Consilience and Retrospection

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Bio

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Abstract

This paper reexamines Stephen Jay Gould's critique of E. O. Wilson's notion of consilience, going back to William Whewell's original formulation of the concept. The element of hermeneutic hindsight which inheres in the process of consilience is clarified and brought to the fore as a notion pertaining to cognitive narratology.

Meandering and beating around the bushes before pouncing on the point of a subject is by now, after the New Historicism, a well-established way of opening an essay. Stephen Jay Gould brings that art to a parodically baroque elaboration in his posthumous volume *The Hedgegog, the Fox, and the Magister's Pox*—with the meanders starting right from the title—but still it is worth following him through any bush he beats. Furry and bristly animals run out from the undergrowth. The book often refers to the comparative strategies of the hedgegog, who can only do one thing, but is very good at it, and the fox, the sly owner of a whole bag of tricks. These contrasting abilities are used to comment on the differences between the sciences and the humanities. The subtitle is more explicit on the book's actual contents, "Mending the gap between the sciences and the humanities." That is, Gould advocates a true reconciliation between the humanities and the 'hard' sciences, and of course also the 'softer' sciences like the evolutionary biology of which he is a practitioner. The obstacle lies not just in the mutual ignorance and mistrust in the disciplines themselves, but also in some strained or hurried attempts

at reconciliation, to the critique of which Gould devotes the most substantial chapters of the volume.

In a complex world there is not just one mode of knowledge, Gould argues, and the modes of knowledge proper to the sciences and those proper to the humanities have all their own legitimate spheres, as long as they do not overstep it trying to usurp the position of another discipline. On the other hand, apart from outright invasions, there is the converse problem of inadequately traced disciplinary borders. One must also take into account that the very history of disciplines has led them to erect some absurd or non-existent barriers: "our taxonomies of human disciplines arose for largely arbitrary and contingent reasons of past social norms and university practices, thus creating false barriers that impede current understanding" (Gould 2003: 17).

Sometimes a problem is treated in a muddled way in a given discipline, from a mistaken perspective, while the conceptual instruments required to solve it exist in a neighbouring discipline—but the communication between them is lacking. Gould gives an example from his own experience, applying narrative theory to evolutionary theory:

> remembering the fox's strategy, I explicitly realized that the necessary apparatus for understanding much of life's evolutionary pattern lay in methodologies established by the historians in departments of our humanities faculties, and not in the standard experimental and quantitative procedures so well suited for simple, timeless, and repeatable events in conventional science. (Gould 2003: 18)

As a matter of fact, evolutionary theory deals with complex, unique, and unrepeatable events—i.e. historical events. In spite of the perceived principles and regularities in the workings of evolution, best exemplified by the biochemical basis of genetics, the dominant explanatory principle in Darwinian evolutionary biology is

natural selection, an ecological principle,[1] and thus evolutionary biology is primarily a historical science, concerned with some chapters of the one and only Big History. Darwin himself referred to the evolutionary origin of the species, including human beings, as "that grand sequence of events".[2] Besides any narrative components, Gould argues that science is, also, mythical. Its central myth is the assumption that it observes the world in a pure and undistorted way—while actually science is what we might term dialogic: it is not a photographic catalogue of the world, but an ongoing debate between human beings and between diverse theories, as Darwin himself acknowledged:

> Charles Darwin wrote to a close colleague about the myth of "objective" recording: "how odd it is that anyone should not see that all observation must be for or gainst some view if it is to be of any service". (Gould 2003: 35)

Other persistent myths are those of a supposed warfare between "science" and "religion", and the dichotomous opposition between "science" and "non-science." Gould devotes a whole chapter to the establishing of dichotomies as a mental habit or vice: it is a cognitive maneuver which may have evolved for good practical reasons, but it tends to hinder adequate theoretical perception. Thus, the very idea of "two cultures" in opposition, science versus the humanities, is simplistic. There are different modes of knowledge and cognitive practices legitimated or enabled by each discipline, in a way rather more complex and fuzzy than this abstract and idealistic concept of "science" would suggest. And rereading C. P. Snow himself, the original author of the notion of a confrontation in his essay *The Two Cultures*, Gould highlights that Snow was well

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[1] "Thus, the darwinism of *The Origin* postulates the subordination of biochemistry (heredity) to ecology (adaptation), insofar as natural selection, as *dator formatorum,* is an ecological principle, not a biochemical one" (Insua 2012, my translation).

