V2_PRESENTS
BLOWUP READER #1

Wild Things

BLOWUP

CONTENT

Introduction Wild Things

This e-Book, the first in the series of Blowup Readers released by V2_, explores the emerging realm of art for animals, especially within media art and speculative design.

About V2_:

V2_, Institute for the Unstable Media, founded in 1981, is an interdisciplinary center for art and media technology in Rotterdam (the Netherlands). V2_ conducts research at the interface of art, technology and society. V2_ presents, produces, archives and publishes about art made with new technologies and encourages the debate on these issues. V2_ offers a platform where artists, scientists, developers of software and hardware, researchers and theorists from various disciplines can share their findings. Art and culture play an essential role in the social embedding of and attitude towards technological developments, and V2_ creates a context in which technological issues are explored through critical reflection and practice-oriented research.

About Blowup:

Blowup, launched in 2011, is a series of events and exhibitions that explore contemporary questions from multiple viewpoints. Blowup zooms in on ideas, bringing into focus clear pictures of how art, design, philosophy, and technology are transforming our lives -- or reinforcing the status quo.

Each Blowup event will provide a deeper understanding of a theme relevant to this moment in time. Some events will ask you to be hands-on, and some will involve just listening or looking. No two events will be the same: Blowup events mix artists and theoreticians; mix formats; challenge assumptions; and take risks. Investigating topics ranging from art for animals to speculative designs for future objects, each Blowup will surprise and inform.

Alongside each event, a Blowup Reader exploring the theme with texts from a wide range of sources will be released in e-Book format. Blowup is curated by Michelle Kasprzak.

Blowup: Wild Things:

Maybe in a few years, Fido (or Fikkie) will go to the museum without you. The first edition of Blowup examined art and design projects that are created with animals in mind as the end users and active participants – not people. This evening event featured three leading practitioners discussing their work that is created for animals to appreciate and actively use. The speakers addressed how their work can instil greater empathy for animals in us, and what they think the animals' experience of the art actually is.

Speakers included American artist Amy Youngs, who has created new habitats for hermit crabs and a lounge space for crickets; Dutch thinker, psychogeographer and writer Wilfried Hou Je Bek who has translated the Epic of Gilgamesh into the lexigrams that scientists use to teach language to apes; and Italian designer Elio Caccavale who has designed a TV for pigs to use among other speculative design pieces in his work Utility Pets.

In addition to the talks by the three guest speakers, a specially-designed play area for cats was also created, with three iPads displaying games designed especially for cats available for playing, and for humans, an animal-themed cocktail was available at the bar.

The event occurred on July 7, 2011 and was streamed live. Archived footage of the event is available at http://live.v2.nl

Notes from the Curator:

When curating this inaugural edition of Blowup, I was motivated by a desire to capture a sense of the current and future possibilities to reach non-human audiences. Several recent events inspired me to pursue this, including hearing about a university research project wherein a game between humans and pigs was being developed, and watching a friend's cat play a game designed especially for cats on their iPad. Perhaps it is inevitable that our contemporary galaxy of gadgets such as smartphones and tablets would collide with an awareness of animals as autonomous actors, as we see in hundreds of YouTube videos depicting animals being cute or funny. Thinking about animals as potential witnesses to or participants in art is a little outside our usual conception of them that places them into categories of friend or food. Redefining potential audiences for art also naturally demands we redefine our notions of what art is, and what it's for, raising more questions than answers.

The texts compiled in this e-Book have been brought together to permit a closer reading of the subject of art for animals, beginning with a seminal text by British theorist Matthew Fuller. Each of our participating speakers at the Blowup: Wild Things event have also contributed texts, which will provide deeper insights into their thinking on the subject and their works. A related text by Louis Bec from the V2_ archive has also been included, and this e-Book is rounded out with a short list of further reading suggestions. With an ever-increasing amount of new content available for reading, it was my conviction that creating an e-Book that brought new attention to texts already in circulation, but in the new context of the ideas expressed through Blowup programme, would be of most benefit to V2_'s audiences. I hope you enjoy these texts and also take time to review the public presentations that were part of this programme, at www.v2.nl.

Michelle Kasprzak
Curator, V2_ Institute for the Unstable Media

Rotterdam, 07/07/2011

Art for Animals

BY MATTHEW FULLER (SECOND EXPANDED VERSION)

'If art is genuine it is creative revolution regardless of who looks at it'[1]

A crowd of apes and monkeys sit clustered upon a box gawping and grinning and staring at a canvas. They've seen nothing like it; or they are bored by it; or they raise their arms in delight at the general hullabaloo. They are of a number of sorts, baboons, gibbons and others, all however have the painting as the primary focus of their attention or reaction. What is on the canvas is hidden from view, all we see is the gilded side of a carved frame. Gabriel von Max's turn of the century comedy in oils, The Jury of Apes[2] points at the trade of the art critic, utter monkey business, but also at the viewer of art, a mug, an enthusiast, or, in the stare of an ape turned to address the viewer through half-closed lids, a rare specimen in itself. For apes to look at a canvas makes the pretensions of those who look with a mind to judge also minds to be judged, or at least, to be sniggered at.

Pliny the Elder's Natural History[3], a book which places painting and sculpture amongst an inventory of animals, plants, and minerals, gives us another story along these lines. In a competition between two painters in trompe l'oeil technique, Zeuxis and Parrhasius, face off in front of a crowd. The first artist pulls away the curtain protecting his work to reveal the most perfectly rendered bowl of fruit, so lucidly real in fact that a flock of birds immediately descends upon it and starts to peck away the paint. Impressed, Parrhasius stirs, but does not move. He simply stands and watches. The annoyed Zeuxis demands that he remove the curtain from his canvas. The second artist does indeed reveal his painting, but by stating that he has no curtain to remove, that it is a painting of a curtain. This painting has deceived the eyes of an artist not a mere bird. Parrhasius wins the competition and perhaps brought to a temporary close a current in art which is only just re-emerging, art for animals.

Art for animals is art with animals intended as its key users or audience. Art for animals is not therefore art that uses animals as a substrate or a carrier, nor as an object of contemplation or use.[4] (Needless to say given these criteria it does not fall into the category of transgenic art, with its all to frequent tendency to animal abuse and naive sensationalist celebration of genetic engineering.) It is not art that, like The Jury of Apes, that depicts animals for human viewers, or that incorporates animals into liv-

ing tableau, but work that makes a direct address to the perceptual world of one or more non-human animal species. There are only a very small number of works that make such an address. This essay will make a brief survey of them and then go on to discuss their implications. Where it differs from Pliny's tale is in that it works, not on the level of successful imitation, of setting up perception as a means by which one is duped, but in rendering perceptual dynamics as both somewhat more irresolved and more powerful.

