



Natural, Un-Natural and Detached Mimicry

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Abstract

Natural mimicry is ubiquitous. Plants mimic animals, animals mimic plants, animals mimic each other and animals may even mimic counterfactual states that deceive or distract other animals. Almost all natural mimicry is based on iconicity which hence anchors it in real world resemblances. The vast majority of natural mimicry is done unconsciously but when humans mimic, they know what they are doing. As Merlin Donald suggest, mimicry may in fact have played a crucial role in the emergence of the human condition, allowing new forms of cognition to emerge. Here it is suggested that the role played by mimicry may have involved the evolution of a capacity for metaphorical perception, where an object may not only be seen ‘as is’ but also ‘as if’ it was a functional mimic of something else. This new form of mimicry made possible new forms of communication, co-operation and creative engagement with the environment. Once these developed to the point where they produced symbolic systems and other cultural tools, the nature of human mimicry expanded radically. No longer anchored in resemblance, it became detached and qualitatively distinct from natural forms. The consequences of this detachment are now becoming clear.

Keywords Iconicity · Affordance · Metaphor · Gibson · Donald · Baudrillard

Introduction

Nature creates similarities. One need only think of mimicry. The highest capacity for producing similarities, however, is man’s. His gift of seeing resemblances is nothing other than a rudiment of the powerful compulsion in former times to become and behave like something else. Perhaps there is

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none of his higher functions in which his mimetic faculty does not play a decisive role. (Benjamin 1986, 333).

Walter Benjamin notes that mimicry is natural. In claiming that human beings have the highest capacity for producing similarities he seems to give it an important role in defining the human condition. But the human condition is not wholly natural. While it has deep evolutionary roots which embed it in nature, the unique cultural setting in which human beings develop sets them apart from nature at the same time. Mimicry played a key role in the emergence of this paradoxical state of existence and continues to play a role in maintaining and developing it. What will be suggested here is part of what this role might be, using a biosemiotic approach to mimicry and the notion of affordance as put forward by James Gibson. These, in combination with theories of the evolutionary and developmental origins of human cognition, will be used to examine the relationship, or lack of it, between natural and human mimicry.

Human beings may have the highest capacity for mimicry, but there was mimicry before there were human beings. The many examples that can be found in the plants and animals now on earth are products of a history of mutual evolution that reaches back to the Cambrian era and possibly before that. While the fossil record would not be rich enough to show specific examples of mimicry such as those to be found in the contemporary living world, the diversity of life forms found in it makes it reasonable to suppose that mimicry existed once there was enough species diversity to support it.

The human capacity for mimicry must relate to that history in some way. But it is overstating the case to say as Benjamin does that it emerged from "... the powerful compulsion in former times to become and behave like something else.". Put that way it makes the human capacity for mimicry seem to be the outcome of a recognisable psychological impulse. But, as many studies makes clear, mimicry can be seen in a huge variety of organisms which are not sufficiently developed to have a "compulsion ... to become and behave like something else". Yet mimicry is very clearly part of the relationship between many species in the natural world from which the human condition will have evolved (e.g. Wickler 1965; Pasteur 1982; Maran 2017). So, while this paper will end by considering how mimicry relates to the human condition, it will begin by briefly looking at mimicry in the natural, that is, pre-human, world.

Natural Mimicry

Definitions of mimicry are many and various. The term appears in the research literature on topics that range from molecular chemistry through physiology, psychology and cultural history. Clearly, the term is too inclusive to be of much use on its own. Introducing some constraints in order to frame a more refined and exact definition seems needed.

A more developed definition of mimicry found in the Oxford English dictionary is: "The action, practice, or art of mimicking or closely imitating, in sport or otherwise, the manner, gesture, speech, or mode of actions and persons, or the superficial characteristics of a thing." This does well to describe what satirical impersonators of politicians do, to use a somewhat odd example. This is clearly mimicry with a particular place in culture. But the definition won't do at the molecular level. Biochemical events are not

in the same class of things as intentional actions within the complex web of human affairs. To refer to them with the same term would be a category error.

Perhaps it might be more productive to define mimicry in terms of cause and effect. When sympathomimetic drugs are used to de-constrict the airways of asthmatics, they are said to mimic the physiological action of adrenaline. Here the link between cause and effect is fairly direct. It could be traced by investigating the biochemical processes involved, since the molecular structure of the drug resembles that of adrenaline it can have the same effects on the body. Therein lies the mimicry. But this won't do to describe, say the satirical mimicry of politicians; this is the category error. Mimicry of this latter sort is intended to amuse and whether it does has to do with the complexities of political culture at a particular moment and an indefinite number of other social and psychological factors.

Moreover, in the human case it is far more difficult to trace cause and effect links because mimicry can take so many forms and has an indefinite number of purposes. Someone who mimics a politician does not expect that their audience will think that they actually are that person. But when a poker player with a strong hand wants other players to think she has a weak one she may mimic what she does when she really does have a weak hand. She wants her mimicry to cause a mistaken state of mind in the other players. Whether that cause and effect link is made will, again, depend on the personalities involved, the history of the game up to that point and many other factors in and around the situation.