[2] *The Descent of man* (Darwin, 2001: 249). See my commentary on Darwin's narrative perspective (2009a).

aware of the simplification supposed by this notion, and of the fact that he was generalizing somewhat freely out of his personal experience of clear-cut humanistic-scientific dichotomies in his specific British milieu. Snow knew well that there exists much middle ground between the poles of "hard" experimental sciences on one side and belles lettres on the other. However, some recent academic episodes, such as the polemic deriving from the hoax article Alan Sokal managed to plant in *Social Text,* have had the unfortunate effect of emphasizing a simplistic dichotomy between humanistic verbosity and scientific precision, which is not accurate—nor did Sokal believe it to be the case, either. Gould takes the opportunity to emphasize the importance of studies in the social criticism of sciences and in the history of science, an emphasis which is evident in his own approach to the development of evolutionary theory (Gould 2002). In his many papers on the history of science, Gould is always attentive to the personality and circumstances of scientists as individuals, and to the sense of their labour in the context of the organization of knowledge in each given period. Here, for instance, he makes a contrast between the cabinets of curiosities in the Renaissance period and the museums that succeeded them: two institutions sharing some continuities but quite different nonetheless in their assumptions and their intellectual economy: the museum aspires to a systematic organization of knowledge, the cabinet does not. The same contrast is visible between what Michel Foucault (1970) would term the science of the "classical period" (that of Aldovandri, for instance, which encompasses all kinds of miscellaneous knowledge on the phenomena under study, be they factual or mythical) and the disciplinary will for system and classification in the new scientists of the Royal Society.

Scientists established a separation between factual and moral questions:

> Science must insist that, whatever the factual state of nature, our yearnings and
> our quest for morality and meaning belong to the different domains of the
> humanities, the arts, philosophy, and theology—and cannot be adjudicated by
> the findings of science. (Gould 2003: 106)

This diversity of criteria and approaches is a central point argued by the book, but it is also here that the main ambiguity or contradiction is to be found, as Gould seems to uphold here the sharp dichotomy that he wishes to question or blur on the other side. Might it not be the case that science does have something to say, after all, about the arts, about morality, etc.? That is the direction taken by many contemporary evolutionary theorists and neuropsychologists, in the wake of E. O. Wilson's call for consilience— trying to develop that "third culture" which straddles the traditional fields of the sciences and the humanities. [3] Gould's thought faces a quandary here, as he is defending both the absence of any sharp dichotomies, and the separate cognitive realms of science on one hand and the humanities on the other. But there may well be a meeting point, or an interface, or at least an arena for debate.

There is no doubting Gould's insight when it comes to discerning paradoxes and double logics at work in previous approaches to these issues. For instance, in his discussion of Francis Bacon, one of the promoters of scientific methodology, whose figure has often been associated to the simplistic notion of cumulative observation without a guiding theory, and the inductive extraction of conclusions—the so-called "Baconian method". It turns out that Bacon, far from being a believer in the possibility of pure objectivism taken almost to caricature, is (as a matter of fact) the one who memorably warned us about "the mental and social impediments that lie too deeply and

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[3] See for instance Boyd (2009), Dutton (2009), or such initiatives as *The Evolutionary Review* and the website *Tercera cultura.*

ineradicably within us to warrant any ideal of pure objectivism in human psychology or scholarship" (Gould 2003: 109-10)—these are the celebrated Baconian "idols", the prejudices, tendencies or traditions which distort and condition our knowledge. Besides the "idols of the cave" (the propensities and limitations of every individual) there are the "idols of the tribe"—the ways in which we tend to distort issues because of the very nature of the human mind, something that is related by Gould to the way in which the human mind has evolved structurally:

> Among those tribal idols of human nature itself, we must prominently include both our legendary difficulty in acknowledging, or even conceiving, the concept of probability and also the motivating theme of this book: our lamentable tendency to taxonomize complex situations as dichotomies of conflicting opposites. (Gould 2003: 111-12)

As regards these prominent idols of the tribe we will presently go back to one which is central to the topic of this paper: our proclivity to *hindsight bias,* or the retroactive cooking of evidence on which to base interpretations and narratives. But one must not forget other apposite idols distinguised by Bacon: the "idols of the marketplace", problems with communication, definitions, meaning, and linguistic ambiguities; or the "idols of the theatre", resulting from the confrontations of philosophical systems, schools and different traditions of thought, ranging from the sectarian to the disciplinary—all of which idols are highly relevant to the issues we are discussing here.

Gould devotes a highly enjoyable section of *The Hedgehog, the Fox, and the Magister's Pox* to the study of the development of tree diagrams in treatises or handbooks, observing the temptation posed here by dichotomies and polar oppositions.

Many idols or their equivalents are currently known in psychology or philosophy as *cognitive biases*. One may go to the Wikipedia for the long list, but I want to place special emphasis on the issue of retrospective or retroactive distortion, the *hindsight bias* which results from our experiencing and interpreting phenomena as a temporal sequence, reworked and reelaborated by memory and attention. Our understanding of phenomena is conditioned by the temporality of experience and by our narrative propensity for interpreting phenomena as a sequence of causes and effects.

The adaptive function of this propensity, in terms of practical cognitive advantage, is apparent from an evolutionary stance: hindsight generates insight—processes and events are better understood when seen from the vantage point of their conclusions or consequences; closure and endings provide a superior perspective, and thus, *hindsight is topsight.* But it can readily be appreciated that our hindsight bias may result in undue simplifications of complex processes, ascribing them to one cause where there is an undecidable overdetermination or a complex vectoring of causes.