A further important category of work that does not usefully fall into this current are objects such as dog-kennels by celebrity architects (such as Frank Gehry[5]) or housings for birds. Whilst some work in zoo design, notably for Carl Hagenbeck by Johannes Baader, and the aviary in London Zoo by Cedric Price does attempt to engage with animals' behaviours, in a way that Berthold Lubetkin's famous double spiral ramped penguin pool at the latter zoo does not.[6] Thomas Schütte installed a work originally entitled Hotel For Birds on a plinth in London's war monument congested Trafalger Square.[7] Made of brightly coloured layers of perspex, this is a sculpture in the style of an architectural maquette designed to catch light, and to act as a 'public space' for urban rock doves displaced by a cleansing policy established by a different branch of the body commissioning the work. (Indeed on installation the work was re-named Model for a Hotel.) Whilst being of interest, it is primarily a 'housing'. David Nash, an artist who works with the materiality of wood, and whose aim is for the work to integrate into natural processes, has made shaped blocks of oak for use in a small copse, by sheep who gather there to escape the rain. They use the blocks for 'shelter, safety and scratching'[8] More recently, the sociology artist Jeremy Deller is using the device of an architectural competition to produce a design for a Bat House for the Wetlands Centre in South London.[9] Whilst these are interesting projects, they largely address animals in terms of ergonomics, making spaces that physically 'fit' them.

At the same time, because many animals experience and shape a locale by literally inhabiting it, there is no absolute distinction between what is proposed here as art for animals and work that produces scenarios that animals live in, work on, and complete, or render definitively unfinished.[10] Equally, other projects that involve moving animals from one context to another as in the case of Hans Haacke's Ten Turtles Set Free (1970) or sorting systems for animals, as in Robert Morris', A Method for Sorting Cows, (1967) are assumed to engage some aspects germane to this project, such as the categorical systems, including property, to which animals are assigned, but fall outside the scope of this essay.[11] Equally, durational performances of co-existence

with animals are related but sit to the side of the present text.[12]

Other areas, which would possibly suggest further development, but which are outside of the present discussion include the production of visual material by animals (famously including paintings by chimpanzees or elephants.) Other perhaps more promising research includes findings that indicate pigeons' capacity to distinguish between styles of picture making. (i.e. Shigeru Watanabe's research that showed pigeons could learn to distinguish between works by Monet and Picasso and subsequently, that they were able to carry over this capacity for distinction to categorically related art by Cézanne and Braque.)[13]

A weakness of some of the main streams of cultural theory over the past decades is that in its emphasis on the constructive aspects of culture, biological questions are neglected or considered reactionary. At the same time, a thread of biologically based research, functioning largely by an unsophisticated positivism makes any chance of a dialogue between disciplines and styles of research difficult. There is a certain laboriousness in getting through the clunky formulations that are dredged up by instruments incapable of finding anything but what is expected and that are proudly displayed as having 'explained' culture. Certain currents in contemporary biology have made an attempt to perform a 'land-grab' on culture, to suggest that biology provides a base-line level of explanation for all forms of behaviour. Often these are characterized as being simplistically 'Darwinian' in motivation, with characteristics of culture identified as mere epiphenomenon. It is not necessary to get locked into simply refuting the shrillest voices or those advocating the most absolute reductionism as an a priori. But this kind of argument has not come solely in the form of a land-grab on culture, nor has it come only from scientists. A 'recall to biology' has been a ruse often played by those in the domain of art discourse who attempt to enforce a 'shared symbolic order' of the kind once supposedly provided by religion.[14] I would suggest that much of this work is a betrayal of the subtlety and speculative nature of the current of thought set in play by Darwin.

Much of such work prefaces its findings by a complaint. In this scenario, biological approaches to culture are refused out of hand because of a conformist consortium of Marxists, poststructuralists, feminists, queers, and others who bunker culture off from questions of innateness or predeliction. When Marx has written about species being, Foucault on biopolitics, Cixous on ecriture feminine, and there is a plethora of more recent research and art emphasising corporeality, it is unfortunately mistaken to describe those primarily concerned with culture as somehow assuming that they

entirely surpass biology. Ellen Dissanyake suggests that art is a refusal to 'grow up', a prolongation of the sense of exploring the world for the first time, of maintaining sensual delight in novel growth and experience, the capacity to escape from a subordinate role.[15] Perhaps certain participants in science too are undergoing such a thrill in their discovery of culture, and their entry into culture as a previously taboo domain. If so, this is entirely to be welcomed, but perhaps they should calm down just a little. At least, in a society such as ours, for scientists to borrow the Cultural Studies ruse of presenting one's arguments as the knowledge of the oppressed, at least has the virtue of being amusing.

Art for animals intends to address the ecology of capacities for perceptions, sensation, thought and reflexivity of animals. The capacity for art is part of the rather mobile boundary line that performs the task of annihilating the animal in human and in demarcating the human from animality. The purpose of this text is not so much to legislate upon the placing of this line, but rather to suggest that the sensual and cultural capacities of various kinds of being, whether ordered into species or not can be explored and to follow a few ways in which this has been done. Paul Perry, has installed a small robotic device to spray Bobcat-urine high up a tree to stimulate an imaginary of pheremone responses. Natalie Jeremijenko makes a robotic goose, the aim of which is to set up interactions with a small group of geese, in a number of other projects she sets up devices for inter-species communication. Louis Bec attempts to set up a dialogue between two speciated parts of the same genus of fish. Anthony Hall also works on communications and perceptual reflexivity with weakly electric fish. Marcus Coates stages a series of actions with animal materials and behaviours with interaction with other species as the prime goal. Some of this work is rightfully absurdist, whimsical, self-trivialising. But all of it moves towards setting up actual, multi-scalar and imaginal relations with animals that involve a testing of shared and distinct capacities of perception.

Deleuze and Guattari, following von Uexkühl, Kafka and Maturana and Varela amongst others, have placed animal subjectivity at the core of their reinvigoration of thought. In this, they provide some dynamic formulations of conceptual personae as animal-beings and of animals as engaged in reciprocal relations of life shaped by colour, growth and habitat formation. In their book What is Philosophy art and nature are described as being alike because they combine an interplay between House and Universe, the homely and the strange, and the specific articulation of the possible with the infinite plane of composition. 'Art for Animals' takes up such work for the category of art.

In engaging animal cultures and sensoria, these projects also make art step outside of itself, and make us imagine a nature in which nature itself must be imagined, sensed and thought through. At a time when human practices are rendering the earth definitively unheimlich for an increasing number of species, abandoning the human as the sole user or producer of art is one perverse step towards doing so. More widely, a core process of Guattari's writing, one which it amplifies in that of Deleuze is the project of understanding ecology at multiple scales, from the social, to the medial, technical and aesthetic, to that of subjectification. This text draws upon such processes to develop the question of animal-human subjectivation as a cultural and inventive process. Within a web of interconnected capacities and materials a set of processes and instances, set-ups, ruses, devices, work to establish what Rosi Braidotti has called 'affirmative interrelations'[16] between, not simply a fixed set of innate behaviours and predilections but of the capacities for becoming that might exist between different forms of life and aesthetic dynamics.

