Karl Eibl

The Induction Instinct: The Evolution and Poetic Application of a Cognitive Tool

Literary theory arguing on the basis of biology and evolutionary theory has always been considered an outsider position. In recent years, a group of outsiders calling themselves "Literary Darwinists" has appeared before the Anglophone public, promising to elevate the humanities to the level of science. For innovations to gain a hearing in a media society, one has to make some noise—although this means courting refutations, for instance that the results by no means live up to the proclamations made. If one is willing to give Literary Darwinism a chance, two particular tendencies of its proponents should be critically addressed. The first one entails a fixation on content,[1] especially on the behavior of characters that ostensibly corresponds to Pleistocene conditions. In this way, literature quickly is reduced to a (little reliable) compilation of socio-biological examples (compare Eibl and Mellmann). Second, often authors fail to distinguish clearly between primary ("ultimate") adaptive functions of protoliterary phenomena and the functional diversity of those adaptations which have emerged under ever changing cultural conditions and now work "proximately." For the time being, Literary Darwinism is still missing out on two areas of investigation: the emotional impact of literature and the media[2] and the cognitive "schemata," "gestalts," "Anschauungsformen" (Kant's "forms of perception"), "categories," and so on, by which evolution has shaped our world perception and construction, and which are also responsible for the perception and construction of literary fictional worlds, of literary "forms" in the broadest sense. In the present paper I will focus on this second area of adaptive predisposition. It includes fundamental cognitive tools of environmental orientation such as causality, teleology, logic, and basic mental patterns ("gestalts"), and patterns of behavior such as reunion (compare Eibl, "Epische") and detection, or such tools as face recognition, recognition of emotional demonstrations, many types of anxieties, and so forth.[3] From this capacious adaptive toolbox (Gigerenzer and Selten; Gigerenzer and Todd) I will single out a particularly effective cognitive operation, which in the history of philosophy has been termed "induction."

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1. Induction as an Evolved Cognitive Operation

The epistemic procedure of induction is already described in Aristotle, but it was Francis Bacon who pioneered modern empirical science (or the self-image of many scientists) by proclaiming that induction was the only certain way to truth. The idea that knowledge is gained in a step-by-step ascent from the observation of particulars to concepts and principles of ever higher general validity is still the way most people conceive of empirical science. But from the strictly logical point of view, deriving a general rule from a particular observation or even from many particular observations is a pretty sloppy, and in fact, an impossible operation. In any case, this was what David Hume thought, thereby rocking the foundations of traditional European philosophy. Wolfgang Stegmüller, with reference to Hume, puts the problem in a nutshell: "Either an inference is correct, in which case it conserves truth but it is not ampliative. Or it is ampliative, in which case we have no guarantee that the conclusion is true, even if all of the premises are correct" (*Problem* 5).[4] In other words: Correct logic confers the truth of its premises upon the conclusion, but there is no increase in knowledge. Such a growth of information can only be gained by sacrificing logical necessity. For instance, from my own experience and the experience of others I can say that metal is harder than wood. But this inference would be correct only if our experience embraces all of the metal and wood in the universe. And even then the problem would remain that our observations have taken place in the past and are only valid for the future if we were to act on the hypothesis of a continuous uniformity of the world. Nevertheless, usually we will be fairly happy with such a generalization. We can go by it until we discover that, for example, pockwood is harder than lead, and see the need for a slight correction, of the kind of: "Most metals are harder than most woods." This statement is truer than the first one, but it contains next to no hard information anymore and is thus unfit for application.

According to a modern philosopher, induction is "the glory of sciences and the scandal of philosophy" (as cited by Stegmüller, *Problem* 1).[5] Efforts to justify induction have given rise to much intellectual activity, in particular to a number of classifications or typologies of inductive reasoning. But still no satisfactory solution has been found for the basic problem of how to justify making generalizations about the unobserved based on what has been observed. Perhaps no such justification is needed. As a kind of compromise, philosophers have suggested a distinction between the context of discovery and the context of justification (Reichenbach) or

between the psychology of scientific discovery and the logic of scientific discovery (Popper). This distinction frees the context of discovery from the stern rule of philosophy and enables it to be dealt with empirically.[6] Induction can thus not be *justified* by means of philosophy, but it can be *explained* by means of an evolutionary psychology of scientific discovery. Inductive reasoning simply is successful. Its compatibility with the rules of logic is secondary. We don't expect our sex drive or our legs to be logical. They are successful results of evolution. As Hume said, the generalization of experience may be philosophically unjustified, but it is firmly anchored in human nature and so successful that "none but a fool or a madman" would do without (116). Even if ampliative inferences are logically unsatisfactory, they are indispensable in real life.