Gould is well aware of the notion of hindsight bias, which has played a major role in many of his essays, notably as the central argument of his book *Wonderful Life.* Here he refers us to a classic on this notion in the field of historiography, Herbert Butterfield's *The Whig Interpretation of History*—although it must be noted that neither Butterfield nor Gould use the precise term 'hindsight bias'.[4]

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[4] Nor do Gary Saul Morson and Michael André Bernstein in their 1994 companion volumes, which provide some of the finest reflections on retroactive foreshadowings, and the reverse readings of foregone conclusions, in the field of literary history. The term has been most popular in psychology, in the social sciences and in narrative medicine. See the special issue of *Memory* (2003).

The Whig historians, Butterfield showed, interpreted past events and institutions according to their party's present-day criteria and priorities, conceiving all of past history moving towards a culmination (unknown to those involved)—a culmination consisting in the Whig political perspective. I suspect that we are all Whiggish to some extent, Tories included, and that hindsight bias on the past in inescapable.[5] And there is much Whiggism in science's notions about itself, as described by Gould—scientists often ignore the way the practices of the founding fathers of their disciplines were implicated with contemporary ideas (e.g. Newton's theology and alchemy) and retroactively select only the "usable" parts of their work, thus promoting a misleading image of Science as a realm of pure truth, objectivity, rationality and lucidity comparable to our present ones, in contrast to the ignorance and social prejudices of other disciplines. The picture is completely false, of course, because the scientific disciplines have a complicated history just like any other discipline of knowledge.

Actually, in order to further clarify Darwin's notion on the utility of theories, we must conceive of science not as an objective description of the world, but as a useful dialogue about the world—an approach to phenomena which allows their effective manipulation for practical purposes, or the continuation of the dialogue itself on an improved, intelligible basis.

> Scientists will not make their appropriate and harmonious peace with colleagues in other disciplines until they recognize their own calling as a quintessentially human enterprise, laden with all the mental idiosyncrasies of the species that must do the work, yet still capable, as its own spacial feature (for every

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[5] See my collection of papers on hindsight bias in criticism, *Objects in the Rearview Mirror May Appear More Solid than They Are: Retrospective / Retroactive Narrative Dynamics in Criticism* (García Landa 2005-2009).

discipline can claim *some* interesting uniqueness) of reaching a more adequate and deeper understanding of material reality. (Gould 115)

Scientists do have some virtues, as compared with humanistic scholars, according to Gould's comparative purview. One is that they tend to give their presentations in the form of oral explanations, instead of reading out texts prepared beforehand. People in the humanities are, paradoxically, comparatively unaware of the deadening effect that written language has on the audience's attention and comprehension when it is delivered as a speech.

But the humanistic disciplines may be envied for their use of *narrative explanations* as a conceptual instrument to understand complex situations, and Gould gladly borrows it for his own scientific discipline. The "hard" sciences deal with abstractions and generalities, not with specific, individual cases,

Yet a large range of factual subjects, evidently part of science and duly explainable (in principle) by empirical methods operating under natural laws, treats different kinds of inordinately complex and historically contingent systems—the history of continents and landforms, or the pattern of life's phylogeny, for example—as not deducible, or predictable at all, from natural laws tested and applied in laboratory experiments, but crucially dependent upon the unique character of antecedent historical states in a narrative sequence fully subject to explanation after the fact, but unpredictable beforehand. Narrative explanations of this kind could have been developed within the sciences, but were underplayed or ignored in these realms because the particular history of disciplinary specialization in Western universities allocated this way of knowing primarily to historians in departments of the humanities. (137)

The humanities, Gould argues, have something to teach to the sciences above all in three types of questions: 1) In their awareness of the influence of social conditions and of cognitive distortions on the disciplines of knowledge, including the most empirical ones; 2) In their awareness of the importance of rhetorical, stylistic and argumentative organization when it comes to the exposition and establishment of knowledge; 3) In its use of modes of knowledge and explanation (such as narrative explanations) which are apt to deal with complex historical phenomena.

The strong point of Gould's book (especially as regards the aims of this paper) is to be found in the final section, with his critique of E. O. Wilson's programme regarding the type of reconciliation, integration or consilience which should take place between the sciences and the humanities. Both scientists share the conviction that "the greatest enterprise of the mind has always been and always will be the attempted linkage of the sciences and humanities" (Wilson 1998: 3). As noted by Wilson, the roots of this project hark back to the very origin of philosophy, in the work of Thales of Miletus. Gerald Holton used to call this dream of reaching the unity of the sciences the "Ionian Enchantment"—based on the notion that the world is an ordered cosmos which therefore can be explained with a small number of natural laws. In modern science, this view was perhaps best expressed by Pierre-Simon de Laplace, who, around 1800, worked on the consilience of mathematics, physics, astronomy and cosmology, following Newton's footsteps.[6]—and left God aside as a useless hypothesis, scientifically speaking. In Laplace's view, the system of nature is coherent in itself and its many aspects ultimately derive from a few fundamental laws.