It is not the intention here to suggest that there is a necessary continuum between human and animal, a continuum is a figure that implies fixed ends and a neat metric running between them. Rather, what is suggested in this initial sketch of a possible field is a myriadic ecology of perceptual-cognitive sets, some of which my overlap or share functions and capacities. As the primatologist Frans de Waal notes in his reflections on culture, 'One cannot expect predators to react the same as prey, solitary animals the same as social ones, vision-oriented animals the same as those relying on sonar, and so on.'[17] Equally, we cannot expect sensual experience to stay the same amongst members of what is logged as the same species. Humans for instance have domesticated themselves since advent of agriculture, with, at the genetic scale, changes in composition equivalent in the degree of change to that found to be involved in the transition from wild corn to domestic corn today. In certain populations such changes manifest in the ability to digest foods associated with a sedentary mode of life, (such as the developed ability to digest lactose linked with the unfortunate tendency to eat cow's milk). At a sensory level, rather than a genetic one, our habituations tend towards similarly substantial changes: one recent study for instance suggests that it is possible, with a little retraining, for humans to acquire an equivalent capacity of smell to that of dogs.[18] Regardless of whether this is desirable or not, or whether it might also suggest the need for an uptake of the scenting and smelling habits of dogs, art for animals does send a tingle along the edges of what we take for granted as our current capacities. It suggests that we search out and test the discontinuities and overlaps between our sensual and intelligent capacities and those of others. What would it be like, for instance, to be able to

see just the very edge of ultra violet in the iridescence of a petal or on the wing of a butterfly? How would such a change in sensual capacity re-order us, make life bulge? Is there a market for drugs that temporarily reconfigure nervous and perceptual systems to those of other species?

Gilles Deleuze laughingly describes the sensorial world of the spider: a juicy fly can be placed in front of it, it doesn't care. All it wants to feel are a few small twitches on the far reaches of its web. Just a few details, a muttering in the background, that's what is appetizing. This, says Deleuze, is the same sense of the world as the narrator of Proust's 'Search…'. Deleuze himself mobilizes various nonhuman sensoria, ticks, lobsters, dogs, lice, bees, wolves, bowerbirds, flies, the horse-knight assemblage. Such creatures become ethological devices to overstep what can be sensed, thought or said. They are paths of becoming, gravitational lodes of traction which pull the human out of its skin, and pull the singular animal into the multiplicity of packs, of evolution and of ecology.

There are a number of ways and particular domains in which such becoming can be seen to occur, at the scale of brains, that of bodily elements and organisation, and that of means and kinds of communication, amongst other things. Paul Rozin for instance catalogues a number of ways in which human cultural processes and evolutionarily accrued predispositions are interwoven in the case of food.[19] What such work reveals is that the bodies of individuals in evolutionary conditions are means by which forms of life scan for potential adaptions, they are also means by which eco-systems arrange themselves, and the platforms for cultures to articulate, be experienced, revised and produced. They are in turn worked on and produced by cultures. Ecologies emerge in a multi-scalar way. What Deleuze and Guattari argue for is that an understanding of the virtual be added both as a specific scale within ecologies, as a dimension of relationality that exists at every scale within such a system, and a diagonal which connects them.

Evolution by natural selection, is often characterised as a process of the survival of the most fit. Fitness is a relative, and distinctly processual, term. A whale is fit for its habitat, but, as the current representative of a mammalian lineage that re-entered the water, it is also the result of massive and quite possibly awkward adaptational change.[20] It cannot be understood to be perfectly fit, but as the ongoing result of many interlocking morphogenetic, material and adaptive capacities that may involve substantial shifts in the use or function of bodily elements. This given, it is useful to consider the question of the virtual in relation to the way in which bodies, entities

that can be regarded as their components (such as genes or organs), their aggregates, and those of their products, such as cultures, explore, adapt to, make adaptations of and co-evolve with and form, ecologies.

It is a commonplace that organs, behaviours or other entities in ecologies can change or add functions over time. Julian Huxley, in his early work of ethology, notes that the behaviour of grebes in courtship includes adaptations and appropriations of movements, such as dives, that might have primarily developed as feeding movements but which are repurposed as displays of fitness and of courtship interest. These are elaborately linked and synchronized in a distinctive and beautiful set of behaviours.[21] In a further dislocation of signaling into mimickry across species, when showing aggression Meerkats, raise and curve their long tails over their backs. In this, they are thought to be mimicking the posture of their enemy and food source, scorpions. North American Chickadees (red-breasted nuthatches) are able to distinguish between the alarm calls of Black Capped Chickadees, according to whether the species being alerted of is likely to predate them, so the signaling of information crosses between species.[22] Signs given of for one purpose are used for another. Such chains of dislocation are potentially endless, the mouth, originally used for biting and eating, over time gains additional functions such as speech and, in humans and a few other primates, sexual activity. Chains of dislocation constitute a form of primary experimentation of the capacities and materials of bodies and of life. They may occur across all scales of a body or at those of individuals or populations.

Aside from adaptions and accumulations of function and behaviour, co-evolutionary assemblages, such as the wasp-orchid reciprocation machine described by Deleuze and Guattari, set up consistencies across scales and discrete objects or organisms, by means of which each probes the virtuality of the other, but also interacts more generally, as an assemblage, with wider formations and compositional dynamics. Thus an entity, or a process might be imagined to occur in the liver of one being, be sensed as creepy sizzle by the automatic fight or flight responses of another, stimulate pheremone exchange between two members of different species, determine the use of grammatical tense in an essay by a specimen of another, but exist as much more than these. There is no teleology in such occurrences, but rather a drift of reciprocal relays established more or less directly by potentially thousands of interacting and diverging entities.

The question of the exploration of virtuality within an ecology is also carried out at an experiential scale in play. The kinds of play associated with different species

are equally heterogeneous. The field of comparative psychology is developing understanding of multiple forms of consciousness: mirror recognition (a test of self-awareness); theory of mind; tool use; emotions and empathy; the capacity to imitate; the capacity to think about thought, metacognition; language; reflection recognition, and other capacities which in turn become affordances for entities, capacities and dynamics, which almost weekly produce experimental results widening the domain of intelligence, and the distribution of skills and aptitudes once thought exclusive to homo sapiens. In his landmark survey of play in a multitude of species, Gordon Burghardt states that, 'Play with objects is behaviour in which an animal investigates not just their nature…but what he or she can do with them.'[23] This would also suggest that play not only acts as a context in which animals probe potential affordances amongst their conspecifics and the things that surround them, but also count themselves amongst the things that, at multiple scales, are being so probed. Play behaviours can also be autotelic, independent of adaptiveness or function, or as such, producing a reserve of 'anticipatory adaption' as such it is at once something that is absolutely live, but also a gateway into the virtual, the plethora of forces and possibilities that interact to produce the actual.