Induction, we can say, is an *instinct*, a cognitive adaptation whose origins extend far back into protohuman stages of development. Hume himself noted that "even brute beasts improve by experience, and learn the qualities of natural objects, by observing the effects which result from them" (118).[7] Bertrand Russell also recognized this, at the same time pointing out a fundamental problem in all processes of induction:

> A horse which has been often driven along a certain road resists the attempt to drive him in a different direction. Domestic animals expect food when they see the person who feeds them. We know that all these rather crude expectations of uniformity are liable to be misleading. The man who has fed the chicken every day throughout its life at last wrings its neck instead, showing that more refined views as to the uniformity of nature would have been useful to the chicken. (56)

Similarly, Pavlov's dog's mouth began to water when the feeding bell rang. For behaviorists this was an exemplar of conditioning. But if we use a cognitive framework of explanation, the dog's expectations of regularity—"whenever the bell rings, I will be fed"—becomes a prime example of inductive generalization. In the lives of all animate beings, it was highly useful to be able to classify edibles (as well as potential mates and threats to safety) in terms of if-then conditions.[8]

Induction is a central element in the adaptive toolbox which we owe to evolution, that arsenal of mental operations which enabled us to exist and reproduce under the pressure of limited time, knowledge, and resources. The efforts of statisticians to arrive at "significant" differences notwithstanding, it is possible only in rather abstract contexts to use degree of

truthfulness as an absolute measurement of probability. It is more important to ascertain the relation between the prognosticated probability and cost/benefit of an incident. In special cases, a single observation may suffice; for example, when I observe that my neighbor is being eaten by a leopard: the number of observations needed for an inductive generalization depends crucially on the acuteness of the situation's cost/benefit potential. Wolfgang Stegmüller points to Rudolf Carnap's dictum that induction is an operation which facilitates "decisions in risk situations." It is the basis for making a "rational bet" ("R. Carnap" 79). Stegmüller and Carnap—both were "inductivists"—did not have recourse to the theory of evolution for the explanation of this usefulness, but their thinking nowhere contradicts the evolutionary explanation: seen in the light of human evolution as a whole, our induction instinct is the result of a natural selection of (statistically) successful methods of risk management in the face of down-to-earth life problems.

2. Inductive Series

The application of the induction instinct primarily runs on identifying uniformities in observed objects and phenomena and from that deriving a prognosis which then guides action. If we assume that human beings obtain pleasure rewards for executing adaptations in the organizational mode—that is, without such executions having an immediate effect—then this activity must also be pleasurable in instances without apparent benefit (Tooby and Cosmides, "Does"). Developmental psychology tells us—if we have not observed this ourselves—that children's play is characterized by repetition. "Repetition is surely based on a biological principle, as only repetition can cement the lessons of experience.... Repetition is fun, i.e., it is reinforced by the motivation system" (Oerter 15). Likewise, the discovery and confirmation of uniformity continues to be of central importance when the individual has matured.

Our attention to repetition can be employed for any number of purposes. The rhetoricians of old assembled an imposing array of repetition devices for their orations. The dictionary lists "alliteration," "anadiplosis," "anaphora," and "assonance" under "A" alone. Jurij M. Lotman recognized the importance of repetition in literary texts and classified the various levels of such repetition. Lotman's first category comprises repetition on the phonological level, such as repetitions of sounds in rhyme and alliteration. He shows how such repetition creates an order which seems to suggest a semantic dimension to the reader or listener. But even without

such a response, repetition on this level addresses a very generalized need for uniformity, as do repetitions of stress (rhythm, meter). From here it is not far to music, which consists (almost!) exclusively of repetition, regardless of cultural origin and level of sophistication. The evolutionary origin of those repetitive patterns was presumably, among others, a means of calibrating the sensory apparatus. Repetition of the same sound sequence or recurring visual stimuli such as the stars in the sky or familiar localities satisfy the need for standards of adjustment. Rhythmic movement aids the perception of one's own body.

A new quality emerges with semantics. By means of semantics the whole world can be repeated, in a dual sense: it can be repeated in linguistic and mimetic representations, and this replication can in turn be charged with repetitions. Linguistic and mimetic repetition of the world leads to recognition and confirmation effects, the sense that "Yes, this is the way it is" (or "ought to be"), which gives pleasure by corroborating what we feel even if the message is that things are as bad as we think they are. It is true that, at least since the days of Russian formalism, deviationist aesthetics have been favored by many artists and theorists. But deviation nevertheless presupposes a norm to be deviated from and may even serve to highlight and confirm that norm. Norm violations that are quarantined within a fictive context are not only unthreatening, they are also preserved as a mental repository for critical situations in the real world. Deviations are shocking not because they violate the norm, but because they disregard the fictional quarantine, which is what makes the deviation seem to compete with the norm in the first place. The main function of art is not alienation but confirmation.