These examples highlight the layers of interpersonal interpretation that can accompany mimicry in the human world. But avoiding these complex and volatile factors, perhaps mimicry in the natural world of animals and plants might be easier to explain in cause and effect terms. But this won't cover the wide variety of mimicry to be found there either. When a Killdeer plover behaves as if it had a wounded wing the effect may be to distract a predator away from a nest, but the biochemical processes involved will be at best secondary explanations for what is going on. The primary explanation of the link between cause and effect will have to do with the co-evolution of prey-predator relationships. It also raises quite fundamental questions about just how intentional animal actions are, the question in this case being whether the plover has the intention to deceive the predator. The poker player above had a clear idea about what she wanted to achieve; it seems unlikely that the plover has an imagined outcome in mind, yet her actions appear highly intentional and in somewhat the same way.

Deception or, more precisely, the intention to deceive, is relevant here in considering the boundary between human and non-human psychology. For example, it is crucially involved in what has become known as Machiavellian Intelligence, which is the capacity to aim for outcomes that depend on some degree of insight into the mental lives of conspecifics (Byrne and Whiten 1988). Whiten and Byrne give a number of examples of animals, nearly always apes or monkeys, emitting false distress cries to gain some tactical advantage in a social situation. In one case a young baboon emitted the sort of cry it would emit if in danger, apparently to attract its mother whose approach would scare off a competitor for some food. Whether this was as intentional as it might appear to a human observer, it is possible that there is some analogy here to the poker player. Certainly there are more grounds for thinking so in this case than in that of the plover. While this is not mimicry per se, it is very close to it, and it is closely bound up with the attribution of intentionality which, as will be touched on below, is

important when considering what distinguishes mimicry in humans from that in the natural world.

When considering animals as complex as birds and apes it is quite easy to maintain what the philosopher of cognitive science Daniel Dennett calls the “intentional stance” (Dennett 1989). This is to regard the actions of people and other animals, as being motivated and guided by mental states such as desires, beliefs and intentions. Even though human beings can’t know it directly it is easy to accept that plovers and apes have some subjective psychological life, that it’s “like something to be them” as Thomas Nagel puts it (Nagel 1974). Human beings know from first-hand experience what it is like to have an intention, which is what makes the case of the poker player understandable. In the case of the young baboon it is perhaps possible to believe that they have something like the intentions a person might have. But the behaviour of the plover is much more stereotyped and fixed to given circumstances and thus it seems less likely in this case. Overall, it is clear that attributing human-like states of mind to animals is best done in the context of careful experimental investigation (e.g. Raby et al. 2007).

Many striking instances of mimicry can be found in simpler organisms like insects and plants where taking the intentional stance seems inappropriate. For example, many insects have bodies that resemble leaves or other parts of plants, which hence camouflage them from predators or from prey. It would seem a little bizarre to propose that they ‘intend’ to hide themselves. They do not behave or assume an appearance ‘in order’ to hide, they have no choice in the matter. That their bodies have the extraordinarily plant-like appearance that they do is a result of their co-evolution with other insects and plants. Their behaviour will also have evolved in tandem with their morphology. For an insect not to look like what it is but like a twig it is best to keep very still (e.g. Robinson 1981).

Plants too can have characteristics that are not what they seem. The flowers of the hammer orchid, *Drakaea livida*, not only mimic the shape of female Thynnine wasps but also emit an odour that mimics the mating pheromone they emit. (Gasket et al. 2017) Male wasps are deceived into attempting to mate with the flower and thereby pollinate it. In this striking example of mutual evolution it’s not so hard to imagine that the wasps have some degree of intentionality, but much harder to think that the orchid is ‘intending’ anything when it deceives a wasp. Here, we are clearly a long conceptual way from the strategic deception of the poker player.

Even this tiny fraction of the great many instances of mimicry found in the natural world shows how diverse they are. The point in providing these examples is to show that despite the diversity, what is almost always the case in natural mimicry is that is based on real world resemblances. This will provide a central contrast to the treatment of different types on mimicry below. But in respect of natural mimicry, biologists, naturalists and others have ordered its diversity into a natural history (e.g. Pasteur 1982) or by using concepts from communication and information theory, both with some success (e.g. Wickler 1965). However, a biosemiotic approach seems particularly suited to doing this (e.g. Maran 2017).

A Biosemiotic Perspective on Mimicry

The nomenclature of semiotics allows the field of mimicry to be structured to provide a more inclusive, ordered natural history. In the cases noted above, the leaf mimicry of

insects and the wasp mimicry of orchids are instances of iconicity, while the orchid's emission of a pheromone-like odour is perhaps more indexical. Much as the notion of smoke being an index of fire, so the odour of a flower is an index of the nectar it affords.

