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Brutal Visions

Mimicry, Biosemiotics, and the Animal-Human Binary in Thomas Belt's *The Naturalist in Nicaragua*

Will Abberley

In 1863 Charles Darwin published an article enthusing about a new concept in natural history: protective mimicry. The term had been coined by Henry Walter Bates, an entomologist who had observed numerous uncanny resemblances between different species of insect in the Amazon. Bates argued that such mimicry was a survival strategy; insects vulnerable to predators evolved to resemble other species that predators knew to be distasteful. With each generation, the individuals that more closely resembled the model species were more likely to be left alone, while those who deviated from this model were more likely to be eaten, rendering the mimicry ever-more perfect. Bates claimed that other species' uncanny resemblances to vegetation or stones had developed in the same way, as random variations helped certain individuals to survive while their more conspicuous brethren died out (see Bates 1862). In the following years, naturalists would argue for the existence of many other forms of biological mimicry, from camouflaged predators to plants that tricked insects into spreading their pollen by mimicking the appearance of nectar.¹ Biological mimicry confounded mechanistic models of animal life. Earlier naturalists had noticed uncanny resemblances between different species, and between organisms and other natural objects, but often explained them away as either unimportant coincidences or proofs of the creator's love of symmetry and patterns (Komarek 1998, 24–28). Such explanations framed the animal world as senseless, acquiring meaning only through the intelligent perceptions of human observers. Conversely, biological mimicry suggested that nonhuman perceptions and interpretations were fundamental to nature's processes. Darwin queried rhetorically, "Why to the perplexity of naturalists has Nature condescended to the tricks of the stage?" (1863, 220–21).

Part of the reason for naturalists' "perplexity" had been that they approached animals as rigid machines rather than sentient beings that inhabited not only physical environments but also fields of mutual perception and semiosis.

This article argues that biological mimicry unsettled, and continues to unsettle, anthropocentric binaries between humans and animals, and nature and culture. Mimicry, therefore, offers a potent motif for cultural theorists who seek to destabilize nature and animality as categories and build more politically engaged and critical models of "post-nature" or "ecology without nature" (see Curry 2008; Morton 2007). Bruno Latour has suggested replacing the concept of nature with "compositionism," that is, the recognition that nature is not "a true world of realities lying behind a veil of appearances" but a contingent human construct (2010, 474–75). Latour argues that Western scientific materialism hides the composted (in the etymological sense) nature of nature, presenting it as an objective reality reducible to mechanistic "concatenations" of causes (482). This model of nature renders agency exclusively human, while the universe outside of humanity seems wholly ruled by necessity. Conversely, Latour frames the world as networks of agential mediators instead of mechanistic causes. He writes,

Nature is *always already assembled*, since nothing happens but what comes from before. It is enough to have the causes, the consequences will follow, and they will possess nothing of their own except the carrying further of the same indisputable set of characteristics. . . . This is why rationalists never detect the contradiction between what they say about the continuity of causes and consequences and what they witness—namely the discontinuity, invention, supplementarity, creativity . . . between associations of mediators. They simply transform this discrepancy (which would make their worldview untenable) into a radical divide between human subjects and nonhuman objects. For purely anthropocentric—that is, political—reasons, naturalists have built their collective to make sure that subjects and objects, culture and nature remain utterly distinct, with only the former having any sort of agency (482–83).

Latour suggests that the scientific materialist edifice of mechanistic "nature" depends on a selective blindness toward the frequent gaps between causes and consequences. I suggest that,

since its first theorization in the nineteenth century, biological mimicry has persistently challenged this dogmatic denial of nonhuman agency. Conceptualizing the phenomenon involved the humbling notion that seeing and interpreting were not exclusively human activities but occurred across the animal kingdom and influenced organisms' evolution through constant feedback loops. Naturalists who wished to understand the history of life on Earth were compelled to give up or, at least, loosen anthropocentric oppositions between human subjectivity and agency on the one hand and animal automatism on the other.

I will briefly trace the history of biological mimicry as an idea that developed in dialogue with models of animal perception and agency, culminating in the recently emerged field of biosemiotics, which redefines signs and interpretation as processes occurring throughout the organic world. I will then explore the implications of these ideas for decomposing animal-human binaries through a zoocritical close reading of one Victorian text that documented various examples of animal mimicry and deception. The text is *The Naturalist in Nicaragua* (1874), a travel memoir by the mining engineer and naturalist Thomas Belt. I argue that Belt's depictions of animal deception vacillated between presenting the animals involved as intelligent or sentient agents and, conversely, as passive units in mechanistic natural processes. However, Belt's vision of biological mimicry was more concerned with the subjectivity of signal receivers than senders, with the interpretation of signs than possible intentions behind them. By treating mimicry and deception as systemic relations between signs, referents and interpreters, Belt obviated intentionality in communication and prefigured the logic of biosemiotics. Further, by narrating his personal encounters with mimetic and deceptive animals in the wild, Belt challenged divisions between humans and animals, encouraging readers to imagine life from the perspective of the deceivers' prey and predators. His use of personal anecdote as evidence for biological

mimicry suggested that animals' experiences of such deceptions could be inferred through his own experiences of being dazzled and duped. In this way, the sensory body becomes a vehicle for empathizing with other species, imaginatively glimpsing fragments of their subjective worlds.