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[6] "The simplicity of nature is not to be measured by that of our conceptions. Infinitely varied in its effects, nature is simple only in its causes, and its economy consists in producing a great number of phenomena, often very complicated, by means of a small number of general laws"— Laplace (1994), book 1, chap. 14., quoted in http://www.todayinsci.com/L/Laplace_Pierre/LaplacePierre-Quotations.htm

One possible way of posing the problem is conceiving of the world's phenomena as manifestations of *complexity* which must be *reduced* to simpler and better understood elements. The aim of *reductionism* as a program for a coordination of the sciences would therefore be

> to fold the laws an principles of each level of organization into those at more general, hence more fundamental levels. Its strong form is total consilience, which holds that nature is organized by simple universal laws of physics to which all other laws and principles can eventually be reduced.[7]

A problem is apparent once the matter is put this way. Would it be a question of conceiving a reduction in abstract, theoretical terms, or an effectively calculable, computable one? To put it in Gell-Mann's terms, could we provide a description of the jaguar not as a jaguar but as a mass of quarks? It appears that there some unbridgeable problems between the ideally conceived reductions and those which can be effectively carried out—not merely a matter of the number and complexity of calculations, but also problems relative to the very notion of the sense of descriptions and explanations within disciplines of knowledge. A quark is a matter of fundamental physics, a jaguar or a Jaguar are not, although (in a limited sense) they are built out of quarks. Complexity spreads as a butterfly effect which turns the detailed calculus of reality into an unapproachable problem.[8]

The term *consilience* was adopted by Wilson as a title for his book and program, drawn from the 19th-century philosopher of science William Whewell. What Gould

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[7] Wilson 1998, quoted in Gould 2003: 192. On this reductionist project I wrote with reference to quantum theory (2006b) and with reference to Herbert Spencer's cosmology (2009d).

[8] Spencer (back to the Victorians yet again) is also the remote father of the butterfly effect in order to account for complexity. See my (2009e) note.

criticizes, in essence, is that Wilson alters the meaning in the process—*Wilson's consilience* is not the same as *Whewell's consilience,* and as far as Gould is concerned, Wilson's notion of consilience provides a misinterpretation, or an erroneous model for the ideal relationships between the disciplines of knowledge, and more specifically between the sciences and the humanities. Wilson's programme is associated to what is recently being referred to as *third culture,* an active and fruitful research paradigm at the inteface of the sciences and he humanities which includes as prominent elements (as bridges drawn between the sciences and the humanities) evolutionary psychology, human sociobiology, and cognitive neuroscience. This program is, like Wilson's program in *Consilience,* somewhat scientistic, and insufficiently attentive (Gould argues) to the specificity of the humanities. That is, it attempts a literal "reduction" of the objects of study of the humanities to a scientific perspective, rather than effecting a real reconciliation or cooperation between the sciences and the humanities, one which is attentive to the specificities of each discipline of knowledge.

This objection—reductionism—has often been raised against Wilson and the proponents of consilience—the new scientistic paradigm in the humanities running through evolutionary biology, neurocognitive poetics, behavioral genetics, and ecocriticism.[9] During the recent Consilience Conference (St Louis, April 2012) Massimo Pigliucci has also taken issue with E. O. Wilson's notion of consilience. From the point of view of logical analysis, he argues, consilience is a kind of inferential reasoning, amounting to an "inference of the best explanation" for a phenomenon—a "consilience of inferences" so that (for instance) different kinds of evidence for a murder seem all to point to a culprit. This is close to Whewell's sense, not E. O.

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[9] Wilson singles out these influential disciplines as the main strands of a consilient paradigm allowing to conceptualize a "new synergism" the sciences and the human in his 2008 lecture.

Wilson's sense, of the word. Pigliucci, like Gould, criticizes Wilson's notion arguing that this kind of consilience would result in a reduction(ism) of humanities to biology. It is certainly the case that the disciplines should figure out what things they have in common, and talk more, Pigliucci argues, and see how they are bounded by one another. It is important that answers from different disciplines of knowledge do not contradict each other, that they are compatible with each other—but they are nonetheless different kinds of inquiry into phenomena, with not much ground in common. As regards the current debate on evolutionary theory, there is also the danger of cultural sociobiology may distort the concept of evolution in order to make all cultural developments fit into it. Cultural evolution, as Pigliucci sees it, is a process that is to some extent decoupled from biological evolution. And it is *congruence,* as different from Wilson's consilience, that should be our aim in the "foreign policy" of the disciplines: e.g. the understanding of culture cannot contradict our understanding of biological evolution, just as biology doesn't contradict the second principle of thermodynamics. But the more general phenomenon, Pigliucci argues, does not tell you much about the more specific one. Wilson's consilience harks back to an outdated notion, associated to the metaphor of the "edifice of knowledge" —while the different disciplines constitute, rather than a building, a "web of knowledge" as proposed by W. V. O. Quine. In a web there are many interconnecting threads, some are farther away from the others, or less central, some are very well connected. The relation of disciplines is a web of knowledge, not a foundational structure.

　　　Like Pigliucci, and like Gell-Mann (2001) before him, Gould points out that the classical project of reductionism cannot be carried out— in his view, because it it ignores two crucial aspects of natural phenomena: *emergence* and *contingency.*

- Emergence was theorized among others by George Herbert Mead in *The Philosophy of the Present.*[10] Gould defines it as "the entry of novel explanatory rules in complex systems, laws arising from 'nonlinear' or 'nonadditive' interactions among constituent parts that therefore, in principle, cannot be discovered from the properties of parts considered separately" (2003: 202).

