

Deep Congruence Between Linguistic and Biotic Growth: Evidence for Semiotic Foundations

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Abstract Language varieties undergo constant evolution, as do varieties of life. Both language and life unfold by semiosis – pervasive processes of growth in which relationships shared between the inherited past, the unstable present and the virtual future are organically intertwined. Although many recent attempts have been made to reunite biotic and linguistic evolution, contemporary treatments are mired in unexamined presuppositions inherited from twentieth century biological theory. Chief among these is the denial of implicit end-directed processes, that which biosemiotics finds to be the necessary condition of living systems – thereby providing semiotic foundations for human inquiry. After reviewing the history and problems of dialogue between linguistics and biology, I make two primary arguments in this essay, one a critique using historical evidence, the other a suggestion using empirical evidence. My critical argument is that crucial features of semiosis are missing from contemporary linguistic-biotic proposals. Entangled with these missing accounts is an analogous form of neglect, or normative blindness, apparent in both disciplines: the role of ontogeny in biological evolution and the role of diagrammatization in linguistic evolution. This linguistic-biotic analogy points to a deeper congruence with the third (and most fundamental) mode of evolution in Peirce’s scientific ontology: “habit taking” or “Agapasm”. My positive argument builds on this linguistic-biotic analogy to diagram its corollary membership in light of Peirce’s “three modes of evolution”: Chance (Tychasm), Law (Anancasm) and Habit Taking (Agapasm). The paper ends with an application involving complex correspondence patterns in the Muji language varieties of China followed by an appeal for a radically evolutionary approach to the nature of language(s) in general, an approach that not only encompasses both linguistic and biotic growth but is also process-explicit.

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Introduction

Attempts to understand linguistic and biological change have proceeded for more than two millennia via an interchange of ideas.¹ Cross-fertilization between philology and biology intensified during the eighteenth and nineteenth centuries; but, for reasons discussed below (cf. “[Biotic and Linguistic Growth](#)”), twentieth century influences discouraged this age-old dialogue. Recent studies² demonstrate that this hiatus was temporary. Just how the re-instantiation of dialogue between biology and linguistics should be framed in the twenty-first century, however, poses an open question, one that biosemiotics can help answer. Although the discussion below is focused on language in its root sense,³ the scientific study of speech behaviour can benefit from a careful review of presuppositions at this intersection as well as Stephen Cowley⁴ and others show.

Widespread disagreement on the nature, scope and applicability of biological models to linguistic (and cultural) change mark the current state of the dialogue (cf. section “[Biological Analogies Gone Wild](#)”). Some theorists promote widely divergent biological analogies for linguistic phenomena. Others suppress biological analogies in the hope of establishing more systematic domain-general approaches; but, over and beyond their differences, neither finds logical/ontological grounding. As I have argued elsewhere,⁵ an architectonic system is needed that is capable of making the nature of domain-general evolution explicit. In other words, a model that embraces semiosis is required. Biosemiotics’ grounding “on a strongly Peircean framework”⁶ fills this gap.

With these issues in mind, I make two primary arguments in this essay, one a critique using historical evidence, the other a suggestion using empirical evidence. My critical argument (cf. especially section “[Evolutionary Theory, Semiosis and Peircean Thirdness](#)”) is that crucial features of semiosis are missing from contemporary linguistic-biotic proposals, including basic accounts of the nature of process, the necessary role of future-oriented (pattern-solving) causality, and attention to modes of continuity or mediation.⁷ Entangled with these missing accounts is

¹Atkinson and Gray 2005, p. 524.

²E.g., Croft 2000 and 2008; Mufwene 2001 and 2005; Richerson and Boyd 2001 and 2005; Driem 2001 and 2008; Sterelny 2006; Mesoudi et al. 2006; Fitch 2008; Pelkey 2013.

³Cf. Sebeok 1986.

⁴E.g., Cowley 2007.

⁵Pelkey 2013.

⁶Kull et al. 2009, p. 168.

⁷I.e., “self-organizing” modes of process that mediate between inherited copying (e.g., “genotypic” analogues in language and culture) and ecological coupling (e.g., “phenotypic” analogues

an analogous form of neglect, or normative blindness, apparent in both disciplines – corresponding with the role of ontogeny in biological evolution and the role of diagrammatization in linguistic evolution. This linguistic-biotic analogy points to a deeper congruence with the third (and most fundamental) mode of evolution in Charles Sanders Peirce’s scientific ontology: “habit taking” or “Agapasm”.⁸ My positive argument (sections “[Evolutionary Theory, Semiosis and Peircean Thirddness](#)” and “[Deep Congruence](#)”) builds on this linguistic-biotic analogy to diagram its corollary membership in light of Peirce’s “three modes of evolution”⁹: Chance (Tychasm), Law (Anancasm) and Habit Taking (Agapasm). Section “[Further Evidence for Semiotic Foundations](#)” supports these claims drawing on first-hand field work data gathered from the Ngwi languages of China (Burmic < Tibeto-Burman) to reveal modes of evolution that drive both biotic and linguistic growth. In contrast to mainstream accounts of evolution, this account develops an emerging Biosemiotic mandate by insisting that any theory of evolution should be grounded in explicit discussion of the nature of process.

Biotic and Linguistic Growth

In spite of Charles Darwin’s own insistence in the *Descent of Man*¹⁰ that evolution must also apply to human behaviour, social sciences shifted away from process thinking in the twentieth century and were little changed by advances in evolutionary theory.¹¹ The reasons for this neglect are numerous and complex (cf. Section “[Challenges Facing Evolutionary Linguistics](#)” summary below). Firstly, it will be helpful to consider the interdependent development of the biological and linguistic sciences in the late classical and romantic periods of Anglo-European thought.

Historical Cross-Fertilization Between Language Sciences and Life Sciences

Although Quentin D. Atkinson and Russell D. Gray describe “two millennia of coevolution between research in biology and historical linguistics”,¹² the richest period of “mutual fencundation”¹³ between the two disciplines spanned from the

in language and culture) – in short, processes that mediate between analogy and automation in linguistics (resp. ecology and phylogeny in biology).

⁸Peirce 1890–1892 [2010, p. 194].