Imagining Brutal Vision

First, let us consider how science has often functioned to deny animals semiotic agency, before exploring how biological mimicry upset this assumption. In the medieval period, philosophers argued for the existence of symbolic systems in the organic world. Concepts of nature as a book of moral analogies sat alongside medicinal doctrines of natural signatures, which assumed that plants resembled body parts that they were intended to treat.² However, these imagined natural sign systems were generally anthropocentric, framing nature's objects as meaningful only insofar as they acted as a channel of communication between humans and the creator. Animals and plants were not usually considered as humans' fellow addressees in such systems; rather, they were the passive, material carriers of the systems' messages. The gradual rise of inductive science eroded belief in such natural signs as investigators like Isaac Newton, Galileo Galilei, and John Ray increasingly studied nature's objects as things in themselves without any symbolic, human-centered meaning. Peter Harrison links this rejection of analogy in nature to literalist, Protestant approaches to the Bible, arguing that the scientific revolution constituted a literalization and designification of the world. He writes,

For a denial of the legitimacy of allegory is in essence a denial of the capacity of things to act as signs. . . . Literalism means that only words refer; the things of nature do not. In this way the study of the natural world was liberated from the specifically religious concern of biblical interpretation, and the sphere of nature was opened up to new ordering principles. The mathematical and taxonomic categories imposed by Galilei and Ray on physical objects and living things represent an attempt to reconfigure a natural

world which had been evacuated of order and meaning (Harrison 1998, 4).

This modern designification was manifested in reconceptualizations of nature and its life-forms as machines. The English natural theologian William Paley compared the organic world to a watch, its species living in perfect balance with each other like the springs and cogs in a timepiece. Similarly, on a smaller scale, René Descartes and Julien Jean Offray de La Mettrie argued that animals were, effectively, machines following fixed patterns of behavior that were predetermined by their morphologies and instincts.³ The animals-as-machines hypothesis never enjoyed universal support, but it gained in power through the nineteenth century as philosophers and scientific investigators strove for ever-stronger distinctions between things and ideas, objects and subjects. The hardening binary between thought and matter framed the attribution of inner life to animals as naïve self-projection, expressed by the perennial bugbear of the professional life sciences: anthropomorphism (Weemans and Prévost 2014, 4).

The consequence of this trend was a hollowing out of animal subjectivity. John Berger noted that images in the modern life sciences typically represent animals as wholly separate from humans, and apprehension as a one-way process from humans to animals. Berger declares, “Animals are always the observed. The fact that they can observe us has lost all significance. They are the objects of our ever-extending knowledge” (1980, 16). The anthropocentric privileging of the human gaze suppresses animals’ perceptions not only of humans but also of each other—they are reduced to puppets of instinct, which cannot really perceive at all. Cartesian dualism, Berger observes, “bequeathed the body to the laws of physics and mechanics. . . . The animal has been emptied of experience and secrets” (11–12). This expungement of animal subjectivity was intensified through the nineteenth and twentieth centuries by the rise of modern, experimental science, which constructed animals as laboratory objects in which reactions could

be predictably induced through controlled manipulation and replicable procedures. While physiology approached animals as collections of organic processes and reflexes, behaviorist animal psychology reduced them to products of conditioning, blindly shaped by patterns of stimulus and response.⁴

However, as Eileen Crist has argued, antianthropomorphism led to an equally dogmatic mechanomorphism by which animals' actions were assumed to be driven by nonagential, automatic causes (1999, 2–7). Although anthropomorphism might seem inherently anthropocentric, the modern stigmatization of anthropomorphism is arguably more so since it limits subjectivity to humans and objectifies all the rest of the living world. “Is not this going rather far?” complained the French sociologist Roger Caillois, who was much interested in insect mimicry, “Does this not isolate man unduly, under the pretext of not projecting on to another species . . . what seems to belong to him alone?” After all, Caillois remarked, since man is an animal, it seems reasonable to expect “to find elsewhere the characteristics of his nature, or, on the other hand, to rediscover in him the laws that one sees operating in other species” (1964, 16). In contrast to such human-centered discourse, Pierre Montebello advocates a “higher anthropomorphism,” which acknowledges likely continuities between human and animal experience without privileging humans as the standard of measurement. Montebello writes, “To anthropomorphize in an empirical way is to project oneself into things, to see oneself exactly in the variety of the world. By contrast, the method of higher anthropomorphism suggests that one can find man in all things because he is similar in nature to all things, with varying degrees of difference. . . . Higher anthropomorphism seizes man at his root: and his root is cosmos.”⁵