In literature there are a number of semantic and semantically pregnant kinds of repetition. We encounter, for example, refrain, *leitmotif*, isotopy, running gags, and topic/comment constructions (as in non-artistic language); and then we have text bundles like gnomic poetry or short story collections or poem cycles whose order suggests a level of meaning above that of the individual poems (compare Eibl, "Consensus"). We might add repetition of elements from other texts: everything under the heading of "intertextuality" is based on such repetition; likewise entire genres of formulaic literature, stories of love lost and found, virtue rewarded, rise and fall, and so forth, which can be extended to entire series of detective stories or daily soap operas with predictable themes and plots and even cross-textually identical characters. Here, serial art and entertainment come close to ritual, and where there is ritual, there is the ostentatious though obviously pointless repetition of symbolic elements behind which we can

suppose a meaning. In this sense we speak of the rituals of football fans as well as of religious rituals. Rituals are said to have mnemonic function, just as repetitive bardic verse makes the bard's job easier. I do not wish to quarrel with this. But in addition, repetition functions to substantiate the uniformity and comprehensibility of the world. In rites of passage, it has the function of signaling security and predictability. Even funerals only whisper *memento mori* to the few. The principal message is still reassuring: There has been change, but life goes on as ever.

There has been a change: this is a necessary correlative to the induction game. We soon tire of mere repetition. To be interesting, repetition in music requires variation, in verse a metric variation—*Tonbeugung*—or an off-rhyme or a certain flexibility with unstressed syllables; even the Catholic mass changes in the course of the ecclesiastical year. Well-dosed variation is essential if repetition is to remain effective. Ideally, repetition catches up with variation and thus confirms the anticipated uniformity of the world—just as variation shows that this uniformity is not to be taken for granted. It is variation which renders the *process* of induction, that is: the *discovery* of uniformity, perceptible in the first place—perceptible as a cognitive engagement that fills us with aesthetic pleasure.

3. Abstract Tropes

The observation of repetition is followed by an act of abstraction. Strictly speaking, there is no such thing as repetition *per se*. You can never step into the same river twice. Cyclical belief systems would have us believe in eternal return and reunion as a consolation for the transitoriness of all earthly things—entirely in the spirit of the induction principle, which posits the return of the familiar. Repetition is a construct made by the cognizing subject in a selective process of attributing relevance to what it sees. This is also why the observation of an instance of repetition is a gratifying sensation: once again one has succeeded in making sense of things!

Synecdoche, metonymy, and metaphor are examples of inductive abstraction, indeed, as Russell correctly noted, even at an animal level. Phenomena which ethologists describe as releasers and dummies can also be described in terms of the selection of relevant features, as abstractions. When a male robin becomes aggressive at the sight of red feathers, synecdochic abstraction is executed. *Pars pro toto*, the red feathers constitute a rival; this is instinctively known information.

Of course, one will make more profound use of the term induction when applying it in contexts of ontogenetic experiences. We can imagine

that, before the emergence of language as we know it, nonverbal mimetic renderings of objects, animals, and human beings stood for the person or thing as a whole—the trunk of the elephant, the mane of the lion, or the hostile expression of an enemy. Onomatopoetic imitation of birdsong, the mating call of a deer, or the whistling of the wind verges on metonymy, which is not so much a question of (a particular mode of) designation as of a condensed factual relation. Metonymy is a more or less inventive statement about the (causal) relationship between objects. Pavlov's dog, in terms of the rhetorical trope, constructs a real metonymy of sorts: "When the bell rings, I will be fed." Or, in a more condensed way: "I will get bell-ringing." Or, in (German) human language: "I'm going to have vesper" (originally an evening snack served around 7 pm, that is, with the ringing of the church bells for "Vespers," the Catholic evening service). Metonymy, we might speculate, is the prime trope of human language, expressing connections between things by using a very primitive syntax.

Language, we know, is essential to our capacity for abstract thought. Using the representational function of language, we can construct intermediate worlds (compare Eibl, *Kultur*), enabling us to conceptualize, remember, and communicate on amazing levels of sophistication. Synecdoche and metonymy do not depend on language; the relations expressed in them rest upon inherent cognitive algorithms and repeated experience and do not require verbal fixation. It is the representational function of language that makes it possible to discover relevances that are not inherent or individually learned, but are social definitions and extensions. For example, via language and culture our evolved genetic bond with blood relatives can be expanded to embrace neighbors, co-workers and colleagues, teammates and countrymen, even the utopian totality of humanity (compare Vowinckel). "Alle Menschen werden Brüder" ("Every man becomes a brother"), as Schiller's *Ode to Joy* famously puts it. Even the Mafia sees itself as a big *famiglia*, and monuments for fallen war heroes everywhere proclaim sacrifice for king and country, family, brothers and sisters in faith. Such semantic manipulation based on similarity is called metaphor.