- *Contingency* is, in Gould's definition, "the growing importance [in complex systems] of unique historical 'accidents' that cannot, in principle, be predicted, but that remain fully accessible to factual explanation after their occurrence" (2003: 202). A theory of retrospection (and of the retrospective status of explanations) would therefore seem to be an essential piece in the conceptual toolkit of the sciences. We enter thereby questions of methodology, of metamethodology, and of reflexivity which would not be much to the taste of a reductionist—questions which can only be asked within the scope of a study of the history of the sciences… which takes us deep into the realm of the humanities.

The origin of our own species is, Gould notes, one of these unique, non-repeatable historical contingencies, resulting from natural laws but not deducible from them.[11]

The problems resulting from emergence and contingency are not adequately conceptualized within Wilson's conception of consilience. As a matter of fact, Gould takes it upon himself to reexamine the original notion of consilence, as formulated by William Whewell in the nineteenth century, in order to show that Wilson uses the term

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[10] See my annotated Spanish translation of *The Philosophy of the Present* (Mead 2006-2009).

[11] One case in point is the origin of language. See Bickerton's *Adam's Tongue* (2009) and my review and commentary (2010).

otherwise, in a way which clearly contradicts the assumptions and conclusions of the scientist who coined the term.

Whewell, Gould reminds us, was not only a prominent scientist in the early nineteenth century, but also a major philosopher of science whose ideas were highly influential on Darwin's conceptions.[12] We owe to him, among other things, the name of *scientist,* given that he was the first to refer to men of science as *scientists.* Or, to be more precise, *women* of science, as in his first usage of the term *scientist,* in 1834, he was referring to a female scientist, Mary Somerville. Whewell was also an influential historian of science and a methodologist—and it is in this capacity that he spoke of *consilience,* although the term did not catch on at the time and was largely forgotten until E. O. Wilson resurrected it at the end of the 20th century, with a rather different sense.[13]

Whewell wanted to understand and analyze the process of induction, or the passage from repeated observations to a general conclusion—the key to the scientific method and the defining activity of modern science, as he saw it—rather than the stronger emphases placed by pre-modern natural philosophers on deduction or on the

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[12] There were others as well, of course. Among Darwin's influences, John Herschel is particularly relevant as a theorist of the scientific method, and of the role of induction. His *Preliminary discourse on the study of natural philosophy* (1831) "set out methods of scientific investigation with an orderly relationship between observation and theorising. He described nature as being governed by laws which were difficult to discern or to state mathematically, and the highest aim of natural philosophy was understanding these laws through inductive reasoning, finding a single unifying explanation for a phenomenon. This became an authoritative statement with wide influence on science, particularly at the University of Cambridge where it inspired the student Charles Darwin with 'a burning zeal' to contribute to this work." *Wikipedia,* "John Herschel", http://en.wikipedia.org/wiki/John_Herschel

[13] Actually, Gould himself had drawn attention to Whewell's term in two papers in 1986, which explains in part his reaction to Wilson's 'reappropriation' of the term (Gould 2003: 203).

logical inference of the probable order of nature derived from more general principles, which only later, perhaps, may be tested empirically (Gould 2003: 207).

Whewell's definition of consilience appears in *The Philosophy of the Inductive Sciences, Founded upon Their History* (1840). It refers not to the usual notion of induction—"a colligation of facts," that is, a repetition of the same phenomenon which allows the formulation of a law capable of predicting a new occurrence—but rather to different observations of apparently disparate facts, different in nature, not repeated, but suggesting nonetheless an underlying coherence.

Consilience, understood in Whewell's sense, would consist in finding an explanation which manages to cover, in the simplest, most elegant and economic way, all these seemingly different phenomena. The hidden unity of the diverse phenomena is not perceived until the *consilient* explanation at once explains them and shows the way they answer to a common underlying principle. Whewell's full name for this mode of knowledge was *a consilience of inductions:*

> XIV. The Consilience of Inductions takes place when an Induction, obtained from one class of facts, coincides with an Induction, obtained from another different class. This Consilience is a test of the truth of the Theory in which it occurs. (Whewell, 1840: xxxix).

In a footnote (2003: 258), Gould recognizes that his own notion of consilience is somewhat different from Whewell's, too, in the sense that it emphasizes some additional aspects of the phemomenon, although (unlike Wilson) he preserves the idea of the autonomy of the disciplines implicit in the original formulation.

I will now suggest we examine yet another facet of the phenomenon of consilience, understood as an event in a narrative series. Consilience can be seen as a

mode of scientific eventfulness, bringing about *theoretical topsight* (the most powerful theory available) together with *insightful hindsight* on the way the phenomena in question were conceived previous to the consilience of inductions. For instance, the Ptolemaic theory and the phenomena it explains is better understood (as a theory—quite apart from the our improved understanding of the solar system) once it is replaced by the Copernican one. Again, the Linnaean taxonomical system is better understood, in hindsight, once evolutionary theory completely transforms the intellectual landscape of biology. Consilience, thus, has a narrative-hermeneutic dimension, and is approachable as a concept relevant to cognitive narratology.