In Deleuze and Guattari's account of ecology as melody[24] affordances become counterpoints, relays between one set of compositional dynamics, such as the bumblebee and the snapdragon, that trip, not simply in tight co-evolutionary couples, but out, from oikos, home, the root word of ecology, to the cosmos. Extending this cosmological dimension, if we concur that, 'a work is always the creation of a new space time'[25] art for animals also allows us a way of thinking through the processes of intersubjectivation that we experience in ecology, a move that chimes with Guattari's critique of the 'pure intentional transparancy'[26] of phenomenology. Guattari calls instead for a means of recognition of components of subjectification which meet each other by means of transits that are relatively autonomous from one another.[27] The cosmos figured here is one that moves towards openness. The works considered below as art for animals can be thought of as specific articulations of such a process of opening.

Paul Perry – Predator Mark

In his work on the literature of wilderness, Gary Snyder suggests that, 'Other orders of being have their own literatures. Narrative in the deer world is a track of scents that is passed on from deer to deer with an art of interpretation which is instinctive. A literature of blood-stains, a bit of piss, a whiff of estrus, a hit of rut, a scrape on a

sapling and long gone.'[1] In encounter with changes in the use of land, these literatures find themselves recomposed. Urban foxes in London for instance are notorious for their habit of shitting on children's toys left outside overnight in gardens and yards. Their territory marking habits have been displaced and appear as cunning acts of deposition.

Paul Perry's 1995 installation Predator Mark is a subtle reordering of such a literature of scents. The work consists of a device made up of an electronic timer, a compressed gas spray mechanism and a flask of bobcat urine. This mechanism was installed high on a tree in a wooded estate, Landgoed Wolfslaar, in Breda in the east of the Netherlands. Bobcats are native to North America and Mexico. Their scents are thus not part of the vocabulary of ecology of the area.

Bobcat urine is however commercially available in north america, along with that of other local predators such as wolves. It commodification, and provision for credit units over the internet, allows its dislocation from territory. Once bought by the user it is judiciously sprinkled to deter certain animals from crossing into the space that the scent suggests is inhabited as territory by another. Other scents, such as the urine of doe deer in heat, are used as lures by hunters, in this case to draw deer away from trails into the line of sight of hunters. The urine of both predator and prey animals, like other animals products available for retail spell out a new kind of literature, one of commodification, of humans gaining the capacities of cunning shitters, and the grisly promise of meat on a stick.[28] Whether, like mosquito repellent, these products have anything more than fetish value for men investing in quality time alone with nature remains questionable.

In Predator Mark, introducing the scent of any animal, predator or not, is imagined to shift the register of references to presence within the place. It suggests an openness to the possible that resingularizes experience as an event in which the dimensions of relationality surging through it require recognition. This is a speculative literature of piss, involving floods, drips and sprays of matter, energy and signs, and the intelligences they invoke to sense and comprehend them.

Whilst one form of experiment is to set things out, to wait and see what gathers or grows in the manner of Duchamp's early artificial life work, Elevage de Poussiere, (Breading Ground of Dust).[29] Perry did not set out to observe if there were any differences in behaviour associated with the installation of this work as would be characteristic of a scientific experiment proper in which one variable only is isolated

and probed for the conditions of its variation. Indeed it is not even clear whether the species most drawn to the scent marking activity of art was even aware of the work's existence. This gratuity of the work, that it addresses itself primarily to animals, those who read no press releases, and its operation in a way that is imperceptible, indeed, by its height from the ground and position deep within a wood, almost impossible to experience, distinguishes it from an entity operating within the normal dynamics of art systems. If, to make one comparison, conceptual art made the move towards experiencing the materiality and multiply structurating forces of ideas and language, such work suggests a means for such conceptuality in multiple species and across many means of sensing, acting in and interpreting the world.

Natalie Jeremijenko - OOZ

Natalie Jeremijenko is engaged in an ongoing series of works called OOZ[30], which test human animal cohabituation of city spaces and set up novel kinds of instruments and infrastructure for urban and feral animals. OOZ, as a series of works, and ongoing revisions of projects, establishes situations for animal and human interaction in contexts in which, unlike that of a zoo, the animals are free to leave. The OOZ series has involved work adopting the housing paradigm, such as an installation on the roof of the Postmasters Gallery in New York in 2006.[31] Whilst this was largely to do with providing amenities such as houses, perches, a supply of fresh water and the growth of plants with medicinal function, there were also two other key directions to this work. One included anthropomorphic architectural organizations of space, such as a 'shopping mall', and architectural work offering ironic recognition for the benefit of human viewers, such as components testing the mechanical understanding of what is normal for animal provision by applying architectural notions of 'luxury' to fittings and spaces. There is an air of the flea circus about aspects of this project, dinky versions of high-end contemporary architectural concerns and urban systems. To achieve these, the project involved commissioning elements from a number of architectural studios perhaps inevitably leading to a tendency towards calling-card architecture. Such elements might perhaps work as lures, sparkly things that attract attention and draw humans towards them. Perhaps anthropocentrism can work as an interpretative layer for one species, whose cognition is partly organised by glamour, without ruining the primary emphasis on addressing the perceptual and experiential capacities of another. More importantly, the project tests the notion of what the feral condition implies, might there be an outgrowth of provision from urban systems in order to provide more edges, and habitats for displaced and incoming non-human inhabitants of cities? Such provision might entail the imagination

of multi-scalar 'green corridors', micro-to-macro scale affordances built on into and through cities for ameliorating, or even improving on the kinds of ecological condition they erase, build into or establish.

A common thread between the different components of the OOZ series is that of experimental forms of communication. The Postmasters installation, titled OOZ (for the birds) included a 'concert hall' space for pigeon calls. Whilst this functioned as something of an architectural in-joke, being a miniaturely scaled version of Casa de Musica, the Office for Metroplitan Architecture's 2005 concert hall in Porto, it allowed for the amplification of voices and calls. In other work, Comm. Technology, (2006) Jeremijenko has set up novel devices for pigeons to amplify their vocalizations.[32] A series of perches to be attached to buildings consists of a hollow plastic horn fitted with a small microphone and speaker.[33] The noises made by the pigeon whilst using the perch are powered up to address the street. Jeremijenko's wager is that the pigeons will recognize this, and note the changes in reaction of humans using the street, including possible food sharing, and begin to favour the use of the perch. Unlike Perry's Predator Mark therefore, there is a sense in which the use of the work is monitored and evaluated, even if only informally. This is in part because Jeremijenko's work sites itself very much in dialogue with design, and the critical design discourse also involving Anthony Dunne[34], Beatriz da Costa[35], Phoebe Sengers[36] and others. Here, design without a direct client or a customer and with animals as its users enters a modality that is enormously suggestive.