⁹*Ibid.*, pp. 110, 194.

¹⁰Darwin 1882.

¹¹Richerson and Boyd 2001.

¹²Atkinson and Gray 2005, p. 524.

¹³To borrow a phrase from John Deely (2007).

late eighteenth century to the late nineteenth century. During this time, the interplay between botany and philology was especially rich, but when it came to rigorous inquiry into the nature of patterned growth through space and time, philology clearly led the way from the 1780s to the 1860s. As a result, evolutionary concepts were being developed in the so-called “social” sciences long before Darwin.¹⁴ When Max Müller retorted “I was a Darwinian long before Darwin”,¹⁵ he was already aware that the biological eclipse of linguistics was beginning to obscure the linguistic eclipse of biology that stood uncontested only decades earlier. The ascendancy of the biological model over the linguistic one by the end of the nineteenth century is undeniable, but biology’s little recognized historical precedent must be emphasized in order to “change the relevance of past to present”.¹⁶

In the immediate wake of the Darwinian revolution, the philologist August Schleicher had already filed something of an intellectual property complaint, arguing that Indo-European philologists were the true discoverers of evolution.¹⁷ Even a century later, informed linguists¹⁸ attribute such foresight to the eighteenth century philologist William Jones. In the words of Müller, “[l]ong before Darwin made the theory of evolution so widely popular, that idea had completely dominated the Science of Language. To speak of Darwin as the discoverer of evolution, has always seemed to me an insult to every student of philosophy”.¹⁹ Naturally, then, “Darwinian ideas of descent with modification were less revolutionary in linguistics than they were in biology. Phylogenetic understanding and methodology in linguistics had already developed rapidly before Darwin, and this continued throughout the nineteenth century”.²⁰

History affirms that philology was “an important source of inspiration for Darwin”,²¹ and Darwin himself, among others, supports a linguistic-biotic homology in a famous passage from *The Descent of Man*: “The formation of different languages and of distinct species, and the proofs that both have been developed through a gradual process, are curiously parallel”.²² These parallels are now a mere curiosity for most linguists, however; and, even when applied to linguistic phylogeny, still tend to be treated as groundless speculation or questionable analogies on loan from biology.²³ Even some seasoned historical linguists now falsely assume the comparative method to have originated in Biology²⁴; and although variationists such as Salikoko

¹⁴ Cf. discussion in Greenberg 1957; McMahon 1994; Alter 1999; Wyhe 2005; Atkinson and Gray 2005.

¹⁵ Müller 1887, p. xi.

¹⁶ Deely 2009, p. 142.

¹⁷ Schleicher 1869 [1983, pp. 32–35].

¹⁸ Greenberg 1957, quoted in Brosnahan 1961, p. 227.

¹⁹ Müller 1887, p. xi.

²⁰ Atkinson and Gray 2005, p. 517.

²¹ Fitch 2008, p. 373.

²² Darwin 1882, p. 90.

²³ Cf. the corresponding discussion in Wyhe 2005.

²⁴ Cf., e.g., Rauch 1999, pp. 36, 45.

S. Mufwene may grant that “genetic linguistics can contribute to theories of evolution”, most assume that nineteenth century historical linguists such as Schleicher were actually taking a “biological approach”.²⁵ Recovering an evolutionary type of linguistics in the twenty-first century remains an uphill challenge.

Challenges Facing Evolutionary Linguistics

Twentieth century approaches to language and linguistics enforced (and, indeed, *invented*) various ahistorical synchronic analyses of linguistic data.²⁶ A general climate of positivism and dualism, along with entrenched worldviews of essentialism, mechanism and nominalism all mixed with anti-teleological thought to determine that discussions of linguistic or cultural change as modes of evolution should be viewed with suspicion. In fact, social scientists themselves “have often been downright hostile toward even considering cultural evolution in Darwinian terms”.²⁷ This is at least partly due to the influence of nineteenth century philologists.

Although phylogenetic methods and concepts of heredity originated in eighteenth and nineteenth century historical linguistics,²⁸ philologists appear to have been distracted by the progressive Hegelianism of the day into thinking of languages as existing along a continuum from decay to improvement, to perfection.²⁹ This problematic baggage (think: “social Darwinism”) contributed to unsavory associations between evolutionary theory and linguistic/cultural change. Meanwhile, “Darwin was pigeonholed as a biologist, and sociology, economics, and history all eventually wrote biology out of their disciplines. Anthropology relegated his theory to a subdiscipline, biological anthropology, behind the superorganic firewall”.³⁰ As a result, the concept *evolution* is to this day conceptually (or dogmatically) fixed with biotic development.

Since we now assume biology to be the proper arena for evolution and language to be the special charge of the human and social sciences, insofar as the two may intersect, language is generally treated as proceeding from neo-Darwinian modes of genetic evolution. In other words, the phrase “language evolution” now seems to be concerned not with the ontological status of language but with its origins.³¹ As a result, instead of focusing on patterns and processes of language growth, those interested in language evolution tend to focus on various prehistorical conditions: e.g., the development and function of the vocal tract, neural architecture, upright posture, tool use and (for many Biolinguists at least) genetics. These are the focuses

²⁵ Mufwene 2005, pp. 30, 32.

²⁶ Cf. Croft 2008, p. 220.

²⁷ O’Brien 2006, p. 359.

²⁸ McMahon 1994, p. 318.

²⁹ *Ibid.*, pp. 319–320; though for Schleicher at least any peak of perfection is followed by another stage of decay.

³⁰ Richerson and Boyd 2005, p. 17.

³¹ This can be noted throughout the numerous contributions found in Tallerman and Gibson 2012.

of the discipline known as “Biolinguistics”. Although such assumptions may sometimes be useful for understanding the nature of language, they also tend to distract from inquiry into language as a process (i.e., actual language ontology). In the biolinguistic school, language evolution is generally understood to mean the evolution of a (presumed) language faculty, not language as a mode of evolution. Of those who pursue the quest to understand language as a process, most default to various presuppositional traps, as I demonstrate further below. In short, cultural assumptions still largely ensure that evolutionary analogies must be drawn from the established categories and methods of contemporary Biology.

