our very nature and responsibilities. They have led us to unwisdom and foolishness.

Every scientific and disciplinary literature is built upon a series of containments, constructing a literature set apart from other discussions, a literature following its own questions and listening to its own special evidence and arguments. The history of disciplinary writing is filled with moves of literatures, setting themselves apart from each other, often with stunning results for the development of new and powerful knowledges. Yet every discipline can be traced, without too complex a genealogy, back to one branch or another of philosophy, and philosophy is at root a wisdom literature.

Every disciplinary writer relies on those containments in order to construct a local intertext that will be persuasive and useful for carrying forth one's own work. But issues can drive one deep into the commonly accepted intertext and its sedimentation of taken-for-granted knowledge. Old texts can be revived to create new representations of the intertext and old containments can be cast aside to propose new linkages. Disciplines, when interrogated by deep enough issues, can be disintegrated into wisdom literatures. But writers can only propose

those realignments. It is up to the readers, who constantly reformulate the discipline by the representations of the intertext of knowledge they accept, to see the wisdom in the new philosophy.

## Notes

1. Yet at least two studies indicate that representations of the intertext do not have to be persuasive or acceptable to certain kinds of readers for the ensuing work to be of interest or credible (Bazerman, *Shaping Written Knowledge*, chap. 8; Schwieger and Shammoo), but that is only because the readers themselves have powerful intertexts in their heads, against which they place the immediacies of the current findings and argument. If the new material does not place within the reader's intertext with its implied aims, methods and warrants, and body of findings/knowledge, then the new work will not be credible or even intelligible.
2. Myers, *Writing Biology*, "Rhetoric of Irony."
3. The one concession Gould and Lewontin make to the adaptationists is recognizing that adaptationists have admitted nonadaptive evolutionary mechanisms such as genetic drift and allometry. However, Gould and Lewontin immediately minimize the import of this concession by claiming the adaptationists, while admitting nonadaptive evolutionary mechanisms in general, rarely consider them as significant in any real case. Again they assert that the generic expectation of adaptationist accounts is so strong that there is little room to assert contrary accounts, even when they are in principle possible. In this manner the literature is kept homogeneous.
4. The first characterization of the process of adaptationist research (atomization and trade-off repairs) is substantiated by no specific articles as evidence. The first claim of atomization refers only to prior critiques making the same point. The second point concerning the trade-off play immediately shifts into the *Candide* analogy. Concerning the characterizations of the repair strategies, substantive evidence from the literature is put forth. Three cases where older, failed adaptationist arguments have been replaced by new ones are cited, as is one case of an appeal to an assumed (but as yet undiscovered) adaptationist account and one case of appeal to unknown details of environment. Concerning this last appeal to ignorance, it is worth noting that the appeal comes from Wallace, near the beginning of a putative research program, where indeed an appeal to ignorance might be warranted. Finally, concerning the exclusion of evidence, the supporting example is drawn from the popularizations of the Boston Museum of Science rather than professional journals, although with a disclaimer from Gould and Lewontin asserting that similar arguments appear throughout the professional literature.
5. The most extended evidence of adaptationist obduracy and willed blindness comes in the form of a two-page account of Gould's critique of Barash for narrowness in considering alternative nonadaptationist accounts and a summary of a follow-up study that further calls Barash's results and story into question. The summarized critique, however, still maintains an adaptationist stance.

5. Baer, Davitashvili, Wallace.

6. Barash; Costa and Biesel; Darwin, *Origin*; "Sir Wyville Thomson"; Falconer; Gould; "Sociobiology"; Grasse; Gregory; Harner; Lande; "Natural Selection"; Lewontin; "Adaptation"; "Sociobiology"; Morton; Getgey; and McGrath; Ortiz de Montelano; Rensch; Riedl, *Ordnung*; "Systems-Analytical Approach"; Rudwick; "Function of Zig-Zag"; Romanes; Sahlin; Schindewolf; Selacher; "Arbeitskonzept"; "Divariate Patterns"; Stanley; Sweeney and Vannote; Thompson; Wilson.
7. Coon, Garn, and Birdsell; Galton; Gould; "Allometry and Size," "D'Arcy Thompson," "Allometry in Primates," *Ontogeny*; Jerison; Lande; "Evolutionary Mechanisms"; Shea; Waddington and Cowe.
8. Lande's argument concerning limb loss and reexpression appears on the surface to be adaptationist, even though he is aware of structural constraints and mechanisms. Nonetheless, by interpretations emphasizing weighing of constraints against adaptive gains, the article can be seen as fitting Gould and Lewontin's characterization of providing a way of testing nonadaptive hypotheses.
9. Although Waddington indeed opens up the possibility of the interpretation given by Gould and Lewontin, he himself is agnostic as to causal factors that might account for the patterns he notes.
10. Galton's anecdote is from a context totally outside the adaptationist or even evolutionary debates. It is in a discussion of the value of anthropometrics, and the point is simply to show the importance of gathering facts. This is not to say that the anecdote isn't appropriate to Gould and Lewontin's argument. It is. However, the context may make it seem that Galton fought the same battle. He didn't.
11. All the papers were published in the *Proceedings of the Royal Society of London*; see Smith and Holliday.

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## Money Talks: Adam Smith's Rhetorical Project

**M**y task is to outline what Adam Smith might have thought he was doing in writing *An Inquiry into the Nature and Causes of the Wealth of Nations*—that is, what kind of act of rhetoric he was committing.<sup>1</sup> Whatever act it was, it was highly powerful. At various times the vision he put forward has been associated with a new science, the intellectual machinery of that new discipline, major legislative changes in Britain and throughout the world, one of the founding ideologies of the country whose economics have in this century reordered international political and economic relations, the invention of its dialectical collectivist opposite that has formed its partner in the ideological and political struggles of this century, and generally the modern way of life. No text can do all of this on its own. Much has been attributed to *Wealth of Nations*, much simplified and reduced, much repainted in the colors of ideology, and much just misunderstood. Nonetheless, powerful stories generate many meanings, interpretations, folk retellings, and curious social reputations. Smith had to give all these interested users and reinterpreters something to work with.

While I am not inquiring into what use people have made of Smith's work (that is, what his text did to and for them), I will address what he thought he was doing to them, his rhetorical intention.<sup>2</sup> To understand his intention, however, we must first reconstruct the rhetorical universe he imagined himself to be taking part in. It is his imagination of the rhetorical world that produced the document.

A reading of the Smith corpus reveals him as self-consciously attempting to create a new basis for social order through persuasion (and in his terms, "conviction"). This social order was to avoid the dominations of the prior forms of hierarchical order and the new forms of social contract. And this social order, while providing the basis for liberty and individual development, would not rely on consistent rational thought or continuing commitment to an ideal of state and