An early component of the OOZ project was Robotic Geese (2005 - onwards) one unit of which, in an installation with the Bureau of Inverse Technology, Romancing the Geese, was placed in a small stretch of water next to the De Verbeelding, art centre in Flevoland.[37] The goose, a basic plastic decoy body with added features including motorized legs, an articulated neck, a head mounted camera, microphone and speaker, was remote controlled from a seat which allowed a visitor to view the eyeview of the robot, to steer it and to 'make utterances' through it.[38] The idea is to stage interactions with a small population of Greylag and feral domestic geese who inhabit the area. In the projected full iteration of the work, each speech interaction will trigger the recording of short bursts of audio-visual information to a database. Once it becomes public, items on the database can be correlated so that users can gradually, through standard collaborative filtering algorithms, aggregate opinions on the semantic content of the utterances of the non-robot geese.

Communication amongst humans is increasingly configured as a means of the de-

livery of order words and the management of the distribution of micro-compulsions to respond, advise, participate, collaborate and to organize attention. Against this figure of the regime of responsiveness, to think about communication outside of the boundary of a species sets up a number of possibilities. Perhaps OOZ allows us to imagine a form of taxonomy in which speciation was marked not by the matter of which animal could engage in effective genetic transfer with another, but on the basis of those which engage in semiotic (memetic) relays.

Marcus Coates – Out of Season, Sparrowhawk Bait, and Dawn Chorus

Marcus Coates has embarked upon a body of work which maps out a certain set of figurations of interactions with animals, with birds in particular. Only a few of pieces of his work fall into the art for animals current and are early, perhaps more minor, more throwaway or institutionally indetermined than the larger-scale projects he is more recently embarked upon. They may indeed be pointing towards something that with his continued interest in 'animal becoming', will return to. Before addressing these, some of the other works are also worth mentioning. In a second work entitled Dawn Chorus (2007)[39] high quality field recordings of bird songs are slowed down 16 times until they reach a pitch easily matched by a human throat. The resulting sounds are played to volunteers who learn to repeat them. These enactments are videoed, then played back as a projection. It seems that, at least in terms of their re-enaction, only the relative size of the vocal apparatus distinguishes the calls of the birds and humans.

In Journey to the Lower World, (2003)[40] Coates uses a persona suggested by brief training in the rituals of Siberian Shamen. He performs a ritual for residents of a soon-to-be-demolished tower block in Liverpool, wearing the skin of a deer, mimicking the work of a shaman, apparently communing with a number of bird spirits and in so doing bringing back a vision of hope for the bemused ladies and gentlemen attending his ritual. The latter work is interesting because it knows that it is weak but makes use of this. The action is awkward, based on a relatively shabby, slightly embarrassing, day of training with the kind of guru who acquires their flock through postcards in health shop windows, and carried out by a denizen of the upper world. Nevertheless this specimen of the contemporary European, gawkily decked out in the culled, shameful, trappings of authenticity, as compromised as it knows it is, attempts to get something going. There is an earnestness achieved through a reflexive mimicry, of ritual, and of animal calls, especially Coates' constant attention to those of birds, that carries through into his work fitting more precisely into the art for

animals current. Mimicry is a means to set up ruses, initiatives that skirt the edge of multi-directional fraud in which the everyday and ideas of the wild, the primitive and capacities of sensual perception that overlap between species can be mobilised. Here mimicry unfolds both as play and as learning; in bird calls with their worlds of call and refrain, or their re-mobilisation of surrounding sounds; and in contemporary art and its constant reversioning of appropriation, pastiche, copy, plagiarism, found materials, how to deal with and configure what exists, what repeats, in relation to the creation of the new. These are vectors in the generation of what Coates calls 'animal becoming' but, partially overlapping they also shift each other.

During a series of short live works in the Grizedale Forest, Coates set up three interactions with local bird populations. They share some of the 'do it and see, (or imagine) what happens' approach of Perry's Predator Mark. The experiment is done for its experiential value rather than the extraction of unequivocable data. In Sparrowhawk Bait, (1999) Coates makes himself the target for a predator. The corpses of: a Blackbird; a Blue Tit; a Mistle Thrush; a Grey Wagtail and a Green Finch are tied to his hair. He runs through the forest, with the anticipation that a local Sparrowhawk will be attracted by and pounce on the momentarily re-animated bodies. Of course, it's silly, nothing happens except for the bouncing of some bodies. In Dawn Chorus (2001) a crop-headed male actor enters an area of young pines and shouts football chants, fan versus fan abuse in good spittle-flinging style. Taking place in a deciduous wood, Out of Season (2000) another short video, documents the same kind of performance, with another actor and the addition of a Chelsea shirt. Aside from its relay and remediation as a video, the primary audience are the birds whose territorial and mating calls normally fill the spaces. In the work concerned with mimicry and imitation, whether of the shaman or of birds, making these chants and calls, listening out for any response, Coates has to link himself as an apprentice to the song domain of the birds, the processes of learning and training of listening and responding, which they establish. Taking the football chants to the forest, sets out not only an idea of how human communications may often be so similar in their territoriality to those of birds. It shows too how demented and dreamy the possibility of talking to the animals really is, but also makes us wonder whether it could ever really be anything more than an unreturnable 'fuck you'.

Louis Bec – Stimutalogues, and Anthony Hall – Enki

Louis Bec describes himself as a Zoosystémicien, a sole participant of this discipline working with an extended conception of artificial life, an abstraction of life in more

general terms, and some developed ideas as to how to proliferate interrelations between technologies of information and different biological manifestations of signification and intelligence. His work tends towards a science fiction in practice and Bec is an adept at the time-accredited techniques of neologism, fabulation, mind-boggling and acronym usage. His manifesto text 'Squids, elements of technozoosemiotics'[41] strives for a moment in which hyperbole and a series of programmatic and poetic statements achieves a density of semantic condensation sufficient to bring a world to life.

Aside from a number of projects developing interactive animated versions of artificial life projects, Bec has worked with various species of fish which use electrical pulses released by special electric organs located in certain parts (varying across species, generally transmission towards the tail, reception in foveal regions at the head) of their bodies. According to a document describing the research programme, this series, the Stimutalogues project includes:

Logognathe Artefact (interactive customizable loop of communication between the living, artifact and interactive agent)

Logomorphogenesis (modeling by dynamic morphogenesis of information exchanges between 3 Gnathonemus Petersii)

Ichyophonie / PanGea (setting up a communication device allowing exchanges between Mormyridées in Brazil and Gymnarchidées in Africa, trying to connect two continents which are getting separated gradually with the tectonic plates).[42]

These fish are nocturnal, as well as having good hearing, they use their electric organs over short ranges to signal mating readiness or aggression, to locate food and to navigate in the dark water. Research by the sensory ecologist Gerhard von der Emde[43] suggests that their complex sensory system is capable of using the way in which an object resists or stores mild electrical currents to determine its shape, and are able to categorise what they find. The movement of the fish, and the tail bending required for ordinary motion, allow the process of electric organ discharge to effectively 'triangulate' objects.