Biological Analogies Gone Wild

Numerous parallels have been drawn between linguistic and biological phenomena. Schleicher is perhaps the first to propose a multi-level analogy between the two, claiming that “[t]he rules now, which Darwin lays down with regard to the species of animals and plants, are equally applicable to the organisms of languages”.³² In addition to remarking on shared principles of gradualness, genealogy, and selective adaptation, Schleicher claims that species correspond to languages, races to dialects, breeds to subdialects and individuals to idiolects.³³ Indeed, whatever they may mean, such similarities are striking and continue to be elaborated, as can be noted in Table 1.

Table 1 Conceptual parallels between biological and linguistic evolution (Atkinson and Gray 2005, p. 514)

Biological evolution	Linguistic evolution
Discrete characters	Lexicon, syntax, and phonology
Homologies	Cognates
Mutation	Innovation
Drift	Drift
Natural selection	Social selection
Cladogenesis	Lineage splits
Horizontal gene transfer	Borrowing
Vegetative hybrids	Language creoles
Correlated genotypes/phenotypes	Correlated cultural terms
Geographic clines	Dialects/dialect chains
Fossils	Ancient texts
Extinction	Language death

³² Schleicher 1869 [1983, p. 30].

³³ *Ibid.*, p. 32. In his own words, “[t]he species of a genus are what we call the languages of a family, the races of a species are with us the dialects of a language; the subdialects or patois correspond with the varieties of the species, and that which is characteristic of a person’s mode of speaking corresponds with the individual” (*ibid.*).

Theorists who explore such analogies usually feel obliged to pin language to some specific sub-domain of biotic growth. William James selects “zoölogical evolution”,³⁴ William Croft prefers botanical evolution,³⁵ but most theorists zoom in to more microbiotic levels – some claiming that linguistic phenomena are analogous to the cellular level³⁶ and others arguing for the genetic level³⁷ of biotic growth. For others, language is a parasite³⁸; for others still, language is a virus.³⁹

The disagreements over grounding analogies do not stop here. If language is a parasite or a “mutualist symbiont”,⁴⁰ it is also supposedly an organism, or so the inevitable logic progresses – and not merely an organism but (and here the logic suffers) an organism dwelling in the human brain (cf. “the beast in the brain” discussion⁴¹). Mufwene,⁴² however, insists: languages are not parasites qua organisms but viruses qua species. From Mufwene’s perspective, idiolects (individual speakers), not languages, are analogous to biological organisms. Though this particular disagreement might be partially resolved by appealing to the embattled distinction between “Language” and “languages”,⁴³ Noam Chomsky, the twentieth century champion of the former has determined that language is not an organism but an organ.⁴⁴ In short, biological analogies in linguistics have run amok. What is more, some language theorists mix and match biological analogies at so many different levels that we are left with no clear theory of how these analogies function together.⁴⁵ In spite of his own preferred analogy between language change and botanical growth, Croft warns against taking biologically grounded analogies as the basis for language theories:

Although analogies or metaphors between biological evolution and language change can be fruitful, one does not know which parallels between the two domains are legitimate to draw and which are not, or even more important, which parallel structures must be present for the analogy/metaphor to make sense. In particular, it is common to assume that the mechanisms that cause variation and selection in biological evolution must be the same in other domains such as language change, yet the mechanisms are domain specific. What is required is a generalized theory of evolutionary change that subsumes biological evolution, language change, and other phenomena of evolutionary change such as cultural evolution.⁴⁶

³⁴ James 1880, p. 441.

³⁵ Croft 2000.

³⁶ Sereno 1991.

³⁷ Dawkins 1976.

³⁸ Kortlandt 2003.

³⁹ Mufwene 2008.

⁴⁰ According to Driem 2008.

⁴¹ *Ibid.*, p. 105 sq.

⁴² E.g., Mufwene 2008.

⁴³ Also known as “competence” vs “performance”, respectively, or the presumed language faculty vs its manifestations in different societies or circumstances.

⁴⁴ Chomsky 1980, p. 185.

⁴⁵ Croft 2010, p. 307.

⁴⁶ Croft 2008, p. 220.

Other contemporary thinkers concur (from different perspectives) arguing that “deviations from the biological case [...] do not necessarily invalidate an evolutionary approach to culture; they merely require novel treatments of cultural phenomena within a general evolutionary framework”.⁴⁷

But what is this “general evolutionary framework”? or rather, *which* general framework? Croft appeals to David L. Hull⁴⁸ who takes his cues from Richard Dawkins’⁴⁹ memetic theory of language (and cultural) evolution, a theory of cultural replicators that served as a catalyst for reviving biological analogies for language change in the late twentieth century.⁵⁰ Not only are such approaches founded on implicit Biological analogies themselves, but (more importantly) both are also heir to a number of questionable presuppositions that continue to guide contemporary Neo-Darwinian thought. It is at this crux that biosemiotic perspectives may well be indispensable for progress.

The Biosemiotic Synthesis

One key aim of the emerging biosemiotic synthesis⁵¹ is “to understand the dynamics of organic mechanisms for the emergence of semiotic functions, in a way that is compatible with the findings of contemporary biology and yet also reflects the developmental and evolutionary history of sign functions”.⁵² As a result, biosemioticians find contemporary Neo-Darwinian biology to be “dependent on unanalyzed semiotic assumptions”.⁵³

Prominent among these presuppositions is the pervasive presence of “function” or “self-maintenance conditions”⁵⁴ in biological descriptions of living phenomena. These conditions are non-trivial and require that organisms be substantially defined by their needs – i.e., relationships with that which is extrinsic to them or absent in them. In other words, “[e]volution presupposes function, and not vice versa”.⁵⁵ If specialized functions are in some way intrinsic to the very nature of evolution, it would be invalid to assume that specialized functions are merely the products of evolution. And yet the latter position is the current mainstream consensus.

Not bound to prevailing dogma, biosemiotics seeks to “provide a theoretical grounding” for teleological (end-driven) concepts. Since the pervasive role of function requires a teleological level of causation to be re-admitted to the natural (and social)

⁴⁷ Mesoudi et al. 2006, p. 345.

⁴⁸ Hull 1988.

⁴⁹ Dawkins 1976.

⁵⁰ Cf. also Mesoudi et al. 2006.