Protective mimicry necessarily involved imagining the misperceptions of animals that were duped by resemblances, usually through the naturalist's own experiences of being misled

by resemblances in the field. The idea that vision could be a vehicle of interspecies empathy was a new one. Traditionally, Western philosophy had privileged human vision as a special kind of knowledge that transcended the mere organs of sight.⁶ Yet the development of optical physiology and psychology through the nineteenth century had undermined such beliefs, emphasizing the limits, unreliability, and materiality of vision.⁷ Studies into the nervous processes involved in sensation split sight into a flow of raw sense impressions, on the one hand, and a bank of mental associations interpreting it, on the other (Teukolsky 2009, 51–56). Instead of being qualitatively different from animal vision, human vision seemed to be distinguished only by its greater associative accumulation and coordination. Darwinism enhanced this materialization of vision, suggesting that the sense of beauty was not a metaphysical or uniquely human condition but a faculty existing across species, serving the utilitarian causes of survival and reproduction (Smith 2006, 276–85). Instead of viewing nature's shapes and colors as art designed by God for humans to appreciate, Darwin and his followers presented them as environmental conditions that every sighted animal responded to and, thus, helped to form. Hence, the Victorian science writer Grant Allen claimed that “from the coarse animal pleasure of beholding food mankind has already developed, through delicate gradations, our modern disinterested love for the glories of sunset” (1879, 282). From this new, Darwinian perspective, the organic world needed to be studied as a network of appearances and interpretations. The Oxford entomologist and theorist of protective mimicry Edward Bagnall Poulton summed up the imaginative leap that such studies involved when he wrote, “We argue from the effect produced by certain colours, forms, or attitudes upon ourselves, to the effect that must be produced upon other animals” (1884, 52–53). As I will show in my textual analysis of Belt's memoir below, studying protective mimicry meant trying to picture the world through other species' eyes.

At the same time, though, challenging the binary opposition between humans and animals does not have to imply humanizing animals—it could mean, conversely, animalizing humans. Human actions that seem intelligent and agential might, through the prism of species-wide behavioral tendencies, acquire a mechanistic aspect similar to many animal actions. Let it be remembered that Darwin’s mechanism of evolution by natural selection was derived from economic theory, which reduced humans to populations blindly multiplying, the same as animals.⁸ The potential of evolutionary continuity between humans and animals to undermine individual autonomy in the former was most memorably summed up by Darwin’s disciple Thomas Henry Huxley in 1874. Consciousness, Huxley wrote, might be related to the body’s actions “simply as a collateral product of its working, and to be as completely without any power of modifying that working as the steam-whistle which accompanies the work of a locomotive engine is without influence upon its machinery” (1901, 240). Hence, “our mental conditions are simply the symbols in consciousness of the changes which take place automatically in the organism” (Huxley 1901, 244). Huxley viewed consciousness as being of little importance in biology since, in his opinion, it could merely register instinctive drives behind action without influencing them.

In line with such determinism, protective mimicry as a concept had the power to remodel deception as a mechanistic law of life, occurring across the animal and human worlds irrespective of individual consciousness. Bates’s colleague Alfred Russel Wallace commented in 1867,

It is to be particularly observed that the word “mimicry” is never used in this article in the sense of voluntary imitation. It here means a particular kind of resemblance only; a resemblance not in internal structure but in external appearance; a resemblance in those parts only that catch the eye; a resemblance that deceives. As this kind of resemblance has the same effect as voluntary imitation or mimicry, and as there is no word in the language that expresses the required meaning, “mimicry” was adopted (17).

Although the interspecies resemblances described had the same effect that intentional imitation would have had, they were produced by pure chance—that is to say, by a series of random variations from one generation to the next. Protective mimicry was not merely a metaphoric use of language but a reconceptualization of imitation and deception from ethically freighted human activities into amoral laws of nature.