Anthony Hall, is leader of a related project called Enki, (2006) which also uses a number of species of weakly electric fish including Black Ghost Knife fish. (A species which breeds quite comfortably in captivity.) The technique is to place them in a tank containing sensors which pick up the electrical signaling of the fish. The signals

are then converted into waves which are played at a seated user by means of sound and flickering LEDs. A lead travels from the arm of the user carrying electrical pulses from the human body to an electrode in the water in which the fish swims.[44]

As with the Logognathe Artefact and Logomorphogenesis proposals, the fish are placed in conditions in which, compared to their native habitat, they are sensorially and behaviourally deprived. Elephantnose fish (Gnathonemus Petersii) do not breed in captivity, and will therefore in every case of their use as a component in such projects, have been captured from the wild, from areas, Nigeria and Brazil, already subject to significant pillaging for materials. In terms of the development of species-specific art, the question of how markets in animals and animal products intersects with the organization of art, and with the global distribution of habitats and organisms, is essential to recognise. By comparison with the emphasis on the capacity for animals to come and go in OOZ projects, most of the work done with elephantnose fish has substantial problems in terms of its ethical composition. The one clear exception to this is a version of the Ichyophonie / PanGea project which will be discussed last.[45]

In versions of the Enki project which also involve a human subject, it is not clear whether, if, from the perspective of the fish due to their modeling in the system that receives them, and their mediation by layers of devices, it might not be simpler to replace them, or indeed the human user, with an entity in software equally capable of providing aleatory stimulus to the mechanism. The latter is the approach of Bec's Logognathe Artefact.

Underneath the generalizations about possible therapeutic implications and pastel fractals of one early iteration of the Enki project website it becomes clear that certain aspects of the project are potentially quite welcomely dark. Gregory Bateson, in work discussed by Guattari in The Three Ecologies, suggests that decisions and learning may be made by systems 'immanent in the large biological system – the ecosystem'46 or 'at the scale of total evolutionary structure,'47 that are analogous to or developing qualities characteristic of mind. Such minds, systems of learning, occur between interacting elements, they are not isolatable to one single entity bounded by a membrane, but arise from cybernetically describable relays of entities bound at such a scale. One spin on the Enki project is that what we might be seeing here is the production of a mind or mentality, a mind that is at once fish and human but not reducable to either. That the fish part at least, (when petersii are used) in its refusal to breed, is displaying classic signs of confinement stress suggests signifi-

cant questions about the ethico-aesthetic dimensions of art for animals involving captive life. Extreme doubt must be applied to any project that involves confinement, and especially confinement with such negative consequences. And here the question of the conjunctive form ethico-aesthetics proposed by Guattari is useful to draw upon. The Three Ecologies emphasizes processes of subjectification that are artistic in style and inspiration, in imaginal power, rather than being quasi-scientific. Ethics does not consist of the completion of a series of tick boxes of an approvals committee. More fundamentally, to make of the fish an instrument, even one whose cognitive and communicational processes 'complete' the work is to curse it. Art for animals proposes instead that animals have a necessarily ontological world-making dimension. As such an ethico-aesthetic approach disrupts the normal great chain of thought, that starts with ontology, proceeds through epistemology and ends with the mere implementation details of ethics and aesthetics. It suggests that each moment of each scalar state is riven through with such figurations and modes, without any gaining an a priori superiority or precedence to the others. Electronic art is trivial and boring when it simply confirms the inter-relation between sensors and responses. Art using animals is trivial and abusive when it locks animals into devices that deplete its involvement in and creation of the world rather than supplementing it.

This given, the last listed of Louis Bec's projects in this series is particularly interesting to attend to. Ichthyophonie / PanGea is an attempt to develop a communication network between two families of fish using electric signaling, location finding and, more fully, echoperception. These two families, the Mormyrids in located in South America and Gymnarchids in West and Central Africa, originally sharing an early common ancestor, were split apart into different phylogenetic branches by the movement of continental plates as they broke from the early super-continent, PanGea (or Panagea). As yet unrealised, the plan involves setting a network of sensors / actuators in the habitats of these fish which are to be connected to each other via internet. This would allow the communicatory behaviours of these fish, at least those transferable by such means, to enter into some kind of sense of co-location with the possibility for sensorial interplay: perhaps, evoking and probing remnants of shared signaling; or perhaps simply adding a small sizzle of now meaningless noise to a particular patch of water. Perhaps too, it is something else, a paradox: something that tickles the fishes' curiosity, changes the economy of their attention, dislocating their access to the virtual.

In this respect, Enki also establishes some interesting possibilities for further development. Electroperception in electric fish has some very special qualities. Electric

waves move in curved rather than straight lines, and the reflections produced typically become larger the further they are from the object – so this is something rather different to the capacity for orientation via sonic ecolocation or by vision. These fish can also produce concepts of the objects in the sense of abstract categories that are transferable across entities they may encounter. In other iterations of the project, Anthony Hall set up a context in which no human was attached. The fish's signal was picked up by one or more electrodes, typically placed in the corner of their familiar tank. This signal was then fed back to the fish in a different corner of the tank. Because the fish perceive the world in waves, the effect of this can be imagined as being something similar to pushing a limb towards a mirror only to have it 'reflect' via a wall behind you, an experience Hall recounts as provoking much curiosity in the fish. When two weakly electric fish of either of these families meet they go through a process of modulating the individual frequency of the current they give off in order that each can maintain their own signal or refrain. Interestingly, the signals produced by the fish in this context do not carry this 'handshake', suggesting that they recognise themselves in this substantially distorted context, one which they spend time in exploring.

'Je weet nooit hoe een koe een haas vangt'[48]

One way in which art for animals might progress is along the lines suggested by biosemiotics or zoomusicology.[49] Biosemiotics is concerned with the transmission of information as part of living processes, expanding the domain of signaling from that of DNA, to molecules, the interoperation of body parts and systems to the function of organisms and out into other scales of ecologies. Coupled with this, it is a field which develops an idea of a more generalised domain of semiosis, such as communication, subterfuge, courtship and ludic enjoyment configured at the level of the organism or, as with Bateson's ecology of mind, in interactions between organisms. Of importance here too is a notion of aesthetics, of the configuration of beauty. This is something that has been present in a certain way in biology from Darwin's work on sexual selection, and threads through to sociobiological accounts of beauty configured as attractiveness. Amongst other creatures, Deleuze and Guattari draw upon the stagemaker bird, whose pergola is an example both of an extended phenotype and an exuberant courtship display. It is usually taken to be a highly nuanced example of aesthetic judgement involving dimensions that are spatial, colouristic, to do with the freshness of materials and their inter-composition. For them, this constant act of the compilation, sorting and arrangement of materials epitomizes an enactment of territory as rhythm within the melody of ecology.