⁵¹ Cf. Sebeok 2001; Hoffmeyer 2008.

⁵² Kull et al. 2009, p. 170.

⁵³ *Ibid.*, p. 169.

⁵⁴ *Ibid.*

⁵⁵ *Ibid.*, p. 170.

sciences, it may be found inconvenient, or even threatening, to mainstream biological and linguistic theorists. On the other hand, this contribution and its implications provide grounding for a domain-general theory of evolution in which end-driven causation is “a natural property of the world at large”.⁵⁶

Evolutionary Theory, Semiosis and Peircean Thirdness

Biosemiotic’s own grounding “on a strongly Peircean framework”⁵⁷ enables accounts of future-oriented causation to be neither naïve nor reactionary but natural – and informed by millennia of careful thought.⁵⁸ Built on his discoveries of three ontological categories⁵⁹ in nature and experience, Peirce’s evolutionary cosmology⁶⁰ forms the “central nervous system” of his system building philosophy, without which some argue that his semiotic logic cannot be properly understood.⁶¹ Relationships between this framework and the problems at hand can now be brought into sharper focus.

Semiosis and Domain-General Evolution

Many nineteenth century thinkers, including Charles S. Peirce, Herbert Spencer and Charles Darwin himself, assume evolution to be “true not of one class of phenomena but of all classes of phenomena”.⁶² Even two decades after the Darwinian revolution, M. Müller retorts: “How a student of the Science of Language can be anything but an evolutionist, is to me utterly unintelligible”.⁶³

Multiple contemporary theories seek to establish a “unified science of cultural evolution”.⁶⁴ Kim Sterelny⁶⁵ overviews meme-based models, dual inheritance models, Boyd-Richerson (population genetic) models and others, including her own proposal; but no criteria emerge to ensure that biological and linguistic/cultural

⁵⁶Hoffmeyer 2008, p. 51.

⁵⁷Kull et al. 2009, p. 168.

⁵⁸As reconstructed in Deely 2001.

⁵⁹Discovered in mathematics, logic, chemical valence, phenomenology, and demonstrated to be at work in numerous other domains, these categories he discusses as Firstness (quality), Secondness (reaction) and Thirdness (mediation).

⁶⁰Peirce 1890–1892 [2010].

⁶¹Thellefsen 2001.

⁶²Spencer 1862, p. v (cf. pp. 144, 490). As the remainder of Spencer’s book makes clear, this quotation refers prominently (though not exclusively) to evolution.

⁶³Müller 1887, p. xi.

⁶⁴Mesoudi et al. 2006.

⁶⁵Sterelny 2006.

processes are both covered without defaulting to the dogmas of either science when making “unified” claims. Three features of Darwinian evolution, for instance, are widely discussed as domain-general: “variation, selection and inheritance”.⁶⁶ Can these at least be identified as unifying features? Unless these aspects of evolution are examined at a presuppositional level, they are unlikely to be freed from the Neo-Darwinian assumptions of those who apply them.

From its inception “[n]atural selection, as conceived by Darwin, has been a mode of evolution in which the only positive agent of change in the whole passage from moner to man is fortuitous variation”.⁶⁷ Although contemporary theories of evolution incorporate a replicating component to account for the maintenance of inherited features (and generation of further variation), at least three problems remain for mainstream (asemiotic) theories of evolution at this general level, each of which will be examined in the remainder of this paper: (1) the actual nature of process is left unexamined; (2) no mode of process is proposed that provides continuity or mediation between the extremes of random variation and mechanical replication; (3) no proposals are offered to account for future-oriented (pattern-solving) modes of causality required by the functional realities of life (and language).

Semiosis and Process-Explicit Evolution

Processual phenomena may seem to be part-and-parcel with evolution; but, as Terrence Deacon⁶⁸ describes in detail, inadequate theories of process are the Achilles heel of contemporary evolutionary theory. This is true in linguistics as much as in biology. Consider Croft’s attempts to situate language change within a domain-general theory of evolution.

Following Dawkins,⁶⁹ Hull⁷⁰ and others, Croft argues that linguistic structures evolve through language *use*, explaining that in his model “linguistic replicators are [...] tokens of linguistic structures in utterances”.⁷¹ When replicating these tokens, speakers generate “variation in the production and comprehension of utterances”.⁷² Croft, however, deliberately avoids specifying “the mechanisms by which variation is generated”.⁷³ Rather, “like all evolutionary biologists and most historical linguists, [he] rejects teleological mechanisms”⁷⁴ – instead, he cites such phenomena as

⁶⁶Cf. Wyhe 2005, p. 97.

⁶⁷Peirce 1890–1892 [2010, p. 190]. *Moner* is an archaic term meaning ‘single celled organism’.

⁶⁸Deacon 2012.

⁶⁹Dawkins 1976.

⁷⁰Hull 1988.

⁷¹Croft 2008, p. 222.

⁷²*Ibid.*

⁷³*Ibid.*

⁷⁴*Ibid.*

“expressiveness” and “avoidance of misunderstanding” as stand-ins.⁷⁵ But what is understanding? And how is one to avoid the missing of it? And what is the nature of “expressiveness”? This problem is not unique to Croft.

Deacon⁷⁶ aims critical floodlights on precisely this issue: how can a legitimate theory of process legitimately provide no account of process? How can evolutionary theories of replicators (those which get copied) avoid open, direct and thorough discussion of the copying processes themselves? He remarks that “there is a curious irony in treating the only two totally passive contributors to natural selection – the genome and the selection environment – as though they were active principles of change”.⁷⁷ This leaves us with a “self-referential loop”⁷⁸ in which “inanimate artifacts”⁷⁹ are somehow accepted as “patterns that contribute to getting themselves copied”.⁸⁰ Such “highly non-trivial kinds of processes” aren’t to be ignored.⁸¹ Instead, theories of evolution require “a ‘positive’ (order-inducing) factor and not merely a multiplicative factor”.⁸² For Deacon, and other biosemioticians, this order-inducing factor is teleological not in the caricatured sense of spooky intervention or reified purpose acting backward from some distant future; rather, the order-inducing factor involves the emergence of integrative sign relations through constraints on information, the search (however vague or unwitting) for something *missing*.