Animalizing Mimicry

This reconceptualization of mimicry and deception as communication without the need for a conscious sender has continued to interest observers from the twentieth century to the present, seeming to promise both to dissolve differences between humans and animals and to consolidate them. For example, Caillois compared insect mimicry to humans' interest in masks and disguises, arguing that mimicry reflected universal, transspecies tendencies toward aesthetic patterns, imitation and intimidation. Adopting a psychoanalytic frame, he suggested that insect camouflage stemmed from a primordial urge toward “assimilation to the surroundings,” a kind of cosmic death drive ([1935] 1984, 27). Perhaps more convincingly, he later compared insects' ocelli, spots resembling the eyes of larger animals, with humans' use of masks as “an instrument of intimidation and political power” (1964, 106). Regardless of the intentionality of human or animal masking, Caillois wrote, “the *repertoire of frightening appearances* is limited and applicable to all creatures. . . . The effect sought for is the same, and the method of getting it too” (1964, 120–22). Semiosis cuts across animal and human experience less in terms of the conscious manipulation of signs than in their interpretation by receivers. Semiosis, Caillois implies, is primarily about the reception and extrapolation of meanings from signs rather than the agencies or intentions that might have formed them. However, Caillois still sometimes partly

endorsed the traditional, Cartesian division between mechanical animals and human subjects due to a larger ideological agenda. Influenced by the surrealist movement, he sought to present insect mimicry as an example of paradoxical creativity without agency and intelligence without thought (Cheng 2009, 72). Hence, Caillois concluded, “The success of man, or his misfortune perhaps, is to have introduced an element of play into the rigid machinery [of nature]” (1964, 127). Caillois was more interested in mechanizing aspects of human life than finding agency in the nonhuman.

This denial of communicative agency to animals has since been refined and (more often) countered from numerous quarters. Jacques Lacan argued that humans were conscious that they existed as objects of perception and could thus manipulate and “play” with their appearances, while animals were incapable of such true self-representation. Human disguises are infinitely changeable, he claimed, but the animal is “captured” by its disguise, most obviously in the mimetic semblance that is built into its physical form (1977, 107; see also Silverman 2000, 134–36). However, as Jacques Derrida pointed out in his critique of Lacan, modern psychology has undermined faith in the human sovereign ego, blurring the boundaries between conscious and unconscious action (2008, 119–25). Phenomenologists such as Maurice Merleau-Ponty have questioned traditional distinctions between subject and object, arguing for the centrality of the body in perception, which positions humans on an experiential continuum with other species (2002, 379–89). Further, the rise of structuralism and poststructuralism in the twentieth century has generated models for conceptualizing semiosis irrespective of intentionality. While Ferdinand de Saussure (2013) divided semiosis into sign and semantics, Charles Sanders Peirce (1994) conceived a triadic structure of sign, referent, and interpretant (the effect of a sign on its interpreter). Moreover, models of meaning as a constant process of deferral have undermined traditional notions of the author or sign maker as an agent controlling meaning (see Derrida

2001; Barthes 1977). This reconceptualization of signs as matters of effect rather than intention has opened up new possibilities for thinking about semiosis as a field of phenomena that imbricates humans with other organisms rather than separating them. As the scholar Timo Maran notes, Peirce’s definition of a sign as “something which stands to somebody for something in some respect or capacity” dovetails closely with “the essential research question of biological mimicry.¹⁰⁰ . . . What resembles what to whom in what respect?” (2001, 243–57).⁹

At the same time, developments in the life sciences through the twentieth century established a firm basis for theorizing about animal perceptions. After studying the sense organs of many creatures, the Baltic-German biologist Jakob von Uexküll contended that all sensory beings should be considered as subjects inhabiting their own perceptual world, or *Umwelt*. Organisms sharing a common environment, he wrote, coexisted in “circuits of meaning,” acting as, respectively, “carriers” and “utilizers” (or receivers) of salient signs to each other (2010, 172). Hence, Uexküll concluded, “every living thing is a subject that lives in its own world, of which it is the center. It cannot, therefore, be compared to a machine, only to the machine operator who guides the machine” (45). This approach to animals as perceptive subjects grew in tandem with ethological studies of biological mimicry as researchers modeled mimicry as a triadic system divided between mimic (the imitating organism), model (the organism or object being imitated), and signal receiver (the organism that conflates these organisms) (see Wickler 1968; Vane-Wright 1976). From this perspective, crypsis, or camouflage, could be redefined as a “nonsignal,” involving an organism failing to register in a perceiver’s *Umwelt* rather than registering as something it is not (Maran 2001, 331). In the last decades of the century, the American semiotician Thomas Sebeok strove to expand semiotics into animal communication and perception, popularizing terms such as “biosemiotics” and “zoosemiotics.” Importing

¹⁰⁰ If this ellipsis was part of the original and not added here, please stet. No, it was not part of the original.

Peircian sign classifications into biology, he argued that organisms' survival depended on "the correct decipherment of indexical signs ceaselessly barraging their *Umwelt*" (1990, 95–96).

Further, he described protective mimicry as a form of iconicity, since it involves signification through resemblance.