Put this way, it is arguable that consilience as understood by Whewell is the equivalent, in the field of the natural sciences, of that other perspectival-temporal phenomenon Borges commented in "Kafka and his precursors"—retroactive influence. This matter can be approached from an angle very much related to my favourite object of study in narrative theory, retrospection—this time focusing on the benefits of hindsight, rather than on the tails side of the phenomenon, that is, hindsight bias perceived as an obstacle to insight.[14]

As observed by Borges, Kafka exerted a retroactive influence on a number of writers, transforming them, through the very fact of his appearance, into something they were not before: precursors of Kafka. In a series of recent books, Pierre Bayard has written amusingly and incisively on some of these retroprospective and paradoxical dynamics in the humanities.[15] There is a similarity between the story of Kafka's precursors and Whewell's consilience of inductions: in both cases, preceding phenomena are reread, reinterpreted retrospectively: they are no longer isolated cases, but nodes in a structural network of relationships; they have somehow been

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[14] See my note on the watchtower of hindsight (2006a) and my (2007b) paper "Benefit of Hindsight".

[15] See e.g. his book on anticipatory plagiarism (Bayard 2009)—and my paper on the subject (2009g).

retroactively altered, at least insofar as they are cultural objects, in their relationships with our explanatory discourses (e.g. Adam Smith as a "precursor of Darwin").

Whewell admits that this cohort of coordinated facts, explained by a common interpretation, does not constitute properly speaking a *demonstration* of the theory in question—yet it must be admitted as a provisional truth, or as an interpretation which improves comprehension. (It will be seen that with this notion we are well on the way to some aspects Popper's conception of the potential falsifiability of scientific theories). Darwin's methodological notions were much influenced by Whewell, and Gould notes that "the establishment of evolution as the unifying principle behind the relationships and history of life provides the most instructive case for consilience in all of science" (2003: 211)—thanks to the theory of evolution and common descent, many facts without an apparent logical cause, and many apparently unrelated facts, suddenly acquire a coherence which provides the theory with its greatest conceivable support (—although it must be said that Whewell, ironically enough, did not support Darwin's theory!). David Deutsch (2009) compares very graphically the two kinds of explanations—scientific and nonscientific ones. Contrary to the arbitrariness of mythical explanations, scientific explanations are difficult to displace. And, among them—Whewell would argue—consiliences of inductions are difficult to replace with other scientific explanations, precisely because of the quantity of different facts they contribute to explain.

Good scientific theories, Whewell contends, simplify our system of knowledge, and harmonize apparently different phenomena under a single encompassing interpretation. It is in this sense that they are true. This notion of scientific "truth" is equivalent to the pragmatic formulations of the concept of truth formulated by William James (1909) or G. H. Mead (1929). Truth can be defined as that description or

interpretation of facts which is most consistent with what is generally known or shared—the most communicable, so to speak, the one which least requires the use of inexplicable or *ad hoc* elements for explanatory purposes. In this sense, science is a vast cognitive machinery for the generation of truths (*pace* Popper)—maybe not obvious ones for the uninitiated, but *truth-effects* which are congruent with other formulations in the relevant communicative contexts.

Whewell distinguishes the aforementioned *consilience of inductions* from this more general process of *simplification, unification and coordination of theories*. Gould argues that actually the two processes are not very clearly separated in Whewell's writings—but that be as it may, Whewell never intended that this unification of theories should encompass the humanities. Quite on the contrary, he was always careful to differentiate the realms of the humanities and of the natural sciences, and Gould argues for his part that E. O. Wilson's reductivist purview makes him ignore this aspect of Whewell's theory—together with the emergent elements in the humanities. Wilson's attitude is one of scientific supremacism, also recognizable in some contemporary debates on the present-day mission of such disciplines as cognitive neuroscience, or evolutionary psychology, which for some proponents should sweep the humanities clean of constructivist, deconstructivist, hermeneutic and formalist theories, inaugurating a new paradigm of study and research predicated on the wholesale rejection of those theories and approaches which have been dominant in the humanities during the last century (see e.g. Carroll 2009).

Gould ends his evaluation of the relationship between the sciences and the humanities with a critique of reductionism and of that supremacy of the sciences which, as presupposed by Wilson, should rule this so-called conciliation between the sciences and the humanities:

Reductionism works by breaking down complex structures and processes into component parts, and then ultimately explaining the complexity as a consequence of properties and laws regulating the parts.

Now, and obviously, just knowing the properties of each part as a separate entity (and all the laws regulating its form and action as well) won't give you a full explanation of the higher level in terms of these lower-level parts because, in constructing the higher-level item, these parts combine and interact. Thus one must also include these interactions as essential aspects of an adequate higher-level explanation. How, then, can reductionism work if interactions among lower-level parts must figure prominently in any higher-level explanation? (2003: 221)

Unpredictable interactions ("nonadditive" or "nonlinear" ones) actually govern complex systems, as Gould and many other scientists see it, "thereby precluding reductionistic explanation in principle" (2003: 222). These properties of complex systems which appear only at the upper level of interaction are what we referred to as emergent properties, intractable from a reductionist standpoint. Individuality is one such property. Inanimate objects are just as historically individual as human beings, but usually we are not interested in them at that leve, but only as regards their general properties. Unique, *contingent* historical events (such as the appearance of our species) have a central importance in many disciplines, and cannot be dealt with adequately without addressing their contingent, unpredictable nature, which is intractable for reductionism.