From the changing morphology of finch beaks in the Galápagos, to the changing morphology of Germanic word structure in English, evolution is driven by a needs-based pursuit of better fit between population and environment. In the case of Darwin’s finches, the need is for new sources of food locked in untapped resources, such as cactus seeds. In the case of English typology, the need is for more predictable regularity in grammatical paradigms, due to intensified language contact with non-native speakers. In each case we find an end-oriented pattern-solving activity involving “the *virtual influence* of the future upon the present changing the relevance of the past”.⁸³

Semiosis and Thirdness in Linguistics and Biology

Peirce⁸⁴ identifies three modes of evolution: (1) *Tychasm* (“evolution by fortuitous variation”), (2) *Anancasm* (“evolution by mechanical necessity”) and (3) *Agapasm* (“evolution by creative love”). Agapasm he identifies as conspicuously missing

⁷⁵ Viz., “homunculi” cf. Deacon 2012, pp. 46–79.

⁷⁶ Deacon 2012.

⁷⁷ *Ibid.*, p. 132.

⁷⁸ *Ibid.*, p. 131.

⁷⁹ *Ibid.*, p. 132.

⁸⁰ *Ibid.*, p. 131.

⁸¹ *Ibid.*, p. 437.

⁸² *Ibid.*, p. 422.

⁸³ Deely 2008, p. 481.

⁸⁴ Peirce 1890–1892 [2010, p. 194].

from mainstream theories of evolution (with the possible exception, in his day, of Lamarckian ideas). Little has changed in this regard in the intervening century. This necessary mode of evolution can be thought of as the action of habit-taking and habit-breaking toward some general idea or developing function – a working need (whether witting or unwitting) to solve some puzzle, pattern or problem not yet in equilibrium between (e.g.,) organism/population and environment. In all cases, as discussed above, this is motivated by something absent in the organism, the individual and/or the population.⁸⁵ This mode would both mediate and motivate – not only natural selection⁸⁶ but also mechanical replication. Agapasm closely corresponds to “Synechism”, or processual continuity⁸⁷; and since “[c]ontinuity represents Thirdness almost to perfection”,⁸⁸ Agapasm would be Thirdness in-process or the semiosis of mediation, that process which both brings together and moves between the selection of fortuitous variation on one hand and the mechanical replication of inherited features on the other in the pursuit of something missing.

Just as mediatory process is neglected in evolutionary theory, those processes in which mediation is most prominently at work suffer neglect in biological and linguistic research. In biology this corresponds with ontogenetic/developmental processes, or “ontogeny” – the growth of an organism from seed to maturity. In linguistics this corresponds to “diagrammatization” – the growing systematization of linguistic patterns based on perceptions of resemblance (iconicity) and the potential for these perceptions to fit with, or reorganize previously recognized part-whole relationships⁸⁹ – or so I will argue below. First let us consider ontogeny.

The relative neglect of ontogeny in biological accounts is not a new problem,⁹⁰ but complaints continue to be registered.⁹¹ Yet, in the words of zoologist Charles Otis Whitman, “[a]ll that we call phylogeny is today, and ever has been, ontogeny itself. Ontogeny is, then, the primary, the secondary, the universal fact. It is ontogeny from which we depart and ontogeny to which we return”.⁹² Stephen Jay Gould agrees: “Evolutionary changes must be expressed in ontogeny, and phyletic information must therefore reside in the development of individuals”.⁹³

Although ontogeny is now widely (if reluctantly) accepted as a key source of phylogeny (according to some the sole source),⁹⁴ and although evolutionary developmental (a.k.a. “evo-devo”) biologists seek to devote attention to organism/

⁸⁵ Cf. also Deacon 2012, pp. 1–17.

⁸⁶ Cf. also *ibid.*, p. 136: “Natural selection could not have produced the conditions that made natural selection possible”.

⁸⁷ That which Peirce once claimed as his “one contribution of value” (Peirce 1866–1913 [1931–1958], CP [= *Collected Papers*] 5.415, 1905 [= a manuscript of 1905]).

⁸⁸ *Ibid.*, CP 1.337, 1886.

⁸⁹ Cf. Jakobson 1965 [1987]; Shapiro 2002; Nöth 2008.

⁹⁰ Cf. complaints in Whitman 1910 [1919]; Gould 1977.

⁹¹ Cf., e.g., Adams and Pedersen (eds.), 2000; Wimsatt 2006, p. 364.

⁹² Whitman 1910 [1919, p. 178].

⁹³ Gould 1977, p. 2.

⁹⁴ Hall 1999, p. 13.

population growth, widespread acknowledgement that ontogeny involves end-directed processes is still forthcoming. And yet, as I will outline further below, ontogeny closely corresponds with Peircean evolution (i.e., Thirdness in-process or Agapastic Synechism: cf. above), which recognizes from the outset continuity between all things. As Whitman notes: “Ontogeny teaches us, then, that there are no disconnected jumps in its processes [...] subtle internal processes that bind all the external form-changes into one unbroken sequence. The invisible work going on beneath the surface follows steadily in a definite direction, culminating at the appropriate times and places in all of the outer and inner form and structure characters peculiar to the species”.⁹⁵ Contrary to Whitman’s early claim,⁹⁶ phylogeny cannot be reduced to ontogeny; rather, the two are interdependent.⁹⁷ The same can be said of the relationship between ontogeny and environmental-coupling factors.⁹⁸ In short, “[a]ll three modes of evolution are composed of the same general elements”.⁹⁹ But, ontogeny/agapasm “exhibits them the most clearly”.¹⁰⁰

Just as ontogeny has tended toward neglect in biology, diagrammatization has been neglected in linguistics.¹⁰¹ At the most general level, the two are not distinct. Just as Agapasm is manifest in the “disposition [...] to catch the general idea [...] and thus to subserve the general purpose”,¹⁰² diagrammatization is manifest in processes that lead to discovering a “fuller realization of the values specific to one’s type”,¹⁰³ – either of which might be a way of discussing the general nature of ontogeny in biology.