Metaphor is not induction, but it operates on the same principle. Metaphors are incomplete inductions (or imperfect abstractions) in which we somehow refuse to take the final step towards a complete generalization. We connect different things or classes of things on the basis of a similarity without explicitly creating a generic term under which to subsume them. Instead of saying that cows and goats are artiodactyls, we say: "The hooves of cows are similar to the hooves of goats," or possibly just:

"Cows are like goats." Or even: "A cow is a goat." What are the benefits of this operation of incomplete induction? In order to preserve knowledge, complete induction or abstraction would probably prove far more effective. But incompleteness endows the operation with the flexibility needed for improvisational use. Exclusive or final emphasis of a specific similarity is not pivotal; rather, similarity initiates an even more comprehensive process of comparison. Metaphor thereby forms the basis for conjectures based on analogy. Long before the discourse of similarity was employed for rhetorical or poetic purposes, it probably facilitated a pragmatic art of *inventio* by means of inference by analogy, resulting in the growth of knowledge and propositional content: similarity with reference to a certain element indicates similarity regarding other elements as well. To be more precise: "Whatever walks on four feet and has two horns is likely to give birth to live offspring and yield milk and is edible." Or this: "A cow is a (certain kind of) goat." This is a viable formula to verify the use of cows. Barley is like wheat. Bananas are like sweet potatoes. But also: lions are like leopards. Enemies are like snakes. Or leopards. This may only be true in part, but this part is relevant to us.

There is a certain type of metaphor I'd like to call primal metaphors. These are especially interesting with respect to evolutionary psychology because they are rooted in old strata of the mind, dating back to the Pleistocene or even before, thus possessing a power of persuasion that is difficult to resist. The aforementioned example of kinship can be seen in this context. Particularly potent examples of such metaphors are based on sociomorph, technomorph and biomorph concepts, as explicated by Ernst Topitsch in his analysis of *Weltanschauungen* (world views). With regard to sociomorph themes, Topitsch elaborated on how to picture anthropologic anchoring in phylogenetic disposition. Technomorph concepts have their roots in two million years of experience in tool use. The evolution of biomorph concepts had probably begun even earlier; they were likely formed as our ancestors studied biological data and incremental and maturing cycles immediately relevant to meet their nutritional needs.

Another domain from which primal metaphors are recruited, for instance, is the metaphorical field of equilibrium. To lose your balance will put you in a dangerous situation. Accordingly, our attention is constantly and consciously busy monitoring and equilibrating the environment—cliffs, catwalks, trees—in order to keep balance or seek shelter in time. For this reason, equilibrium seems desirable even if it was to be taken literally, merely signifying stagnancy and death (Reichholf). Needless to say, attention to the differences between male and female human beings is

biologically ingrained as well, since it considerably improves reproductive success. Several complementary constellations build on this distinction, from labeling connectors "male" and "female" to yin and yang. Finally, spatial imagination should be mentioned as a resource for metaphor creation. An investigation of this cognitive ability holds a lot of promise and would certainly afford enough material for a second article.[9] Cognitive metaphor theory in general states that "mapping always takes place from a concrete, clearly structured source onto an abstract, propositionally complex target" (Müller and Ziegler 4). *Cum grano salis*, this holds true for all the potential resource areas of metaphor construction. But the above-mentioned examples of primal metaphors demonstrate that the focal range of interest is not restricted to individual and social "embodied experience" but often ought to be conceptualized as a phylogenetically evolved mental disposition, too. There is plenty of work to be done in this area. Critical talk about the "embodied mind" or findings that the universality of metaphor is "based on bodily experience and neuronal activity in the brain" are pointing in the right direction (Kövecses 34). But the method of "reverse engineering" as employed by evolutionary psychology should be added in order to deepen and substantiate the notion that certain metaphors have evolved (compare Tooby and Cosmides, "Evolutionary" 25ff).