Peirce's semiotic triad is a flexible framework into which it's possible to fit the baboon and plover examples. The triadic framework could also accommodate the poker player and the impersonators, but there the relationship between sign object and interpretant is vastly more complex. What makes it so is the human capacity for reflexive consciousness combined with metaphorical cognition, which will be touched on in the next section.

In the natural world, however, it is clear that the power of a biosemiotic approach is that it treats the natural forms of mimicry as meaning based. This is far more productive and realistic than trying to describe it, and the wider field of interaction between organisms and their niches, in abstract and reductive terms, such as the exchange of information, the development of stimulus - response habits or even to mere physiology.

Biosemiotics is a rich blend of biological science, especially ethology, Peircian semiotics and owes much to Jacob von Uexküll's approach to living processes, which was fundamentally meaning based. Strongly influenced by the Naturphilosophie of Hegel and Schelling, von Uexküll took evolutionary change to be the progressive unfolding of organic plans rather than the accumulation of useful accidents. Ecologies in his view were integrated systems of living things, harmoniously interacting with one another on the basis of meaning. Indeed, for von Uexküll life itself was based on meaning: "... life can only be understood when one has acknowledged the importance of meaning." (von Uexküll 1982b). A biosemiotic approach brings Peirce and von Uexküll together to offer a picture of the organic world as perfused, and hence structured, by signs, that is, by the exchange of meanings (Hoffmeyer 2009; Romanini and Eliseo Fernandez 2014; von Uexküll 1982a).

Here it is well to remember that 'meaning' has a dual character, namely, what the world 'means' to the organism and what organisms 'means' to do in acting towards the world. This dual character is what makes the biosemiotic approach ideal for describing the how mimicry is an aspect of the interrelatedness of living systems, thus: "In semiotic relations, different organisms are bound together through perception, recognition, communication and action, and it is in this layer that the organism's interpretation starts shaping the future stages of the mimicry system." (Maran 2017, 117).

A biosemiotic approach also addresses the question of what drives and directs evolution. Rather than appealing to immaterial forces such as Bergson's *elan vital* or to mystical final causes like Teilhard de Chardin's Omega Point, a biosemiotic approach suggests that progressive evolutionary change is in the direction of what Hoffmeyer calls semiotic freedom (Hoffmeyer 2010). This direction is towards states in which organisms can interpret a wider range of signs, and have greater flexibility in the interpretation of those signs. "Selection would in fact be expected to favour the evolution of more sophisticated forms of semiotic freedom in the sense of an increased capacity for responding to a variety of signs" (Hoffmeyer 2010, 9). This increase in capacity is perhaps the same as a move from 'closed' to 'open' evolutionary strategies, to use the distinction put forward by Ernst Mayr (Mayr 1974). By 'open' Mayr meant animals that were adaptable and able to learn while by 'closed' he mean animals that were more reliant on instinctual habits, making Hoffmeyer's trajectory towards sophistication a move towards open strategies.

In summary, biosemiotics not only offers a comprehensive theoretical vocabulary for ordering the huge field of natural mimicry but also a way to understand the direction of evolutionary change. The question might then be asked, does this direction point towards the human condition, with the more complex forms of mimicry that can be found in it? Here it will be suggested that it does not. Not, at least, in itself. However, the clarity the biosemiotic approach gives to the issue of mimicry helps to prepare the way for an explanation, as it were. In the next section some biosemiotic ideas will be used, in conjunction with others from the work of Merlin Donald, Michael Tomasello and James Gibson, to suggest a role, or roles, for mimicry in the human condition. Not all of these roles are natural and this is why human mimicry is fundamentally different from that found in the pre-human world.

Un-Natural Mimicry

Both animals and human beings are conscious, but only human beings know that they are. Reflexive awareness is an evolutionary anomaly that has had profound consequences. Together with other cognitive resources that also appear to be more or less a human monopoly, it has ushered in the era of cultural evolution. The history of this era is the subject of a vast research literature and although it changes as new discoveries are made, some features and their dates are fairly well established.

Tool making of a higher order than that found in the animal world appeared around two million years ago, while controlled use of fire seems to have been established around a half million years ago, and farming about ten thousand years ago. This progressive increase in the cultural scaffolding supporting human existence will have been accompanied by, and made possible by, the parallel development of a set of cognitive and communicative resources, eventually including language.

In his sweeping survey of the cognitive history of human beings, Jeremy Lent gives significant coverage to Merlin Donald's notion of mimesis, (Donald 1993), which will be outlined below. In his chapter 1, which Lent entitles 'How we became Human.', he quotes Donald's observation that mimesis "... underlies all modern cultures and forms the most basic medium of human communication." (Lent 2017, 40). He also cites it as a crucial factor in the development of co-operative cultural patterns that allowed human groups to grow in size and to survive more effectively in their environment. This is an issue to which we shall return at the end of this paper. In subsequent chapters Lent carefully traces out the various cultural advances made by human beings to show how they may have produced, from the relative cultural homogeneity which probably marked early humans, the great diversity of human cultures that have existed in the more recent past and that have persisted into the present.