While Peirce’s type-token distinction has been absorbed into contemporary linguistic theories,¹⁰⁴ the place and purpose of the distinction within the broader doctrine of signs has been all but ignored. Diagram tokens (whether linguistic or non-linguistic) are “iconic sinsigns”; diagram types are “iconic legisigns”. A diagram is an “icon of intelligible relations”¹⁰⁵ that “facilitates reasoning possibilities”.¹⁰⁶ Diagrams are by no means restricted to visual signs and are manifest at every level of speech activity and language organization. Diagram tokens are always variable

⁹⁵ Whitman 1910 [1919, p. 176].

⁹⁶ *Ibid.*, p. 178.

⁹⁷ Cf. Rieppel 1990.

⁹⁸ Hoffmeyer 2008, pp. 102–108.

⁹⁹ Peirce 1890–1892 [2010, p. 194].

¹⁰⁰ *Ibid.*

¹⁰¹ Cf. the discussion in Jakobson 1965 [1987]; Shapiro 2002; Nöth 2008; Pelkey 2013. As Frederik Stjernfelt (2007) and Winfried Nöth (2008) note, the term *diagram* in this sense encompasses relations within and between embodied cognitive types at numerous levels, including schemas, prototypes, constructions, blends, gestalts, concepts and general cognitive models.

¹⁰² Peirce 1890–1892 [2010, p. 194].

¹⁰³ Shapiro 2002, p. 118.

¹⁰⁴ Nöth 2002, p. 5.

¹⁰⁵ Peirce 1866–1913 [1931–1958], CP 4.531, 1903.

¹⁰⁶ Stjernfelt 2007, p. ix.

and available for selection, whether in comprehension or production, to serve some general end. These include idiolectal phones, novel utterances, nonce formations, live speech events and the like.

Diagram types involve real relations – perceived and remembered resemblances that are cognitively organized into integrated part-whole schemas – but are not themselves existing things.¹⁰⁷ Iconic legisigns grow out of iconic sinsigns, following the end-directed repetition of sufficiently similar tokens, resulting in taking up a new habit or “self-organization”.¹⁰⁸ Thus, in linguistics, diagram types should be understood to encompass distinctions at all levels, including phonemes, lexemes, concepts, gestalts, schemas, constructions and the like.¹⁰⁹ As with ontogeny, such processes may be largely subliminal but are governed by vague (i.e., “rhematic”) alertness to the potential for enhanced equilibrium – the ongoing search for a better fit between perceived resemblances (in speech or memory) and the efficient relations that hold between part-whole schemas, in order to serve some end related to enhanced communication. As we find illustrated in the growth of English morphology mentioned above, the perception of regular morphemes such as /-s/ to mark plurality continues to lead to the extension of this resemblance so that it comes to include more and more previously irregular plurals, such as *oxen* > *oxes*, thus enhancing the equilibrium of the overall system.

Deep Congruence

The prospect of a deep congruence between biotic and linguistic growth is now primed for exploration: (1) environmental-coupling processes introduce chance variation, revealing surprising gaps and suggesting new habits; (2) iconic replication processes entrench inherited and acquired habits into law like patterns; (3) these processes are mediated through space and time as new habits are taken up and old ones dispensed with for the sake of realizing a better fit according to some general cognitive type. In this section I consider the relevance these rough descriptions hold for biology and linguistics, arguing that, in biology, they apply to Ecology, Phylogeny and Ontogeny, respectively; while in linguistics, they apply to Analogy, Automation and Diagrammatization, correspondingly. Peirce summarizes them as “Chance”, “Law”, and “the tendency to take habits”¹¹⁰; modes of evolution that are actually domain-general. With these distinctions and relations in mind (summarized in Table 2), an evolutionary account of language and linguistics is possible – one that avoids the worst unanalyzed presuppositions (i.e., asemiotic pitfalls) of mainstream biology.

A growing number of contemporary studies in biology implicitly illustrate the intertwining relationships between these three modes of evolution. This can be

¹⁰⁷ Peirce 1866–1913 [1931–1958], CP 4.447, 1903.

¹⁰⁸ Cf. Hoffmeyer 2008, p. 62.

¹⁰⁹ Nöth 2008; Stjernfelt 2007.

¹¹⁰ Peirce 1890–1892 [2010, p. 110].

Table 2 Deep congruence between linguistic and biotic growth

Peircean...	Mode of evolution	Evolution by...	Biotic...	Linguistic...
Tychasm	Chance	“Fortuitous variation”	Ecology	Analogy
Anancasm	Law	“Mechanical necessity”	Phylogeny	Automation
Agapasm	Habit taking	“Creative love”	Ontogeny	Diagrammatization

noted, to cite a handful of specific cases, in research ranging from the evolution of bats,¹¹¹ to primate lactation,¹¹² to botanical fructification,¹¹³ to vertebrate neurology,¹¹⁴ to mongoose middle ear development.¹¹⁵ In their collection of perspectives focused on the re-assessment of bat evolution, for instance, Rich Adams and Scott Pedersen¹¹⁶ draw attention to overlooked niche habitats (ecology) that can be described at various early stages of bat development (ontogeny). These result in remarkably distinctive juvenile characteristics that often differ as dramatically as those commonly held to distinguish various bat species (phylogeny). Thus, the exclusive comparison of adult members of various bat species is shown to be short-sighted for purposes of understanding the actual nature of bat evolution. They insist, rather, that such complex patterns of growth require an “integrative biology”, one which “utilizes multidisciplinary approaches to establish a more complete and, therefore, insightful interpretation of an organism’s biology”.¹¹⁷ Such complex integration is rare in linguistic treatments; but we have much evidence that the same three modes of evolution are working together in linguistic processes.¹¹⁸ For the sake of focus and further validation, it will be helpful to consider each mode of linguistic evolution in relative isolation before turning to an integrated illustration.

Evolutionary Chance: Linguistic Analogy

Linguistic chance involves a vast array of contextual factors, frequently contact-based (external) and/or gestural/articulatory (internal), in driving language variation through time. Mufwene, who champions an “ecological” account of language evolution, states that “the communicative activities that produce language evolution are largely determined by the socio-economic ecologies in which speakers evolve,

¹¹¹ Adams and Pedersen 2000.

¹¹² Milligan 2007.

¹¹³ Leins and Erbar 2010.