In current theoretical biology, this semiotic approach to mimicry is challenging animal-human and nature-culture binaries in radical ways. The Danish biologist Jesper Hoffmeyer observes that "genocentric" biochemistry and microbiology present "genetic information" as "a simple causal factor," much like Latour's mechanistic "concatenations" of causes (2010, 157–58). Yet, Hoffmeyer observes, "genetic information does not simply 'cause' things to happen"; the functioning of genes is shaped by myriad environmental influences (158). He thus suggests "signs" as a better paradigm for understanding biological phenomena than mechanistic "information," because signs "are not causes in the traditional sense of (Aristotelian) efficient causality, for the effect of a sign is not compulsory but depends upon a process of interpretation, and the interpretation may well be—and probably most often is—'mistaken'" (159). Protective mimicry is an obvious example of such slippage between cause and effect, involving the subjective interpretation of a signal receiver. Indeed, Hoffmeyer suggests that organisms being the receivers in such relationships could have been crucial to the development of perception and cognition. As mimetic species evolved evermore-perfect resemblances, he claims, this selection pressure would cause their prey or predators to evolve "more sophisticated forms of 'semiotic freedom' in the sense of an increased capacity for responding to a variety of signals through the formation of (locally) meaningful interpretants" (164). For example, mammals have evolved to scrutinize the world through a variety of complex sensory systems. These systems are further elaborated by cognitive capacities that enable them to recall many aspects of their impressions

(such as animals' characteristic styles of movement or hiding places) and so cross-reference these impressions and read more identificatory cues (see Maran 2015, 217). In this way, Hoffmeyer presents biosemiotics as a paradigm for bridging the apparent gulf between a mechanistic material universe and subjective consciousness. More automatic forms of semiosis at the cellular level can be imagined as scaffolding¹⁰¹ the emergence of more semiotically free systems of interpretation. A trajectory can thus be plotted through animals' increasingly complex cognitive-perceptual subjectivity to the highly abstract, flexible, and self-aware symbolism of human language. Hoffmeyer declares, "Instead of the Cartesian either-or thinking, biosemiotics institutes a more-or-less thinking" (165). The supposed categorical distinction between agential human lies and mindless animal deception thus collapses into a continuum.

The Biosemiotics of Mimicry in Belt's *The Naturalist in Nicaragua*

The remainder of this essay will contend that such biosemiotic thinking was foreshadowed by nineteenth-century field naturalists studying mimicry who empathized imaginatively with the animals being deceived. I will pursue this claim through a close reading of Thomas Belt's *Naturalist in Nicaragua*, which contains many anecdotes of deceptive appearances and behavior witnessed among animals in the country. These anecdotes vacillate between anthropomorphizing and mechanomorphizing animals, as well as zoomorphizing the narrator as his immediate sensory impressions are offered as proxies for the experiences of animals.¹⁰ While Belt remains uncertain of which animals are capable of consciously deceiving and to what extent, his text ultimately frames deception among animals as systemic and dependent on the psychology of the signal receivers rather than the senders. The possible intentionality of the deceiving party fades

¹⁰¹ "Scaffold" is not listed as a verb in MW11. Should this be "scaffolding for the emergence"? Perhaps replace with 'laying the groundwork for'?

into irrelevance as Belt explores the complex, shifting worlds of appearance that animals inhabit and how these perceptual worlds, or *Umwelten*, reshape their environments. Belt's descriptions of his encounters with mimetic and deceptive animals in the wild exemplify Anat Pick's concept of "creaturely poetics," which depicts experiential overlap between humans and animals based on the "corporeal reality of living bodies" (2011, 3). Belt's anecdotes are also comparable with Nicole Seymour's model of ecological consciousness as "an empathetic looking with" rather than an othering "looking at" (2013, 118). Belt achieves the former effect through his efforts to understand the dynamics of deception among animals by placing himself in the position of signal receiver. The naturalist is able to reflect detachedly on his impressions and thus construct abstract theories about the world. Yet, in the immediate moment of being deceived by animals, he inhabits a comparable experiential space to these creatures' natural prey and foes. In such moments, the narrative focalization shifts from the intellectually distant scientist to a visceral sentience that blurs species boundaries.¹¹ Belt developed this protobiosemiotic view partly through the hybrid genre of the naturalist's travel memoir, which mixed scientific discussion with autobiographical impressions.¹² Working in this form, Belt was able to use his personal, subjective experiences of Nicaragua's natural environments to imaginatively enter their intraspecies semiotic networks, or "semiospheres."¹³

Thomas Belt was an engineer and geologist from Newcastle who spent four years in Nicaragua on a gold-mining project. In his spare time during this period, Belt meticulously studied the country's wildlife in accordance with Darwin's evolutionary principles. These studies, along with ethnological observations of Nicaragua's human inhabitants, formed the bedrock of his memoir. Although little studied in the twenty-first century, *Naturalist in Nicaragua* won high praise from Belt's scientific contemporaries. In a letter to Joseph Dalton