Yuval Harari also presents a far-reaching account of human history and, like Lent, emphasises the role of co-operation in the success of early human beings (Harari 2011, 52). While he goes somewhat deeper than Lent into the origins of *Homo sapiens*, he also emphasises cognitive and social abilities rather than physical characteristics. Although he does not deal with mimicry explicitly, like Donald, he places great importance on the development of new cognitive resources as a major factor in the spread of early humans. These resources will have been deployed to meet the challenges of a hunter-gatherer lifestyle more effectively. Significantly, studies of such

societies show that they foster a deep appreciation of the natural world, seen as an interdependent web of living beings, and the place of human beings in it (e.g. McLuhan 1994, chapter 6); this is another issue that will be considered at the end of this paper.

As Donald suggests, these new cognitive resources will also have allowed early humans to monitor their own actions, to act collectively and to share skills to a degree not possible for other species (Donald 1993). This would certainly have meant a move towards "... more sophisticated forms of semiotic freedom ..." to use Hoffmeyer's surmise about the direction of evolutionary change. But, crucially, these more sophisticated signs will have gradually become detached from those of the natural world. The development of the human mind created a new sign domain with qualities not found in the pre-human domain. While this domain clearly includes the cultural signs dealt with by much of semiotics in general, these must have had evolutionary forebears. This is something to which less attention is paid; there is little about evolution to be found in the work of Lotman or Barthes for example.

In a somewhat complementary sense, there's virtually nothing about semiotics in Donald's influential account of the evolution of the human mind. It nonetheless gives a central place to mimicry and takes advanced cultural signs, including language, to be relatively late evolutionary developments. Donald suggests a three-stage evolutionary sequence for the appearance of the cognitive resources that together make the human case special. The sequence, in extremely compressed form, is from the development of the paired capacities for autonomous episodic recall and mimesis, through a process of lexicalisation to the externalisation of collective cultural symbols.

First in the sequence is the development of a capacity for self-cued, that is, autonomous recall from episodic memory allied with the ability to mimic what is recalled through actions of the whole body. Donald suggests this may have appeared in the human line even as early as two million years before the present and well before the appearance of language. It supports the idea that "... human intelligence without language has properties that set it apart from ape intelligence ..." (Donald 1993, 93). Being able to recall and re-enact at will the actions involved in, say, tool use, allowed those actions to be practiced and improved. Being able to recall and re-enact episodes of collective action also meant that proto humans could communicate about them and perhaps plan further actions. It is this form of mimicry that Donald calls mimesis. Mimesis allowed for a vastly more enriched social life than even than the highly developed forms seen in apes and cetaceans. Mimesis is a highly developed form of mimicry that goes well beyond the mere reproduction of appearance. By comparison with natural mimicry it is more open, that is, less tied to particular circumstances. It is also strongly linked to the development of a specifically human capacity for referring to objects or events not actually present. This is why Donald suggests it as a precursor to language, and proposes that as communication developed, particular repeated acts of mimesis became ritualised into known and shared particulars, which is what Donald refers to as lexicalisation. Finally the lexicon becomes the basis for language and this in turn opened the way to the externalisation of shared cultural experience in the form of words and the multitude of symbol systems like writing and numbers.

In this highly abbreviated account, mimicry, or a particularly distinctive development of it, plays a central role in the emergence of the human condition. Rather than mimicry as mere reproduction of resemblance, what appeared in the human case is what Donald distinguishes as mimesis. Mimesis is a self-generated type of mimicry

used to elaborate individual memories and skills as well as to communicate with conspecifics. Lying thus at the heart of what it is to be human, it persists to the present day. As Donald puts it: “If mimesis was the adaptation that generated a distinctively human culture, it follows that the deepest communicative framework of human culture must still be mimetic.” (Donald 2005, 293). What we notice here is that mimesis is not the accidental production and preservation of resemblance that characterises mimicry in the world of animals and plants. Rather it is and was a purposive mental act by self-aware humans and, presumably, proto-humans. The purposes involved are open ended and potentially creative. Mimesis might be the repetition of the actions involved in making tools or building structures. Its purpose, apart from actually producing tools or structures, might be to vary the actions in order to see how they might be more effective. It might also have been used to demonstrate actions to others, or to refer to actions in the past or even to actions planned for the future.

For mimesis to work as a means of communication in this way, observers of mimetic acts must be able to understand the intentions of the mime. Crucially they need to recognise that the actions need to be seen as representing something. This capacity to see something not ‘as it is’ but ‘as if it were something else’ is a sort of metaphorical perception that is so rare within the world of animals that it is effectively a human monopoly. Evidence of something like metaphorical perception can be found in apes. For example, Kohlers’ classic studies of chimpanzees showed that objects like packing cases could be ‘seen as’ something like a ladder to be used to grasp something out of reach (Kohler 1925). However, that capacity was limited and highly dependent on circumstances. Human mimicry is not limited to anything like the same degree.