4. Applications: Transcendental Oxymoron, Symbolic Parataxis, Concetto

I have so far mentioned several applications of the induction instinct which seem unrelated to the pragmatic context of survival in which this instinct evolved ("ultimate causation"). This aspect will now be further reinforced, because it is a distinctive feature of *homo sapiens* to skillfully lift adaptations or parts of behavioral programs out of the context in which they evolved and place them into new contexts, where they are applied to either help solve new problems emerging within a culture or just evoke intrinsic gratification, that is, lead to pleasure gain (compare Eibl, *Kultur*).

As a first detailed example of how the induction instinct serves specifically human aims of reflection and communication, I would like to discuss the *transcendental oxymoron* as a symbol of religious mystery. To explain the iconicity and function of this religious concept, Niklas Luhmann's theory of religion seems to provide a particularly suitable framework. The merit of Luhmann's concept of religion is that, on the one hand, it does not immediately expose religion as ideology, while, on the other, it does not presuppose belief. In this way, Luhmann is able to develop an

exclusively formal definition of religion's function. Within his distinction-based approach, the supernatural is a result of a distinction, too, namely the dark, unilluminated side of a distinction. The supernatural "is part of the environment of the respective system"[10]—the unknown part of this environment (Luhmann 19). What he has in mind is a "split environment" (Luhmann 20)[11]—an environment approved and defined by our tools of cognition and practice, and an invisible background of which the only thing we know is *that* it exists. In other words: we know the selective character of our world constructions. Beyond the boundary of known "immanence" there is unknown "transcendence."

It is feasible that this knowledge of the unknown is potentially highly irritating; one is constantly threatened by the "risk of disregarding something relevant" (Luhmann 24).[12] This kind of permanent stress potential is only restrained by a procedure that Luhmann has termed "simultaneous thematization of what is determined and undetermined" (Luhmann 36).[13] A kind of "boundary problem" arises: "*the simultaneity of determinateness and indeterminableness*" (Luhmann 36, italics original)[14]; this boundary problem is the key problem of religion: religious language in the way Luhmann defines it is fundamentally ambiguous.

Religion can find its form and perform its function by means of induction and metaphor. It infers from the observed and familiar to the unobserved (unoberservable) and ampliates the knowledge by "anthropomorphic" designations. In its more refined forms it also incorporates signals of inadequacy. "The Son of God"—on the one hand, this image refers to something familiar, even on an everyday basis, and on the other to the unknown supernatural. Likewise, the realm of the gods of antiquity is modelled on worldly family clans. If Jupiter had numerous legitimate and illegitimate offspring, one may grant Jehova a son issued from an affair with a worldly woman. The subtlety of this practice arises from the idea that a virgin gave birth to him and that the son is identical with the father (and the holy spirit). The outright incompatibility of celestial and mundane patriarchs establishes an inductive series which instantly annihilates itself. Goethe's reaction to the numerous portrayals of Holy Mary in Venice may demonstrate what kind of effect such paradoxes can have on a non-believing yet aesthetically susceptible mind:

> What a beautiful invention the Mother of God is, is something you don't feel until you're in the midst of Catholicism. A Vergine with the Son on her arm, who is however a *santissima* Vergine because she has brought a son into the world. It's a subject that brings your senses to such a beautiful standstill, it has a kind of inner grace like poetry that gives such pleasure and makes you so unable to think, that it really is made into a religious object. (83–84)[15]

Goethe's half-joking hint at the kinship between such notions and poetry is of course only applicable to the latter's development over the past 250 years, when the operation of alienation and the generation of unsolvable metaphors often came to be seen as a near mystic procedure, with its inconsistencies seen to express ineffability: the failure of induction is considered as an evidence of a higher truth and reality.

A specifically poetic technique developed in this context is that of *symbolic parataxis*, which, rather than performing incomplete induction or paradoxical or oxymoronic self-destroying abstractions, merely places singular facts and things side by side. Because of the simultaneous thematization that it performs, the transcendental oxymoron is always duplicitous. On the one hand, it denies the principle of induction, on the other, it can achieve a sense of reality that can even become a dogma—even to the point of resulting in wars about religious "truths." Symbolic parataxis, however, eschews this ambiguity by withdrawing inductive conclusions from communication and leaving them to the individual.