Hooker, dated March 25, 1874, Darwin described the book as “the best of all the Nat. Hist. journals which have ever been published” (Darwin 1874). Wallace was similarly impressed, writing in a review, “Mr. Belt is a close, an accurate, and an intelligent observer. He possesses the valuable faculty of wonder at whatever is new, or strange, or beautiful in nature; and the equally valuable habit of seeking a reason for all that he sees” (1874, 218). Belt would die only four years after the publication of his book, struck down by fever while studying glacial deposits in Colorado, still in his forties. However, one obituary confidently declared, “The name of Thomas Belt will not be forgotten. Though he has passed away from us in the flower of his age, the work that he has done has gained for him a position in the scientific world to which few of greater years attain. . . . In the departments of Natural Science to which he applied himself his name stands as an authority, and his work is quoted as that of a master” (Wright 1880, 238). Belt failed to achieve the long-lasting fame of many of his peers, but his memoir was a popular and influential text in Victorian natural history literature.

The memoir was written under the mentorship of Bates and described many examples of protective mimicry that Belt claimed to have observed, along with other forms of deceptive animal behavior.¹⁴ Such deception sometimes seemed intentional. For example, watching an army of ants tearing through the forest, Belt noted that “spiders generally were most intelligent in escaping.” He observes one spider amid the ants “lifting, one after the other, its long legs, which supported its body above their reach. Sometimes as many as five out of its eight legs would be lifted at once” (19). Belt’s description seems to imply that the spider realizes the ants will only attack what they sense with their tactile organs. It appears to possess the mental abstraction to imagine the perceptions of others—what psychologists now call “theory of mind” (see Wynne 2004, 175–82).

However, such attribution of Machiavellian intelligence to animals was countered in Belt's thinking by a strong interest in hereditary instinct, which he also offered as the cause of deceptive behavior. While his anecdotes of individual animals can often seem to treat them as conscious deceivers, Belt's visions of broader, evolutionary trends suggest, conversely, that such creatures are following fixed, instinctive promptings shaped by generations of variation and selective pressures. Although Belt highlighted the role of behavior in many animal mimics (such as holding still or assuming a certain pose), he was uncomfortable with the agential connotations of "mimicry" as a term. Echoing Wallace, he wrote, "I must explain that it is only on account of the poverty of our language that we have to speak of one species imitating another, as if it were a conscious act. No such idea is entertained, and it might have been well if some new term had been adopted to express what is meant" (8). The potential automatism of deceptive animal actions is shown when Belt observes a locust that escapes the ant army's detection by freezing still as they walk over it. Yet, instead of attributing this action to intelligent calculation, Belt explains it by a "fixed . . . instinctive knowledge that its safety depended on its immovability" (19). At other times, Belt wavers between treating animals as intentional deceivers and mere organic machines blindly following their instincts. This uncertainty is discernible in an anecdote in which he nearly steps within biting distance of a live alligator. He had mistakenly thought that the alligator was dead due its stillness, others having been recently shot nearby. Luckily, Belt sees the creature's eye following him and retreats just in time. He demurs from pronouncing on the possible intentionality or automatism of the alligator's stillness, writing, "It is the habit of these animals to lie quite still, and catch animals that come near them. Whether or not he was waiting until I came within the swoop of his mighty tail I know not, but I had the feeling that I had escaped a great danger" (9). Prefiguring the strict empiricism of

twentieth-century behaviorist psychology, Belt retreats from inferring unseen mental operations to merely recording external actions or “habits.”

Yet such possible intentions are not necessary for deception to take place, since Belt formulates this as receivers interpreting signs rather than senders consciously transmitting messages. Animals thus encroach on the human-held territory of agency and cognition less by deceiving others than by being deceived themselves. Their capacity to be mistaken reflects the nonmechanical nature of their existence. Their actions are not merely links in fixed chains of necessity but arise from subjective experience, however seemingly limited when compared with that of humans. The mechanistic link between cause and effect loosens into a more open and flexible play of semiosis. This flexibility is an inevitable part of Belt’s evolutionary vision as deceptive organisms and their perceivers survive in the perpetual arms race described by Hoffmeyer. Increasingly sophisticated deceptions necessitate more sophisticated forms of looking to unmask them, as Belt comments: “Natural selection not only tends to pick out and preserve the forms that have protective resemblances, but to increase the perceptions of the predatory species.” He outlines this principle with an imaginary example of dogs marooned on an island where food sources are limited and fast moving. Over generations, he argues, not only would the dog population become faster as slower dogs died out, but also “the dogs might increase in cunning, or combine together to work in couples or in packs by the same selective process” (383). Detecting, pursuing, and avoiding other animals are by no means straightforward actions and can involve increasing perceptual and cognitive complexity as these rivals become wiler and more elusive.