¹¹⁴ Creutzfeldt 1995.

¹¹⁵ Gishlick 2008.

¹¹⁶ Adams and Pedersen 2000.

¹¹⁷ *Ibid.*, p. 1.

¹¹⁸ For explicit treatments cf. Pelkey 2011 and 2013; for implicit treatments cf., e.g., Shapiro 1991, and 2002; Bybee 2010.

which is similar to saying that *the ecology rolls the dice in evolution*".¹¹⁹ Indeed, as in biology, so in linguistics: with ecological-coupling comes chance variation. Language variation is pervasive at every level of linguistic structure, within the production and comprehension of every speaker, and between all groups of speakers, in ways that are fractal scalable, potentially approaching infinity.¹²⁰ Darwin, concurs: "We see variability in every tongue, and new words are continually cropping up".¹²¹ Variation alone is not evolution, but the analogical selection of chance variation is.

Analogy pervades linguistic communication.¹²² "Speakers/signers understand each other not because they use identical systems", notes Mufwene, "but because similar minds deriving similar patterns from similar data can 'read' each other".¹²³ Similarity, however, is semiotic: a semiotic relation of resemblance between an object and its sign vehicle according to the experience, expectations and needs of an interpretant. Language is pervasively iconic,¹²⁴ and analogy is iconicity in process. Most variation goes unnoticed and may seem inconsequential, but more remarkable variation (experienced first as "rhematic indexical sinsigns") evokes surprise. If selected and replicated, a token variation comes to be a shared symbolic type useful for communication between lects of a speech variety.

Evolutionary Law: Linguistic Automation

Linguistic law involves the automation of a given habit or diagram type through mimetic replication¹²⁵ to the degree that the original innovation becomes a linguistic fact, an identifiable part of the whole at the level of symbolic pattern, in relation to and in contrast with other linguistic facts. These facts are mimetically replicated and inherited, and often seem to lose association with their original motivation (as in the lexicalization of *goodbye* from the utterance *God be with you*).

Paradoxically, such replication also involves variation, both in production and in comprehension¹²⁶ that may lead to further habituation¹²⁷ and/or provide grounds for new analogies. Naturally, "with every adaptation, there are innumerable other arbitrary properties potentially brought into play".¹²⁸ Nevertheless, the regularity of sound change and the clear presence of historical splits persist in spite of this

¹¹⁹ Mufwene 2005, p. 30; italics mine. – J.P.

¹²⁰ Kretzschmar 2010.

¹²¹ Darwin 1882, pp. 90–91.

¹²² Cf. Anttila 2003.

¹²³ Mufwene 2014, p. 15.

¹²⁴ Not only in terms of its production and comprehension, but also (and especially) in terms of its organization (cf. Nöth 1999 and 2008 for further verification and clarification of this claim).

¹²⁵ I.e., the action of dicent indexical sinsigns.

¹²⁶ Croft 2008.

¹²⁷ Cf. the discussion in Bybee 2010, pp. 50–53, 75.

¹²⁸ Deacon 2012, p. 424.

variation. Just as most language varieties are maintained until ecological pressures become unbalanced,¹²⁹ most automated forms persist until they no longer fit the patterned needs of the individual and/or community.

Darwin makes the argument that “The survival or preservation of certain favoured words in the struggle for existence is natural selection”.¹³⁰ Here the tell-tale metaphor of competition and struggle, may easily distract from our need to account for implied modes of process. The natural selection of new words begins with analogy, according to some general pattern (of diagrammatization). The preservation of such words, within the macro-diagram depends both on the ongoing goodness of fit and various frequency-induced fossilization effects as “the human brain adjusts to repeated access by creating shortcuts”.¹³¹

Evolutionary Habit Taking: Linguistic Diagrammatization

As discussed above, linguistic habit-taking (necessarily including habit breaking¹³²) involves the “self-organization” or future-oriented pattern solving of language relationships, working “to render inefficient relations efficient [...] to establish a habit or general rule”.¹³³ This mode is typified in the lifetime growth of polylectal individuals and populations through space and time. As Deacon reminds us, “[v]ariations do not exist in the abstract; they are always variations of some organism structure or process or their outcome”.¹³⁴ As variations are selected, for purposes of implicit pattern solving (or diagrammatization) they enter into phases of habituation, gradually becoming automated, institutionalized and fossilized.

Ordinary examples of such fundamental process include negotiation of meaning in live conversation, evolution of speech pragmatics, development of new vocabulary, linguistic uses of communication media, empathic speech comprehension, the slow development of grammatical paradigms (e.g., pronoun systems), and embodied modeling of spatial relations typified in grammar. Consider the development of new vocabulary as a succinct example of diagrammatization. When a new student of linguistics begins to learn the technical jargon of articulatory phonetics, he simultaneously takes on new habits and breaks old ones. His new habits of embodied perception correspond to new lexical titles, such as “interdental” and “palatal”. His old habits of less-focussed attention are also marked by phrase-level circumlocutions such as “with my tongue in-between my front teeth” and “on the roof of my mouth”, respectively. The embodied semantics of such new concepts (or prototypes) are

¹²⁹ Bailey 1982.

¹³⁰ Darwin 1882, p. 91.

¹³¹ Bybee 2010, p. 50.

¹³² To take up a new habit is in some sense to break an old habit. Thirdness involves “a habit of taking and laying aside habits” (Peirce 1866–1913 [1931–1958] CP 6.101, 1902).

¹³³ Peirce 1866–1913 [1931–1958], CP 8.332, 1904.

¹³⁴ Deacon 2012, p. 422.

slowly organized in relation to each other (e.g., further forward vs further back, or part vs whole), as an integrated paradigm set. This is accomplished both through trial and error processes of analogy and through mimetic repetition of relationships that slowly come to be more and more efficient and automated. Nevertheless, the intervening, or mediating, stages of learning, and any future modifications of the lexical paradigm that result (however slight) require the presence of a modelling activity that can be reduced to neither the guesswork of analogy nor the automation that proceeds from mimetic repetition. This modelling activity is diagrammatization.