A few observations regarding Robert Musil's short story "Grigia"[16] specifically illustrate how the technique of symbolic parataxis is applied in modern prose. In this story, an engineer undertaking a scientific expedition to an exotic valley in the Alps experiences an existential crisis, which causes his world to be restructured in a new and ultimately fatal way. At the beginning of the story, town houses come into view, sitting there "like scattered cubes inanimately manifesting to every eye some strange morphological law of which they themselves knew nothing" (17).[17] Later there is a thief, who is made to believe that he will be hanged by a brutalized group of explorers. Subsequent to this episode we read:

> And it was always just the same—although this was hard to explain—when horses arrived … they would stand about on the meadow … but would always group themselves somehow, apparently at random, in a perspective, so that it looked as if it were done accordingly to some secretly agreed aesthetic principle, just like that memory of the little green, blue, and pink houses at the foot of Mount Selvot. (26)[18]

In the same paragraph a fire, a birch, and a pig tied to the tree are mentioned. "The fire, the birch, and the pig were now alone" (27).[19] Finally, the slaughtering of the pig is described and at the end of this section a

summary is presented: "All these were things Homo [the protagonist] saw for the first time in his life" (28).[20] The objects described remain empirically unconnected, but for the fictional character (as well as, somehow, for the reader) they are conceptualized as a series of observations calling for induction without allowing it to be fulfilled. The technique of paratactic sequencing relies on our inductive instinct. But it is precisely for the reason that this series does not amount to some generalized concept or rule/norm; it beckons us to either assume that there is actually some precept within the realm of the unspeakable, some universal rule existing beyond the empirical world, or even to supplement such a rule on our own.

My final example illustrating how the induction instinct is activated in the organizational mode emphasises once again its playful dimension. After all, the induction instinct is the basis of many, if not all, jokes and riddles. Everyday jokes and riddles initially set up barriers of interpretation only to offer additional information from a different context in which previous information suddenly makes sense again. It is also the basic principle underlying the cultivated literature of European early modernity, registering under the names of Petrarchism, Gongorism, Marinism, Euphuism. The so called *concetto* (*concepto*, conceit), which is typical for this kind of poetics, is essentially based on "wit," that is, on the ability to discover similarities, that is, the use of the induction instinct, for pure pleasure. An example is the sonnet-shaped dialogue between Romeo and Juliet during their first encounter. The induction instinct emerges on two levels. While within the plot it serves as the basis for the protagonists recognizing each other's intellectual equality, it also allows the audience to enjoy their own mental capacities.

ROMEO. If I profane with my unworthiest hand
This holy shrine, the gentle sin is this.
My lips, two blushing pilgrims, ready stand
To smooth that rough touch with a tender kiss.
JULIET. Good pilgrim, you do wrong your hand too much,
Which mannerly devotion shows in this.
For saints have hands that pilgrims' hands do touch,
And palm to palm is holy palmers' kiss.
ROMEO. Have not saints lips, and holy palmers too?
JULIET. Ay, pilgrim, lips that they must use in prayer.
ROMEO. O, then, dear saint, let lips do what hands do!
They pray: grant thou, lest faith turn to despair.
JULIET. Saints do not move, though grant for prayers' sake.

ROMEO. Then move not while my prayer's effect I take.
He kisses her.
Thus from my lips, by yours, my sin is purged. (52)

Aesthetic pleasure resulting from recognition is based on two requisites: first, the text must hold some resistance, preventing immediate comprehension and thus pique our curiosity; second, it should not puzzle us too much, lest the text frustrates readers who eventually might give up on it. Both conditions are fulfilled in this text.

The puzzle begins when Romeo, at the opening of the scene, voices concern that he might profane a—"this"—holy shrine. But which one? It seems that something is not spelled out clearly here. Stage directions help us by suggesting that Romeo takes Juliet's hand,[21] so that the textual gap (in the sense of Ingarden and Iser) is filled. But calling a hand a holy shrine seems a somewhat unusual thing to do—even in the context of Petrarchan *ratio*: is it a casket for relics? A tomb? A place of worship? Where is a similarity, a *tertium* to permit a metaphoric induction? Romeo now appoints his lips to take on the role of two blushing pilgrims intending to heal the coarse touch by a tender kiss. Juliet knows that it would not be seemly to accept this proposal outright, but she does not want to decline it either. She therefore responds with some reserve: she asks Romeo not to blame his hand for the respectful compliment, recognizes that saints in fact have hands, and allows the pilgrim to express his devotion palm to palm (not lips to hand or even lips to lips!). On a sub-textual level the heartfelt joining of the palms (palm to palm) might be interpreted as a synecdoche, hinting at the desire for an even more intimate bodily contact between the two. When Romeo clumsily points out that saints do not only have hands but also lips, he still sticks to the literal level, and Juliet is parrying him on the same level by saying that pilgrims' lips are meant for praying. But eventually Romeo manages to merge the touch of lips and touch of hands in one bold (and not particularly proper) induction: "let lips do what hands do! / They pray." Now Juliet is persuaded, granting Romeo the favor of a kiss while claiming to be unable to move.