Reductionism, Gould argues, would eventually lead to a conception of human intelligence not as a contingent phenomenon, but as the predictable result of a tendency. It must be said that this insistence of Gould's on the contingent and unpredictable nature of evolutionary phenomena earns him many skeptical comments among the proponents

of the new evolutionary psychology along Wilson's lines, such as Brian Boyd (2009), who are in favour of exploring the farthest reach of reductionism.

> This mistaken view of ourselves as the predictable outcome of a tendency rather than as a contingent entity, leads us badly astray in many ways far too numerous to mention. But, in the context of this book's brief for the best way to link science with the humanities, our status as a contingent entity holds special salience as a strong argument against Wilson's favoured solution of conjunction by reductive consilience. (Gould 2003: 226)

Gould criticizes our anthropocentric tendencies, it may be argued, as being based on hindsight bias. Still, the narrativist argument cuts both ways—hindsight results in both bias and insightfulness. On the issue of whether we are purely contingent, Gould's reasoning may be turned on its head arguing that if there was not an intrinsic tendency towards humanity that made us human, now that tendency is easily detectable… looking backward. The historically contingent is both what might have never happened in principle, and what is now inevitably inscribed as historical necessity, as what actually did happen: as Democritus said, "Everything existing in the universe is the fruit of chance and necessity".[16]

According to the defenders of the new cognitive-evolutionary paradigm, if the phenomena studied by the humanities are in the last analysis the product of generalizable natural tendencies (in human sociality, in cognitive modes, etc.), they should be tractable by the sciences, even if they are unique phenomena appearing in one single instance, or one single species. It is here that we meet once again the problem of

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[16] Gould (2003: 306) quotes Democritus' phrase, an epigraph to Monod's *Chance and necessity* (1971).

the specifically human, and to what extent it is that specific.[17] An interesting lecture by Robert Sapolsky, on "The Uniqueness of Humans" (2009), strikes a nice balance between an attention to the unique peculiarities of human behaviour and their basis on the behaviour of other primates, or other animals. So I would argue we need both things: we need, on the one hand, reductivist evolutionary theory, going as far as it can lead, but always without losing sight of this complexity of the human; and on the other hand, we need the in-depth study of phenomena in their own context, in the humanistic disciplines, which are themselves sites where complexity is generated—but with an awareness of the global panorama of the formation and evolution of human culture and cultural objects, and of their ecological and sociobiological basis, so as to keep our feet on the ground. For Gould, the deeper we go into the specifically human, into the historical and contingent, we shall depend all the more on narrative explanations, and reductionist explanations will become less and less relevant. The issues and subjects traditionally treated in the humanities, Gould argues, are not tractable in this new key. And he is arguably right: for all the contributions of the evolutionary and neurocognitive paradigms, these paradigms will not displace every object and context of discussion in the humanities—although they will of course transform them; they are already transforming in a substantial way the relationship between the sciences and the humanities. It is foreseeable, too, that in the course this reorganization of the disciplines of humanistic studies, many of the questions and problems traditionally addressed by the humanities will be solved not through consensus or reduction or integration but rather the way they have always been, through abandonment, neglect or cultural marginalization.

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[17] See my note on the specifically human for a discussion (2009b).

Actually, it is only natural that a degree of consilience should be obtained between Gould's position and that of the cognitivist-evolutionists. As Gould makes clear, he accepts "that factual information in scientific form will be extremely helpful and relevant to the discussion of almost any important question in nonscientific subjects of the humanities, ethics, and religion (2003: 235)—and those who refuse out of hand to recognize that relevance must be pedants or fools. Now, Gould does not step back from the battle against simplistic reductionism, or a more dangerous rival, *apparently unsimplistic* reductionism, whenever it rears its head, trying to level down complex structures or situations into simple (or simplistic) component parts. This is for instance a tendency which is often recognizable in evolutionary psychology after *The Naked Ape*—unevolved evolutionary psychology, so to speak,[18] unevolved insofar as it tries to explain the behaviour of human beings as basically that of prehuman primates, or australopithecines in the savanna, or at any rate *Homini erecti* living in a cultureless environment of hunter-gatherers. This line of reasoning is actually, when pursued single-mindedly, *alien to evolutionism,* since it is a basic principle in evolutionism that the origin of a phenomenon should not be confused with, and does not determine, its present use or functioning. Which is due, in part, to a principle dear to Gould, *exaptation,* or the displacement of functions in the organs of living beings, or in social behaviours and institutions, as a consequence of their intrinsic multifunctionality in a complex environment.[19] New wine in old bottles, so to speak, is the rule; and there is much that is new in human beings, even though many of the basic materials, as argued by Morris or Sapolsky, are also present in the makeup of other primates.

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[18] Morris (1969); see García Landa (2009g).

[19] Further reflections on this in my note on exaptation (2005).