Many other linguistic phenomena such as recursion, borrowing, semantic shift and language acquisition also mediate between fluctuation and regularization. Advances in grammaticalization and lexicalization theory,¹³⁵ show that processes of semantic bleaching that enable greater grammatical functionality and processes of semantic enrichment that allow for fresh lexical versatility are operative between analogy and automation.¹³⁶ Without a third element in language theory, we can neither understand linguistic systems nor explain them. Exploration of mediatory process has become a priority and a necessity.

Further Evidence for Semiotic Foundations

The deep congruence mapped out above may indeed point to semiosis as the common ground of biotic and linguistic growth. To better support these distinctions and their interrelationships, and in order to clarify them through a condensed illustration, I offer evidence drawn from my research on the Muji languages¹³⁷ of Southwest China.¹³⁸

The Muji languages of southeastern Yunnan Province are marked by a redistribution of lexical tones in syllable classes that were historically coda-final,¹³⁹ according to a mirror-image pattern in which High > Low and Low > High, conditioned by inverse manner of articulation in the proto-syllable onset. In the Phuma language, ‘sweep’, for instance, is pronounced /çi³³/, and ‘shake’ is pronounced /ʔu³³/. Since both descend from the high-checked tone class,¹⁴⁰ this shared pitch is the expected reflex of each. Low-falling tones featured on words like /çi²¹/ ‘kill’ and /vje²¹/ ‘pig’ are also expected since these forms descend from the low-checked tone class. In fact, this particular binary distinction is inherited from the proto language stage – preserved via replication through space and time for more than 1,000 years. Long-term preservation of linguistic features is one aspect of evolutionary Law: the process of linguistic automation at work in ways that go beyond conscious awareness or deliberate control.

¹³⁵ E.g., Brinton and Traugott 2005.

¹³⁶ Pelkey 2013.

¹³⁷ Tibeto-Burman > Burmic > Ngwi > Southeastern.

¹³⁸ For a further, more detailed empirical study in which these relations are made explicit, cf. Pelkey 2013.

¹³⁹ Pelkey 2007 and 2011, pp. 293–300.

¹⁴⁰ Cf. Bradley 1979.

Other lexical reflexes break this pattern, however: /tɛ^{hi21}/ ‘pinch’ and /kɑ²¹/ ‘stir’ feature low tones even though they descend from the high-checked tone class; while /ʔv³³/ ‘hang’ and /na³³/ ‘demon’ feature high tones even though they descend from the low-checked tone class. This distinctive mirror-image reversal cries out for explanation.¹⁴¹ Closer inspection reveals that the inverse redistribution is conditioned by [+obstruent] (i.e., non-continuant) syllable onsets. In other words, syllables that began with stops exchanged pitch value, and syllables involving fricatives or glides in the onset preserved the original tone. Strong evidence from the Laghuu language (a peripheral Muji variety currently only spoken in Vietnam) indicates that the low-checked tone values shifted first in this environment, followed in other Muji languages by high-checked tone values.

In order for this to occur, Chance variation of L>H on token utterances must have been provisionally selected, only to spread by analogy to other lexical utterances in this class, whereupon the analogy was taken up (selected) as a newly developing Habit for some implicit end such as an identity-based dialect distinction. This, naturally, would have had unintended consequences relative to the overall system. Underdifferentiation in the checked-tone classes, for instance, would have prompted a correlative shift or “flip-flop” of H>L to maintain equilibrium (e.g., homophony avoidance), thus illustrating the close cooperation between the work of linguistic Analogy and linguistic Diagrammatization.

This pattern is unattested elsewhere in Ngwi (or in the rest of Tibeto-Burman for that matter), a fact that points to evolutionary Chance, the selection of random variation according to some implicit absence – in this case, a likely blend of diverging ethnic identity reflected in emerging dialect differentiation, later followed by the need for pattern equilibrium as pitch values began to merge ambiguously. The correlative pattern is now highly regular among the Muji languages, suggesting a reinitiation of evolutionary Law in the wake of the innovation – the subsequent automation or fixing of efficient relations.

The pattern also features a significant exception, not discussed here,¹⁴² which has its own internal regularity (Chance within Law). That there is a pattern at all (much less patterns within patterns) is the result of evolutionary Habit Taking or “self-organization” relative to the overall system. This aspect is irreducible to mechanical necessity (i.e., Law: the blind copying of replicators) since one outlying Muji language does not share the innovation, and Laghuu speakers, who emigrated early to Vietnam, show evidence of only the first half of the split (i.e., L>H). Thus, three distinct but intertwining modes of evolution are necessary not only to account for the full complexity of the innovation but also to make progress in understanding it.

¹⁴¹ A dicent indexical legisign.

¹⁴² Cf. Pelkey 2007 and 2011, pp. 293–300.

Coda: On the Need for a Semiotic Theory of Evolution for Linguistics and Biology

A radically evolutionary linguistics is overdue¹⁴³ – one consonant with biosemiotic developments but not tied to mainstream biological ideology. In other words, it is time to ground the study of linguistic (and biotic) growth in a domain-general theory of evolution that is process-explicit. Whether we wish to work technically or wish to understand the nature of language in general, it will be necessary to move beyond the endless generation of factual trivia multiplied by bald descriptions and statistical manipulations of linguistic data as ends in themselves. The interrelationships between Chance (Analogy), Law (Automation) and Habit Taking (diagrammatization) in language change – and the congruence these share with biological ecology, phylogeny and ontogeny – should open a way. Jesper Hoffmeyer sees in the biosemiotic approach to the life sciences the potential for a revitalization of human inquiry in general.¹⁴⁴ Kalevi Kull agrees, noting that biosemiotics should be understood as an enhancement of biology rather than as a mere commentary upon it.¹⁴⁵ Applied to linguistics, this, more than anything else, should motivate further development and application of the relationships mapped out above: an open opportunity to enhance our understanding of language, a possibility for revitalizing the science of language. Linguistics would no longer be bound to isolated descriptions of speech that oscillate between minimalist regularity and bewildering variation; instead a growing understanding of language processes and linguistic relations may well emerge.

This incomplete contribution is offered to that end.

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¹⁴³ Cf. also Rauch 1999, p. 48.

¹⁴⁴ Hoffmeyer 2011, p. 203.

¹⁴⁵ Kull 2011, p. 226.

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