This paraphrase is still not fully satisfying. Although Juliet takes on the role of the saint twice, this would be a highly presumptuous thing to do. The exact meaning of "holy shrine" has not yet been specified, and it is also peculiar that saints would not move when granting mercy. The puzzle is solved when we think of the saint not in terms of a real person, but picture him or her as an image or a statue. This is the main point (or the semantic isotopy in the sense of Greimas) of the sonnet as a whole.

The pilgrim's kiss is an inherent part of southern Catholic religious practice, in fact at some destinations of pilgrimage—for example, the bronze statue of Saint Peter at St. Peter's Basilica in Rome—you notice the traces of wear caused by countless kisses. Romeo and Juliet, two young Catholic Italians, are playing "pilgrim and holy image."[22] The similarity on which the induction is based is not Juliet's saintliness but the kiss, which Juliet tolerates "unmoved" like a picture or a statue. The pleasure concomitant to this realization is caused as an intrinsic reward of the finally successful activity of the induction instinct.

University of Munich

Notes

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[1] Pinker, even though he is not a literary historian, maps out the restrictions that need to be taken into account here.

[2] Compare Mellmann's and Schwender's illustrative studies, which Anglophone Literary Darwinists have not yet received.

[3] Tooby and Cosmides speak of "hundreds or thousands" of modules; "a face recognition module, a spatial relations module, a rigid objects mechanics module, a tool-use module, a fear module, a social-exchange module, an emotion-perception module, a kin oriented motivation module, an effort allocation and recalibration module, a child care module, a social inference module, a sexual-attraction module, a semantic-inference module, a friendship module, a grammar acquisition module, a communication-pragmatics module, a Theory of mind module, and so on" ("Psychological" 113). Any of the modules mentioned here can be viewed as a trigger for emotion or pattern of cognition in the course of text processing. Compare note 8 for difficulties concerning this theoretical position.

[4] "Entweder ist ein Schluss korrekt; dann ist er zwar wahrheitskonservierend, aber nicht gehaltserweiternd. Oder aber er ist gehaltserweiternd; dann haben wir keine Gewähr dafür, dass die Konklusion wahr ist, selbst wenn sämtliche Prämissen richtig sind" (*Problem* 5).

[5] "[D]er Siegeszug der Naturwissenschaften und die Schmach der Philosophie," as cited by Stegmüller (Problem 1). The original quote by C. D. Broad is slightly different: "May we venture to hope that when Bacon's next centenary is celebrated the great work which he set going will be completed; and that Inductive Reasoning, which has long been the glory of Science, will have ceased to be the scandal of Philosophy?" (399).

[6] However, this distinction was never fully embraced. The controversy between Popper and Kuhn in the 1970s already suffered from the fact that the two approaches—normative and empirical—got mixed up again. Compare Lakatos and Musgrave. The resistance to this distinction can, incidentally, also be explained on the grounds of evolutionary psychology: Human cognitive categories have evolved under the pressure of pragmatic problem-solving needs. It therefore requires some additional effort to refrain from relating theoretic insights to normative instruction.

[7] Hume stresses the instinctive nature of induction in humans as well: "It is an operation of the soul, when we are so situated, as unavoidable as to feel the passion of love, when we receive benefits; or hatred, when we meet with injuries. All these operations are a species of natural instincts, which no reasoning or process of the thought and understanding is able either to produce or to prevent" (59).

[8] To postulate an induction instinct is tangent to the recent controversy about the modular structure of the mental apparatus. In order to clarify the premise of my argument a few comments beforehand: Behaviorism—which has dominated psychology for nearly half a century—believed that the behavior of humans and animals could solely be explained by a single inherent ability, learning. This notion was opposed early on by ethology, namely by Konrad Lorenz and Nikolaas Tinbergen, and later on Eibl-Eibesfeldt. Since the 1990s evolutionary psychology has been stressing modular composition of our behavioral programs. A simile frequently employed to elucidate this concept is the workings of a Swiss army-knife (Cosmides and Tooby) or an adaptive toolbox (Gigerenzer): According to this approach, our cognitive apparatus consists of multiple domain-specific adaptations, which have evolved to solve a number of specific recurring problems. The modularity-hypothesis certainly holds true for "hard-wired" solutions found in simple organisms, and for human behavior that at times seems strange and "irrational" to us. But if an organism is able to learn and improvise, then one must assume that there is information exchange or transfer of problem-solving knowledge between modules, provided by new skills responsible for inter-modular organization and networking. One will have to distinguish between the formation of cognitive abilities, which can be conceptualized in terms of specific modularity, and ongoing evolution leading to multi-purpose-devices (for example, induction instinct). There are different proposals on the details of this evolution, which is beyond the scope of this paper. For further reference compare Cosmides and Tooby, "Consider," "Unraveling," and Tooby and Cosmides, "Evolutionary," a considerable upgrade of frequently quoted earlier contributions (especially Tooby and Cosmides, "Psychological"). Compare Carruthers for an introduction to the debate and the relationship of modularity concepts to the concept of an adaptive toolbox.