What Donald proposes is a far more powerful cognitive capacity that moves cognition over a qualitative boundary. It is a type of communication through mimesis, which, in Peircian terms, involves the elective use of signs whose objects may be distant in time and space. The purpose of the communicator is to create a specific interpretant in the communicatee. For example a proto-human, in acting out the gathering and eating of fruit, might have been intending to co-opt others to help in doing that task. The assumption on the part of the actor being that the conspecifics at whom the mimicry was directed would be able to understand it as communicative and to ‘get the message’ as it were. It is this capacity for metaphorical action and perception that makes this early form of mimicry critically distinct from the diverse examples found in the pre-human world. It lies very close to the origins of human cognition.

Michael Tomasello points out that the extremely rapid evolution of human cognition is a puzzle, since biological evolution does not bring about change so quickly (Tomasello 1999). His solution to it is “... that the amazing suite of cognitive skills and products displayed by modern humans is the result of some sort of species-unique mode or modes of cultural transmission.” (Tomasello 1999, chapter 1). What Donald’s account provides is the mimetic key to how this mode of cultural transmission may have begun. That account also requires a number of other proto human cognitive resources to have become linked and to have facilitated each other. Here we have suggested that in addition to mimesis there needed to have been a capacity for metaphorical perception and action.

Another capacity which also appears to be unique to humans is that unlike apes “Humans understand the behaviour of others as intentional goal-directed action.” (Tomasello and Carpenter 2005, 133). Being able to understand conspecifics in terms

of what they intend to do is a powerful means to develop levels of social integration that would be impossible in species lacking that ability. Others evolutionists have also noted the rapid evolution of human cognition and concluded that it will have had much to do with selective pressures that gave advantage to social intelligence that allowed early human to co-operate more fully and so develop more complex forms of social organisation than those found in the animal world (e.g. Byrne and Whiten 1988; Dunbar 2015).

As Tomasello suggests, an important part of social intelligence is the ability to relate to other human beings through understanding their intentions. But this in turn requires that they are recognised to be intentional in ways that can be related to what we know about being intentional through first person experience. We may even extend that knowledge to make intentional attributions to other species. We easily adopt the intentional stance towards dogs, since they have been bred to be understandable in that way. It is less easy to adopt it towards other species and there may in any case be strong limitations to what we can know about the mental lives of other species, according to Nagel (Nagel 1974).

Some degree of an intentional stance towards conspecifics may be an evolutionary advantage (Humphrey 1980). There is some evidence for it in other species, but human beings are exceptionally skilled intention readers. The work of Meltzoff and colleagues have shown that the preconditions for that skill can even be observed in newborns, who appear to mimic the actions, particularly the expressions, of other human beings (Meltzoff and Moore 1977, 1993). From this Meltzoff has developed what he calls the “Like Me” hypothesis (Meltzoff 2005, 2006). This is the idea that that newborns not only mimic expressions and actions but also experience the link between their own actions and their own states of mind. This in turn provides them with what is now often referred to as a “Theory of Mind”, that is, the attribution of states of mind to others. Although the imitation by newborns is unconscious it is the gateway to higher more consciously intentional forms, including mimicry. These higher forms are part of the sophisticated social intelligence that must have been a crucial element in the rapid evolutionary appearance of human cognition, as Meltzoff puts it: “Imitation evolved through Darwinian means but achieves Lamarckian ends.” (Meltzoff 2005, 55).

In the “Like Me” hypothesis, imitation is more or less literal. What is being proposed here is also a slightly more developed form of imitation based on a capacity for metaphor. It was probably among “... that the amazing suite of cognitive skills and products displayed by modern humans is the result of some sort of species-unique mode or modes of cultural transmission.” suggested by Tomasello as the reason why human cognition evolved so quickly. Although metaphor as now encountered in human cultures is highly culture-bound, it’s origins might well lie in the more direct, pre cultural perception and action systems that fit animals into their niches. For von Uexküll and other biosemioticians these systems are based on the exchange of signs and meaningful actions.

For James Gibson and others in what is known as the tradition of ecological psychology, or direct perception, the fit between active perceivers and their environments is based on what he termed affordance. Gibson defines it thus:

There is information in the light to specify affordances this radical hypothesis implies that the value and meaning of things can be directly perceived. The affordances of the environment are what it offers the animal either for good or

ill. By affordance I mean something that implies the complementarity of the animal and the environment. The notion that invariants are related at one extreme to the motives and needs of an observer and at the other extreme to the substances and surfaces of a world provides a new approach to psychology” (Gibson 1979, 179).