In many accounts of a possible animal aesthetics there is a dance performed around the threshold of functionality or expressivity configured as being demarcated as that which is gratuituous. This dance may pass through various sub-thresholds according to whether expressivity corresponds to a given stack of drives and needs, to evoke curiosity, to learn, to mate, to eat, to dominate, to play. Where this dance gets stuck is to read these as purely obligatory functions or, in a bipolar switch, as being utterly 'free' - without inter-relation with other compositional forces or constraints. This is part of the terms of their composition, but the dance around their thresholds might also usefully recognise the dance within each of these scales themselves. For instance, in a dance within the scale of play as play, comes the dance of the mimicry of mimicry, one which opens out onto all other scales. Such a dance between gratuitousness and functionality needs to be recognized within the context of the general economy, Bataille's substantial contribution to the intellectual work of ecology in which all, drives included, are ultimately gratuitous.[50] As such it is a liberation and a curse which can only be remedied, or modulated, by being entered into with adequately vivid forms of life. Any point in this stack, or others not named or yet to be invented may tip this dance into a new rhythm. Each element of this stack whether operating as drive, function, play, may become more dislocated or increase its capacity of dislocation for a moment yet to come. Equally, in this dance between scalar function and cosmological gratuitouness, elements may exist across many assemblages functioning in different terms in each, as anchors, blocks, voids or torrents. It is taking part in this movement, doubling it by means of reflexivity, in this case, not simply the reflexivity of a single mind or within the scalar boundary of a compositional entity, but its multiplication by an ecology of sensoria, that art for animal emerges.

Whether it is paint, wood, chrome, text, scent, move, sound, leaf, art works with and through materials that are direct to hand, to thought or to experience, but which also anticipate their coming into composition, their recomposition, with, or by means of, other elements, art may require work from primary natural forces in order to become complete. Think of Edward Munch's habit of leaving his oil-painted canvases out in the rain for weeks in order that they may be worked upon by it. It may be suspected that something of the same happens in the philosophy of Deleuze and Guattari, something which brings it closer in practice both to art and which allows it to produce itself as a receptive domain in which ecologies of texts, histories and ideas, occur, spawn and leave their traces. This is philosophy which leaves itself out in too many weathers. In doing so, they form new relays with ecologies.

Before they too become mulch, those who advocate purity of the discipline now have their turn to rain upon this work, so go the almost inevitable recalls to reason. But this is philosophy. With two thousand years worth of beard to avoid tripping over it is almost compelled to immobility. This, disciplinary automatism masked up as a holy stillness allows it to position itself as a meta-discourse towards which all other fields, not simply philosophers, must meaure their orbit and meet their judges. Art is in a certain way equally ambitious, it will admit of no limits. But only in so far as it provides a means by which, in a deeply amateur way, by means of the art methodology of unreadiness, it comes into composition with other techniques of working. Whilst other discursive frameworks cannot by these means become mastered, they can always be used. Whether this capacity really does extend to the sensual, semiotic and world making capacities of animals is something too that needs to be left outside, to see what happens.

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2. Gabriel von Max, The Jury of Apes, 1889

3. Pliny, Natural History, books 33-35, trans. H. Rackham, Loeb Classical Library, Harvard University Press, Cambridge, 2003, p.309 (book XXXV, section XXXVI,)

4. Notable examples would be Jannis Kounellis' installation, Horses, Rome, 1969, in which a dozen horses were stabled in the Galleria L'Attico, setting up a situation in which the physical presence, movement, smell and palpability of the horses goes straight to matter conjugated by the multiple kinds of expectation and viewing accentuated in art systems. Paolo Pivi's work follows somewhat in this trajectory but with an emphasis on exoticism and absurdist conjuncture, an alligator covered in whipped cream, zebras transported to a snowy landscape, a leopard prowling amongst plastic replica cappuccino cups

5. http://arts.guardian.co.uk/news/story/0,,1718642,00.html

6. The development of such architectural work in the London Zoo was at the initiative of Julian Huxley, then secretary of the Zoological Society. Lubetkin also worked later at Dudley Zoo, which, almost in reverse of OOZ (for the birds) provided a miniature example of modern town planning.. For an analysis of the development of the architecture of London Zoo, see Hadas A. Steiner, 'For the Birds', Grey Room no.13, pp.6-31. The Penguin Pool was eventually abandoned after about seventy years of occupation, with the penguins being moved to a more 'organic' site with various kinds of surface and housings. It remains standing as a grade one listed building, but, as of this writing, (April 2007) remain

unused.

7. For further information on Hotel for Birds see, http://www.fourthplinth.co.uk/thomas_schutte.htm

8. Gerttrud Køpke Sutton, 'David Nash, The Language of Wood' in, Art and Design no.36, p.28-73. The Sheep Spaces sculptures were made in 1993 as part of the TICKON Project, Langeland, Denmark. The same exhibition also included an oversize thatch beehive by Jan Norman.

9. Jeremy Deller, The Bat House Project, 2006-onwards, http://www.bathouseproject.org/

10. Elizabeth Demaray, Elizabeth Demaray's set of plastic casings to substitute for shells for hermit crabs being a further example of an artist producing habitations. A problem with this work, or perhaps the rhetoric that accompanies it, is that it is predicated on a supposed dearth of suitable sea shells. As a design project however, this work failed to take into account the full range of variables that it changed. A radical variation in the colouring, weight, aquadynamic qualities, digestibility and crush-ability of the shells used by these crabs creates a significant set of changes, amongst others not listed, in their fitness landscape. 'The Hand Up Project: Attempting to Meet the New Needs of Natural Life-Forms', Cabinet Magazine, Issue 13 Spring 2004 http://www.cabinetmagazine.org/issues/13/demaray.php/
Another artist Nina Katchadourian, in a series of work called Mended Spiderweb Service, (1998) has added cotton threads to broken spider webs in an attempt to repair then. Whilst these are visually interesting – she uses red cotton and photographs hem against a dark background – they lack any sense of a real attempt to modify her repair practice, the materials used in a way which might actually be accepted by the spiders and incorporated into their webs. Such an approach would of course be unlikely to succeed but would be a mark of some attempt to address the spiders rather than produce interesting pictures. The additions to the web are removed by the spiders. http://www.ninakatchadourian.com/uninvitedcollaborations/spiderwebs.php

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29. This work is a photograph by Man Ray of the reverse side of Duchamp's The Bride Stripped Bare by Her Bachelors, Even (1915-1923). It shows the glass in 1920 after having accumulated a landscape of dust.

30. OOZ, xdesign.ucsd.edu

31. OOZ, Inc. (for the birds) Infrastructure and facilities for high-density bird cohabitation on the roof of Postmasters Gallery installed at the Postmaster's Gallery, September 7 - October 7, 2006.

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Cricket Call

COMMUNICATIONS BETWEEN INSECTS AND HUMANS? INTERVIEW WITH AMY YOUNGS
BY GIOVANNI ALOI

Cricket Call is a technologically-enhanced nature experience attempting to facilitate communication between crickets and humans. Why did you set out to work with live house crickets?

I kept crickets as pets when I lived in an industrial loft in Chicago. Their sounds were comforting and their behaviours quite fascinating to me so I spent some with them, observing their stages of life from eggs to adults. When I would show them to my friends they did not see the crickets as interesting at all, in fact, they would often make rude comments about how they were ugly and looked like cockroaches. I could not convince anyone to look closer, so this became an artistic challenge for me; to make a piece that displays the crickets in such a way as to help humans appreciate them.