[9] For a more lengthy discussion see Eibl, *Kultur*.

[10] "[G]ehört zur Umwelt des jeweiligen Systems" (Luhmann 19).

[11] "Zweiteiligkeit der Umwelt" (Luhmann 20).

[12] "Risiko des Außerachtlassens" (Luhmann 24).

[13] "Simultanthematisierung von Bestimmtem und Unbestimmtem" (Luhmann 36).

[14] "*[D]as Zugleich von Bestimmtheit und Unbestimmbarkeit*" (Luhmann 36, italics in the original).

[15] "Was die Mutter Gottes für eine schöne Erfindung ist, fühlt man nicht eher als mitten im Catholicismus. Eine *Vergine* mit dem *Sohn* auf dem Arm, die eben darum *santissima* Vergine ist, weil sie einen Sohn zur Welt gebracht hat. Es ist ein Gegenstand, vor dem einem die Sinne so schön stillstehn, der eine gewiße innerliche Grazie der Dichtung hat, über den man sich so freut und bey dem man so ganz und gar nichts dencken kann; daß er recht zu einem religiosen Gegenstande gemacht ist" (111, italics in the original; Tagebuch der Italienischen Reise, 8.10.1786).

[16] Compare Eibl ("Parallelgeschichten") for more detail.

[17] "[W]ie verschieden gestellte Würfel..., ein ihnen unbekanntes, eigentümliches Formgesetz empfindungslos vor aller Welt darstellend" (235).

[18] "Ganz das gleiche geschah, obwohl das schwer zu begründen wäre, wenn Pferde eintrafen ... sie standen dann in Gruppen auf der Wiese..., aber sie gruppierten sich immer irgendwie scheinbar regellos in die Tiefe, so daß es nach einem geheim verabredeten ästhetischen Gesetz genau so aussah wie die Erinnerung an die kleinen grünen, blauen und rosa Häuser unter dem Selvot" (242).

[19] "[D]as Feuer, die Birke und das Schwein sind jetzt allein" (243).

[20] "Das alles bemerkte Homo zum erstenmal in seinem Leben" (243).

[21] They can rely on Romeo, who states 40 verses earlier: "The measure done, I'll watch her place of stand, / And, touching hers, make blessed my rude hand."

[22] The German Reclam-Edition translates "Saints do not move" as "Heilige regen nicht an" ("saints do not motivate, excite"). This seems to miss the point and is proof that the comprehension of this text is not a trivial issue. Schlegel is more adequate: "Du weißt, ein Heil'ger pflegt sich nicht zu regen."

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Ralph Müller

Interaction in Metaphor

There are two ways to approach metaphors: One emphasizes the infinite creativity of metaphor and its resistance to fixation of sense or meaning. The other one assumes that metaphor is a fairly common (and therefore fundamental) phenomenon in speech, which can be researched according to its principles of cognitive processing. Although the divide between these two approaches does not strictly follow the alleged opposition of the sciences and the humanities, we find many literary scholars among proponents of the first approach, and mostly psychologists and linguists among adherents to the latter. The first approach has much appeal for literary scholarship, as it fits very well the type of open-ended reading and the meticulous exploration of different meanings of a literary text of literary hermeneutics. However, if taken to the extreme, the unlimited creativity of interpretation may lead to awkward poststructuralist positions which proclaim and practice the impossibility of successful communication (e.g., Lacan). If you agree that, even if literary scholars typically strive for novel or most interesting readings of a text, there must also be some kind of minimal mutual consensus among philologists when interpreting a metaphor, then you might also accept that it is worthwhile to investigate the principles of cognitive processing that underlie such interpretations.

In the following essay I will review some recent theories about metaphor processing from psychology and cognitive linguistics. Although the paper is written from the perspective of literary studies, it requires my venturing into other disciplines and, hence, an acceptance of research questions which may look at first sight remote from literary studies. Nevertheless, I would like to argue that knowing how we normally process metaphors allows a better understanding of what proficient readers of literature do when they are looking for best readings of a metaphor. Cognitive Poetics has contributed significantly in this respect (see Stockwell). Evolutionary Psychology (EP) is another promising source of information that explains mechanisms that are at work when all human beings consume fiction or poetry. At the same time, EP does not propose some kind of genetic determinism, but considers the possibility that evolved cognitive mechanisms may serve different purposes under modern conditions, and that such