Gibson’s aims in putting forward this idea in the 1970’s was to offer an alternative to the information processing approach which at that time was dominating the psychology of perception and action. In something like the pragmatist spirit of Peirce, Dewey and others, Gibson was skeptical about treating the mind as if it were the holder of representations of the world from which active organisms could work out how to act. This approach meant that the link between perception and action was indirect, via a process of inference or computation. Instead, Gibson suggested that psychologists needed to look more carefully at how the world presents itself to the senses rather than to invent possible internal structures that represented it. As one of Gibson’s colleagues put it “Don’t ask what’s inside your head, ask what your head’s inside of.” (Mace 1977). Gibson’s view was that looked at in the right way, it would be clear that there was invariant structure in the ambient arrays of sensory energy that could directly guide action. For Gibson affordance was among the most important of these guides.

Gibson’s theory of affordance provides a psychological counterpart to von Uexküll’s bio-semiotics. It deals with “... the reciprocity that has evolved between living systems and their environments ... especially the transactions between them related to perceiving and the execution of purposes.” (Gibson 1979, 170). It owes much to the pragmatist approach to perception, which is that every perceived thing is perceived as a means to a possible end. Viewed in this light, perception is both for action and an action in itself. What is perceived is what may be done. Accordingly, affordance, means the perception of what opportunities for action exist in the immediate environment of a particular organism. Such signs do not have to be emitted by other organisms, though they may be, but can also be emitted, or ‘broadcast’ by objects and events, to borrow another term from Gibson. Thus the environment furnishes not meaning-free stimuli but rather a structured set of signals indicating what can be done. In short, affordances are signs (Pickering 2007).

Affordances are part of natural systems of signs which designate the behavioural meanings of the environment for particular organisms. An organism is attuned to perceive where, when and how its environment offers it the opportunity to do what it is adapted to do. Affordances are the psychological part of this attunement. They are not “in the environment” and “detected by” the animal, nor are they “in the animal” and “projected onto” the environment. Rather, affordances emerge with mutually evolved relationships within ecosystems.

In Peirce’s tripartite classification of signs, affordances appear to be for the most part indexical in that they bear a direct and necessary connection to their denotation. In this sense affordance indicates exactly what actions are possible in a given situation or, more specifically, what can be done with or to an object. The object is perceived literally, ‘as is’. But it is here that metaphor may have had its evolutionary origins. Early hominids will have been able to engage with the world on the basis of literal affordance as just defined. But what may have opened the way to a richer more creative engagement could have been the appearance to the capacity to engage with the world on a metaphorical basis, that is, on the basis of perceiving it ‘as if’ it were other than it was.

Take the example of a stone. Its literal affordances to an early hominid would include throwing, lifting, pounding and an indefinite range of other actions depending on its size, shape and so on. But the same stone might afford an even greater range if modified in some way such as by chipping off flakes or to create a saw-like serrated edge, or by using the flakes themselves as knife-like tools. The crucial step needed for this to be possible would have been to go beyond perceiving the stone ‘as is’ to perceiving it ‘as if’ it were something else. While the ‘something else’ in this example would be closely related to the original condition of the stone, once this metaphorical capacity was found to be useful, it might well generalise, to other objects, either singly or in combination. The affordances of stick perceived ‘as is’ will be transformed by perceiving it ‘as if’ it were lashed to another stick or furnished with a stone flake tip.

The creative transformation of objects into useful tools is a variety of functional mimicry. A rock perceived ‘as if’ it were a fist is a hammer. A stone flake perceived ‘as if’ it were a particularly hard and sharp fingernail is a scraper. A lump of clay perceived ‘as if’ it had been shaped into something like a pair of cupped hands is a container. And so on; although these examples are of relatively primitive actions, it is quite possible that the foundations for a more developed metaphorical form of mimicry lie here. Once it had appeared it would be available to the mimetic processes sketched by Donald where reflexivity and the ability to demonstrate purposive actions to conspecifics would have rapidly elaborated it, though of course ‘rapidly’ here is used in terms of evolutionary timescales. This elaboration could have developed to a significant degree prior to the use of language. Anthropological studies of the cultural transmission of skills, such as those for making tools and other cultural artefacts, show that much of it depends heavily on imitation and observational learning (e.g. Ingold 2000). It does not need language or other symbolic systems, although these are clearly central to other types of cultural transmission. Likewise developmental studies have shown how much interpersonal communication can occur prior to the development of language (e.g. Lock 1978).

Given that a capacity for metaphorical perception and action is closely related to mimesis, this would mean that it appeared in the first of Donald’s stages in the origination of the modern mind. During the subsequent stages of lexicalisation and externalisation it will have developed to become incorporated in “... deepest communicative framework of human culture ... “as he puts it. Claims have been made for metaphor as the basis of much thought and language (e.g. Lakoff and Johnson 2003).

Metaphor aside, human mimicry is as varied as it is in the natural world. But, unlike the natural world, human mimicry is often consciously produced and can often rely on culturally agreed understandings, as in the case of satirical impersonators. Mimicry in the natural world is often a means of deception or concealment. This can also be true in the human case, like the poker player, but the reflexivity and the unique human capacity for metaphor makes it into something qualitatively different.