Belt illustrates this process through his observations of animals adapting to register and interpret indexical signs of their predators. He studies an area thick with spiders’ webs and

wonders how the butterflies nearby know to avoid these traps. Belt reports that “getting behind them, and trying to frighten them within the silken curtain, their instinct taught them to avoid it, for, although startled, they threaded their way through open spaces and between the webs with the greatest ease. It was one instance of many I have noticed of the strong instinct implanted in insects to avoid their natural enemies” (109). The functioning of the spiders’ webs as devices for procuring food is derailed by the insects’ interpretive aversion, however simple and fixed this may seem. More challenging to mechanistic views of nature are Belt’s depictions of animals as beings that learn to differentiate signs of things rather than doing so simply by instinct. Belt claims that the country’s leaf-cutting ants learn through experience to collect leaves, demonstrated by younger ants carrying unsuitable objects into the nest such as grass. These mistakes are corrected by older ants, however, as Belt writes: “After a while these pieces are always brought out again and thrown away. I can imagine a young ant getting a severe ear-wiggling from one of the major-domos for its stupidity” (83). The anthropomorphic imagery reflects Belt’s high estimation of ant society as a semiosphere. The communication systems within their colonies seem so complex that Belt is even moved to elide their social and psychological differences from humans, writing, “Perhaps if we could learn their wonderful language we should find that even in their mental condition they also rank next to humanity” (27). Conversely, the ants’ rivals are shown to survive by eluding or sabotaging the semiotic network between the ants. While the stillness of the aforementioned locust creates a nonsignal for the army obliviously marching over it, birds hide from the swarm by nesting in holes of trees, “with their heads ever turned to the only entrance.” This strategy, Belt notes, enables them “to pick off the solitary parties when they first approach, and thus prevent them from carrying to the main army intelligence about the nest” (23). Belt’s account frames the struggle for life as what

we might now call a semiotic struggle, with rival species adapting to each other's *Umwelten*.

Belt further eroded distinctions between human and animal experience by claiming to demonstrate animal deceptions through anecdotes of his own misperceptions in the field. His stories of being beguiled by insects' and other creatures' appearances presented his human impressions as proxies for those of animals. After encountering numerous stinging ants in one region, Belt recalls swinging his net and seeing inside it "what appeared to be" one of the ants. However, "it was a small spider that closely resembled an ant, and so perfect was the imitation that it was not until I killed it that I determined that it was a spider and that I need not be afraid of it stinging me" (314). In another vignette, he "observed what appeared to be a hornet, with brown semi-transparent wings and yellow antennae. It ran along the ground vibrating its wings and antennae exactly like a hornet, and I caught it in my net, believing it to be one." Again, only close examination reveals the creature to be a hemipteran, or true bug, "a widely different order" to that of the hornet (319). Belt's series of impressions mirror the imagined perceptual processes of insectivorous animals deceived by the spider's and bug's resemblances to unpalatable species. While Belt's anatomical examination of specimens gives him an informed, reflective vision that these predators lack, his immediate, embodied perceptions of the mimics on the wing are imagined as a shared experience with nonhumans.

Belt's sense that visual impressions could form an empathic bridge between humans and animals drew energy from Victorian art theory, which sometimes framed such immediate sensory experience as anterior to ideation. The critic John Ruskin called for artistic vision with an "innocence of the eye," which would naively capture the colors, shapes, and tones of raw sight prior to the intervention of intellect (1857, 6). Such "innocent" vision could be imagined as comparable to the sentience of animals. In this vein, Belt writes in awe of "the wonderful

perfection of mimetic forms,” offering his aesthetic pleasure at the uncanny resemblances as a vehicle for empathizing with animals that also glimpse them (384). Belt’s descriptions of camouflaged animals sometimes even carry the style of ekphrasis, apprehending nature’s appearances like the suggestive lines and colors of a painting. One tree lizard “is not only of a beautiful green colour, but has foliaceous expansions on its limbs and body, so that even when amongst the long grass it looks like a leafy shoot that has fallen from the trees above” (340). Similarly, as Ruskin celebrated the ability of painters to capture nature’s “illusions” on canvas, Belt depicts natural environments and the animals indigenous to them as arrangements of colors and contrasts that trick the eye. When discussing birds that blend in with vegetation, he recalls “once in Australia firing at what I thought was a solitary ‘green leek’ parrot amongst a bunch of leaves, and to my astonishment five ‘green leeks’ fell to the ground, the whole bunch of apparent leaves having been composed of them” (197). Through such impressionistic anecdotes of his perceptions in the field, Belt encourages his readers to imagine life through the eyes of animals—to conceptualize them as not machines or dead specimens but sentient beings who, like humans, experience the world subjectively, albeit with different sensory organs and, perhaps, less mental abstraction.