The theorization of this displacement of psychological tendencies and institutional functions is attributed by Gould to the Nietzsche of *The Genealogy of Morals:* starting form a competitive instict for dominance, and the exercise of the "will to power", phenomena such as punishment acquire a number of social functions and utilities: the control of crime, of economic transactions, etc. The *origin* of a social or psychological phenomenon must not mistaken for its *present-day use*. Likewise, sociobiological or "paleolithic" theories about the origin of art and literature should not restrict our analysis of the present-day uses, forms and funcions of art and literature, or subordinate them to that paleolithic explanatory context. Or again, moral dilemmas are often better understood once we understand their evolutionary origins, but they cannot be *reduced* to those origins—it is not to be expected that a scientific study of the ethology of humans as primates will give us the clue to a scientific morality, because properly human behaviour includes the whole complexity of the institutions and disciplines of knowledge developed by human cultures. Evolutionism, then, yes, by all means—but not half the way.

Gould nears his position to Whewell's in arguing that consilience must arise as an inspiration or an illumination which makes us see the coherence underpinning a number of phenomena previously unconnected in our mind. It does not consist in subordinating some phenomena to others (for instance, of the humanities to the sciences), but in reinterpreting their relationships in a way which far from reducing them to one another, reaches a higher-level explanation

> The sciences and the humanities have everything to gain (and nothing to lose) from a consilience that respects the rich, inevitable, and worthy differences, but that also seeks to define the broader properties shared by any creative intellectual activity, but so discouraged and so often forced into invisibility by

our senseless (or at least highly contingent) parsing of academic disciplines. (Gould 2003: 258)

As an interdisciplinary (and consilient) conclusion, let me insist on the central notion informing this reading of Gould's reasoning and book. There is a narrative structuring inherent in the progress of knowledge, a structuring which manifests itself in different ways, one might say through different "narrative genres" in scientific discourses and activities: in the development of an experiment controlled to test a theory, in the observation of repeated phenomena which lead to an inductive reasoning, or in the succession of explanatory paradigms which make us realize that a scientific revolution (Kuhn 1970) has taken place.

This narrative structuring assumes yet another form, which has an element of intrigue, of suspense, of detection—somewhat of the formulation of a plot or congruent structuring of events (and here I refer back to Paul Ricœur's observations in *Time and Narrative* on the Aristotelian conception of plot, narrative emplotment, as a cognitive instrument). There is to it, even, somewhat of an ephiphany—akin to those aesthetic illuminations which, in some Modernist writers such as Joyce or Woolf, suddenly make the world appear more congruent, more aesthetically unified, and unveil a different face of reality. I am referring, of course, to the phenomenon or experience of *consilience* in Whewell's sense—or is it Gould's—the unification of several previously unconnected phenomena under the interpretive framework of a theory which helps explain them, gives them a new sense and generates an effect of understanding.

Heraclitus, according to Aristotle, argued that a wonderful harmony arises from joining together the seemingly unconnected: concordance arising out of discordance. "An unapparent connexion is stronger than an apparent one" (fr. 210 in Kirk and Raven

1957). These statements are uncannily reminiscent of a reflection of Einstein's quoted by E. O. Wilson (1997: "It is a wonderful feeling to recognize the unity of a complex of phenomena that to direct observation appear to be quite separate things" (from a letter to Marcel Grossman). There is an element of eventfulness here, and of retrospection: the unveiling of the way things are transforms the earlier mindscape as seen in hindsight. "The real constitution of things is accustomed to hide itself" (Heraclitus, fr. 211 in Kirk and Raven 1957). Thence the value of *aletheia,* unveiling, as a cognitive activity.

Samuel Johnson, for his part, developed a cognitive theory of wit, of the verbal and ideational creativity of poets: "wit … may be more rigorously and philosophically considered as a kind of discordia concors; a combination of dissimilar images, or discovery of occult resemblances in things apparently unlike".[20] There is a potential consilience underpinning these notions, the consilience offered by narrative understanding. Apparently unrelated things are reconceptualized, and thereby transformed retroactively as cognitive objects; the retrospective action of consilience transforms them into what they had always been without our knowing, and creates a narrative of their coming together and coming to light. *Consilience and retrospection—* witness here two consilient phenomena, joined by a kinship which has remained neglected, but that their family resemblance invites us to establish and investigage. They will be transformed in the process.

A consilience of inductions is a cognitive-scientific phenomenon which is at once narrative, eventful—the kind of story which can be told only *once the contingent event which is being narrated has taken place*—and it is also a question of pure hermeneutics, an instance of the hermeneutic circle of understanding which is also

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[20] On Heraclitus, Johnson, et al., see García Landa (2011b).

applicable to the reading of a foreign text, or to the search for coherence in an author's body of work.[21] The process takes place, therefore, on the meeting ground of cognition and narration; it is a competence of both the sciences and the humanities. And the role played in the process of consilience by retrospection, and by the narrative reorganization of the past and of reality, is a neglected aspect of the theory of knowledge—an exemplary case of that *disciplinary invisibility* criticised by Gould. He was one of the thinkers who have thrown most insight on the fundamental role played by narrative structures in science—one additional reason to keep on missing him.

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[21] See the classical formulation of the notion of the hermeneutic circle in Schleiermacher's *Hermeneutics* (1986).

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