Detached Mimicry

A great amount of time separates the appearance of mimicry in the natural world from its appearance in the human domain. Moreover, there are significant qualitative differences between these types of mimicry. Human beings may have the highest

capacity for mimicry as Benjamin said, but it seems unlikely that that capacity arises from what he called the "... powerful compulsion in former times to become and behave like something else." What has been suggested here is that it might be nearer the truth to propose that it originally arose from the compulsion to make an object become something else. Thus 'highest' should be taken to mean 'most flexible and productive'.

However, Benjamin may be right to suggest that in humans "there is none of his higher functions in which his mimetic faculty does not play a decisive role." This is because mimicry lies close to the origins of the human condition and continues to be a part of human development. Once mimicry had developed it will have helped bring the world of symbolic culture into existence, where its roles became prodigiously enlarged, diversified and qualitatively distinct from natural forms of mimicry. It is in this sense that mimicry remains important in maintaining and developing the human condition. Words and other symbol systems have generated a recursive web of signs within which mimicry creates structures and practices that, having become detached from the natural world, cease to have any strong or fixed relation to it.

In his semiotic analysis of recent cultural history, Jean Baudrillard traces and extends this detachment (Baudrillard 1993). In what he terms the "Emancipation of the Sign", he shows how detachment allows signs to become autonomous: "The emancipation of the sign: remove this 'archaic' obligation to designate something, and it finally becomes free ..." (Baudrillard 1993, 7). With this freedom signs can mimic anything and hence become mobile and autonomous, producing a vertiginous condition where the signifier floats free from the signified. In this condition chains of mimicry detach from their origin and produce successive phases of what Baudrillard calls simulacra. The production of simulacra can be seen as extending what Donald called mimesis to the point where what is being imitated is itself an imitation. Although this process is mediated by human agency, Baudrillard seems at times to suggest that it can become autonomous. An example might be the way a computer-enhanced image of a celebrity is so widely distributed in social media that it becomes the 'real' thing. Thus a simulacrum means an imitation which, having lost direct connection to what was originally simulated, then becomes treated as reality (Baudrillard 1983).

Two examples from popular culture can illustrate this condition. The first is the artwork on the sleeve of a CD released in 1998 with the title 'Twilight of the Gods: The Essential Wagner Collection.'. The CD offered twenty seven excerpts from Wagner's operas, so it might be expected that the artwork would reflect the mythical and religious themes found in Wagner's *oeuvre*. In fact, the sleeve was made to look as if it was a frame cut from a reel of movie film, with sprocket holes down the sides. In the frame was a sinister descending echelon of military helicopters set against a flaming sun. The explanation for this lies in the first track on the CD which was the leitmotif from *Die Walküre*, usually called "The Ride of the Valkyries". This had featured in the 1979 film *Apocalypse Now* to accompany a helicopter attack on a Vietnamese village. With the success of the film in the intervening years the link between the music and helicopters had become automatic and buyers of the CD knew why the sleeve looked the way it did. Although the chains of simulacra here are part of complex mimetic web they are nonetheless easily understood by anyone with the right background.

The second example is the Fez, a red tasseled cap often worn by men in Muslim countries. A British comedian called Tommy Cooper wore one in his act and much of his appeal lay in the comic effect of the Fez and his catch phrase "Just like that" which

he'd say while making particular hand gestures. Although Cooper died in 1984, tourists still encounter men who, when trying to sell them a Fez, make Cooper's gestures and say "Just like that". The sellers do this because originally so many tourists who bought a Fez would then mimic Cooper's act to their friends. Now, the Fez sellers and their customers preserve Cooper's act without knowing what they are doing.

Baudrillard's treatment of mimicry goes far beyond such examples, but the point being made is that same. It is that mimicry in the human world has become autonomous, mobile and totally detached from its origins. It creates a realm of conventional signs that are in some sense false as they lack the iconic attachment to the real world found in natural mimicry. The signs that support natural mimicry are grounded in the semiotic web of mutual evolution. Even though that web contains what might be called false signs, as when a flower resembles a wasp or an insect resembles leaf, that falsity is still iconic and hence grounded in the real world. The signs that mediate human mimicry, by crucial contrast, even if they too are iconic can be totally ungrounded. This radical disconnection between signs and what they signify is part of what makes it qualitative distinct from natural mimicry. The result, as one commentator has put it, is that "Symbolic culture is a realm of patently false signals." (Knight 2010, 193).

But the falsity here is not of the same sort as, say, the false eye spots on the tail fin of a butterfly fish, which are aids for survival. It is the intrinsic falsity that arises when human beings reflexively manipulate signs. While there is some degree of falsity in the animal world that approaches the symbolic level, it is not based on reflexivity. Gregory Bateson noted how the playful fighting of young dogs, was in some sense an example of falsity in that the manner of their biting enacts the statement "This bite is not a bite" (Bateson 1978). But when René Magritte produced a painting of a pipe and then added "Ceci n'est pas une pipe" to it, a totally different form of reflexive falsification was being enacted.