Belt’s approach to animal mimicry as semiotic play fitted into a larger vision of the living world as endless networks of signs and interpreters. Protective mimicry was often dependent on other species’ aposematism, that is, conspicuous signs that identified them as unpalatable or equipped with other defenses. Hence, an arms race existed not only between perceiving and deceiving animals but also aposematic organisms and those that mimicked them. Unpalatable species could still be killed or injured by predators whose encounters with palatable mimics had eroded the association between the species’ appearance and unpalatability. Consequently,

animals' aposematic advertisements tended toward increasing complexity and variety in tandem with predators' increasingly sophisticated perceptions and mimics' increasingly exact resemblances. Belt demonstrates this dynamic through an anecdote of three macaws, which he recalls

wheeling round and round in playful flight, now showing all red on the under surface, then turning . . . and showing the gorgeous blue, yellow, and red of the upper side gleaming in the sunshine; screaming meanwhile as they flew with harsh, discordant cries. This gaudy-coloured and noisy bird seems to proclaim aloud that it fears no foe. Its formidable beak protects it from every danger, for no hawk or predatory mammal dares attack a bird so strongly armed (196).

Belt's description downplays the question of how much of the macaws' actions might spring from mindless instinct or conscious choice; his focus is on how these actions form salient, distinctive signs to potential aggressors like himself. His aesthetic experience of the birds, converted into verbal art for readers, functions as a vehicle for interspecies empathy. The deep impressions that the macaws' bright colors and wince-inducing sounds make on Belt approximate the impressions that they make on other animals. However, as in contemporary biosemiotics, Belt's empathetic visions of animal semiosis do not so much anthropomorphize animals as decenter communication from humans. Belt sometimes depicted animal communication in anthropomorphic terms, such as in his descriptions of the "language" of ants. Yet he presented his impressionistic accounts of animals' appearances as insights into nonhuman life through their grounding in immediate, bodily sensation and barely conscious perceptual associations.

Belt's example demonstrates that biosemiotics involves not only extending seemingly exclusively human concepts such as meaning and interpretation to animals but also, potentially, extending "animal" models of unreflective perception and reactions to humans. Maran comments that, unlike the Cartesian model of immaterial mind, the "semiotic self is a multilayered

structure, based on all memory-capable codes in the body,” rising through “immunological, neurological, cognitive and in the case of human animals also verbal and narrative layers” (2010, 325). Maran suggests that a field of literary criticism might be founded on biosemiotics, which would explore “communicative and sign relations between human cultural activities and other semiotic subjects and their representation in literature” (2014, 262). I hope that my brief discussion of Belt’s memoir can stand as a modest contribution to this nascent field. Belt’s self-representation in the text as an embodied perceiver, experiencing Nicaragua’s rainforests as a flood of sensory impressions, ran against the growing discourse of scientific objectivity at the time, which revered mechanical forms of observation imagined as undistorted by biased human perception.¹⁵ However, this personal, visceral style served as a vehicle for rethinking semiosis in nonanthropocentric terms. Belt’s visions point toward a new model of sign making and interpretation as universal processes, which no longer cut humans off from the rest of the organic world but, on the contrary, merged them with it.

About the Author

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Notes

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1. On the history of biological mimicry as a concept, see Komarek (1998) and Forbes (2009).
2. See Maclean (2002, 276–332) and Wood (2000, 19–24).
3. See Wheeler (2016, 20–21). One exception to this trend was John Poinsett’s obscure *Tractatus de Signis* (1632), which suggested that signs might be central to the lives of many animals as well as humans. See Poinsett (2013).

4. On the history of scientific objectivity and anthropomorphism, see White (2005), Crist (1999), and Knoll (1997).
5. Montebello (2003, 13–14), quoted and translated in Weemans and Prévost (2014, 6–7).
6. See, for example, Richard Rorty’s (1979) argument that Western philosophy from the seventeenth century onward constructed the mind as a reflective mirror of retinal images (45).
7. In Jonathan Crary’s words, vision changed from “a privileged form of knowing” to “itself an object of knowledge” (1990, 5).
8. On the complex role of Malthusianism in the history of evolutionary theory, see Hale (2012).
9. The question of intentionality still enters into the subfield of “zoopragmatics,” which concerns how animals encode messages. However, many researchers only concede that signals can even begin to be classed as “symbolic” or “goal directed” in communication among primates. See Nöth (1995, 159).
10. On the complex, overlapping rhetorical structures of anthropomorphism, mechanomorphism, and zoomorphism, see Garrard (2012, 152–70).
11. On narrative focalization and human-animal boundaries, see Nelles (2001).
12. On the intersections between the travel memoir and natural history, see Smethurst (2013, 43–50).
13. On the origin of the term “semiosphere,” see Lotman (2005).
14. Belt dedicated his memoir to Bates, declaring the latter’s *Naturalist on the River Amazons* (1863) “my guide and model” (iii).
15. On the rise of this discourse of “mechanical objectivity” in the late nineteenth century, see Daston and Galison (2007, 115–90).

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