John Deely offers this capacity for reflexive engagement with signs as a replacement for the Cartesian *res cogitans* as a definition of what it is to be human (Deely 2010). But the human condition has arisen within the natural world which, according to Peirce perfused with signs. Indeed, Peirce claimed that there is something like thought and sentience to be found at all levels of the cosmos: "Thought is not necessarily connected with a brain. It appears in the work of bees, of crystals, and throughout the purely physical world ... But ... there cannot be thought without signs" (Peirce 1991, 252). But brains have evolved and Peirce, like Hoffmeyer, would most likely have seen evolution as the progressive emergence of more developed forms of semiotic order.

As was noted at the beginning of this paper, reflexive consciousness, that is, the awareness of awareness itself, creates a unique space within this order. Deely designates this to be the location of the human condition, characterised by a capacity for reflexivity: "What distinguishes the human being among the animals is quite simple ... only human animals come to realise that there are signs distinct from and superordinate to every particular thing" (Deely 2010, 10).

Conclusion

What has been sketched here is what may have happened during human cultural evolution that has brought human beings to this realisation. Benjamin attributed a

capacity for mimicry to "... a compulsion in former times to become and behave like something else." While this is close to Donald's ideas about mimesis, a step has been missed. The step is supplied by the proposal put forward here, namely, that part of the evolutionary transition from the pre-human to the human world was the development of the ability to go beyond seeing an object it 'as is' in order to see it, in pre-figuration, 'as if' it were, or could be if transformed, something else. In terms borrowed from Gibson's ecological approach to perception and action this would have meant transforming the affordances of the object from what they were initially to affordances that functionally mimic those of something else. Based on Donald's ideas, it has been proposed that this capacity arises from more mundane compulsions to co-operate, communicate and survive by making things and sharing the skills involved.

Although the proposal relies heavily on ideas already put forward by Gibson, Donald and others what is perhaps novel in it is the role given to metaphorical perception and action, where 'metaphorical' means a form of functional mimicry. In perceptual terms this means seeing objects 'as if' they were, or could be made into, something else that mimics some desired functional affordance. In terms of action, it means the sort of communicative use of mimicry that Donald places close to the origins and persisting identities of human beings.

Jean Baudrillard and Wendy Wheeler among many others, show how pre-human signs at the physical and biological levels of existence have been progressively enhanced by those of human culture (Wheeler 2006, 2016; Baudrillard 1983). Wheeler in particular provides a powerful account of the role of technology in creating a new context for the human condition (Wheeler 2016, chapter 6). Within this context qualitatively new forms of signification have emerged that render human mimicry distinct from that in the pre-human world.

These forms have progressively detached the human condition from the natural world and, to return to issues raised above, it is important to note how this detachment has made a significant break with the encounter with the natural world characteristic of societies, such as those of hunter-gatherers, where technology is relatively simple. Such societies foster an image of the natural world as an interdependent web of meaning. From this image there comes a form of ecological intelligence or sensitivity based in an awareness of the interdependence of all forms of life, including that of human beings (e.g. Lent 2017, 32; McLuhan 1994, chapter 6). The loss of this awareness has had consequences that are now all too clear as the damage being done to the living systems of the earth by consumptive technology becomes more and more apparent (Lent 2017, chapter 20).

In meeting these consequences, which is the dominating geopolitical issue of our era, biosemiotics can, and perhaps should, have a unique role to play. Among the sciences it is ideally placed to account for how the natural and cultural worlds interrelate. Moreover, it is also ideally suited to benefit from the radical changes to the philosophical basis of biological sciences that are presently being put forward. Broadly, these changes lead away from the mechanistic metaphysics and reductive methodology that linger on from the nineteenth century and towards a worldview in which systems, relations and processes are taken as ontologically fundamental (e.g. Dupré and Nicholson 2018; Noble 2016). It is implicit in this worldview that "Ecological interdependence ... is one of the ... most characteristic aspects of the living world ... "(Dupré and Nicholson 2018, 20) and that the hierarchy of systems that compose reality exist in "... reciprocal dependency ... "(op. cit., 3). Such a worldview reveals the anomalous

nature of the detachment sketched in the previous section. What Baudrillard terms the ‘emancipation of the sign’, the removal of the obligation to designate anything real, is an escape from the reciprocal dependency of the living world. Of course, not all the sign systems of human cultures are ‘emancipated’ in this sense. There are in fact immensely powerful and have provided human beings with remarkable levels of control over the natural world. But with that can come a dangerous loss of awareness of the impacts of human action.

It is to be hoped that the changes to the basis of the scientific worldview noted above will go some way to remedy this loss. They are not, of themselves, sufficient to recreate the ecological intelligence of previous eras, and it is obviously impossible, for example, to return to hunter-gatherer lifestyles. However, they may well play a necessary role in the reshaping of our worldview that is so urgently needed to address the environmental problems we now face.

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