I decided to 'technologically-enhance" this piece because I felt it would attract people, seduce them to spend some more time with it and help put them into a mindset to experience something new. Technology is an arena in which we are accustomed to confronting the new and improved. Though crickets themselves are not new, the technology in the piece provides a frame for asking questions and considering the possibility for improved communications between humans and insects.

This work involves the use of a telephone interface receiving and sending sound information. Do you believe that interspecies communication could effectively be established through technology?

Yes, I believe that technology can be used as a tool to facilitate communication between different species. It has been used as a kind of language translator that has allowed humans to communicate with a Bonobo chimpanzee named Kanzi. Researchers developed an iconographic keyboard that Kanzi presses to communicate 348 words, each of which are electronically vocalized in English. He is able to understand thousands of spoken words and he can respond and converse in basic sentences by using the keyboard. Knowing this is possible – and the confirmation that some creatures do have a desire to communicate with humans – means we can also imagine developing technologies that would allow us to decode what they are saying to us in their 'native tongue".

This idea of a techno-translator, is something I was building on with the Cricket Call piece, though it is meant more as speculative device than as a scientific tool. The telephone definitely amplifies the sounds of the crickets into the earpiece for human listener and an electronic chirp is emitted into the cricket house when the mouthpiece is spoken into, but I do not believe that a real vocal translation is occurring. Ultimately, my tool is much too crude. One can imagine however, refining the electronic chirp to match the particular species of cricket and even using computers to 'watch" and 'listen" to crickets with the goal of reproducing meaningful gestures and/or vocalizations that could be activated by human communicators.

The tiny television in the cricket house serves as a possible method for communicating human body language to crickets by shrinking the live, closed-circuit video image of the human participant to cricket size. I think it is most effective as a tool to help the human participant 'see" themselves at cricket scale and in the same room with them. The technology used in the piece works to seduce humans into watching themselves watch, listen and speak to crickets. I have noticed that people enjoy seeing themselves reflected in technology.

Did you design and craft the interior environment for Cricket Call? Why this specific design?

Yes. My overall goal for the design of the cricket house was to create an environment

focused on helping human viewers relate to them. Instead of making a 'natural-looking" home with dirt and leaves, I created a cricket-sized, ostentatious living room with furniture and plush amenities such as velvet rug and a metallic grand piano. I chose the colors of the interior items based on how the crickets would look to us. We are used to seeing them on brown dirt and leaves, but they certainly present themselves more nicely, and visibly, on a royal purple rug.

Originally, I thought I would be able to purchase dollhouse furnishings for the cricket house, but I found them to be too large in scale for the crickets, so I fabricated the furniture objects in wax and then used the technique of copper electroplating to give them a shiny copper shell.

How difficult is to maintain the piece 'alive'?

The maintenance is fairly simple, but most galleries not accustomed to nurturing artwork. A dozen crickets take about as much maintenance as a guinea pig; water every couple of days, fill the food bowl every week and clean the droppings up. In Cricket Call, the food bowl is hidden inside the crickets' grand piano and the water is inside the pot containing the tiny houseplant. A piece of sticky tape works well to vacuum up the cricket droppings and dead crickets every few weeks. Living crickets can be purchased at most local pet supply stores, as they are a staple food for pet lizards and snakes. When I purchase the crickets I try to select mostly males because they chirp, while the females are silent. I've also noticed that the females tend to chew on the furniture, which might be because they are in search of moist places to lay eggs.

How did people react to the piece?

People really seemed to enjoy saying hello to the crickets and they often giggled. They also asked me many questions about crickets, concerning their care, lifespan and behaviour, which made me feel that the project was successful. Some of the criticism I received was that I had anthropomorphized the crickets. I certainly can't argue with that, in fact, I have decided to embrace it. Attributing human characteristics to crickets might not be scientifically accurate, but it can help us relate to them, empathize and even consider the possibilities of what has not been discovered yet by science. It was once thought that language and tool use were uniquely human characteristics, but that notion has certainly been challenged by research being done with animals such as Kanzi the Bonobo chimp.

Holodeck for House Crickets brings the insects back to a less-humanised dimension enabling the crickets to have control over their surroundings.

How did the idea for this work come about?

This newer project presents crickets in an artificial natural environment, which includes a chirp-activated video projection. It began with a desire to construct an experience for crickets that would be exciting and interactive for them; kind of like a Disney-land vacation. I considered that the pet store cricket variety, the common house cricket (Acheta Domesticus), is adapted to living indoors. It is possible that they would enjoy a trip to the outdoors, but they might also not survive such a dangerous adventure. So the video projected into their environment is designed to simulate the feeling of travelling through a prairie grassland. Human viewers of this scene can watch, but cannot participate in the interactive element. The sensor is tuned to listen activate the video only when it detects audio frequencies between 4,000 and 5,000 hertz, which are impossible for us to produce with our voices.

Do you think the crickets developed an awareness of their interaction with the projection?

I really wish I knew. I don't see any indication that they understand their chirping has an effect on the video. However, I do see the crickets attempting to leap onto specific blades of grass in the video, so they are seeing something in it.

Ultimately, the environment I constructed may not be an ideal one for these crickets and I am very interested in this quandary. Wouldn't House Crickets prefer to be left alone? This would mean leaving them to their fate of being purchased from pet stores to be fed to lizards. In the installation of this art piece I included several products that relate to the typical 'care" of this variety of crickets, such as food that is designed to make crickets more nutritious for the pets who eat them and a 'Kricket Keeper" house designed for easy dispensing into the aquariums of hungry reptiles. Perhaps House Crickets would rather be let out into their natural environment of people's houses? This might also lead to their rapid death - either by poisons or by a well-meaning human who captures them and releases them to the outdoors, where they will freeze. Living in a warm glass bubble with artificial rocks, plants and water, an ever-changing video projection and plenty of food and water might a happy medium for them.

Creating, Culling and Caring

BY AMY M. YOUNGS

The Reoccurring Dream:

I call this the rabbit dream even though it always starts out as a nightmare. In it I discover that I have neglected to feed and water hundreds of caged rabbits. Some are dead, but most are still alive; just barely hanging on and somehow I know that they have been waiting for me to come care for them. I have not kept rabbits for over a decade, and even in my dream I am shocked to learn that I am responsible for these rabbits in this dire situation. I then realize that they are the progeny of the rabbits I had bred so many years ago. I don't know who their current owners are, but because I had a hand in bringing their ancestors into the world, I feel overwhelmingly guilty and responsible for them. I am rush around to each cage, trying to revive them. But even in this guilty frenzy I am playing favorites. Realizing that I cannot save every single one before it dies I am looking at each of them, judging them, choosing to first feed and water the most promising-looking specimens; those with the proper coloring, ear carriage, body type, etc. I begin to fluctuate between feeling horribly guilty and feeling hopeful that I will save the 'best" rabbits and be able to continue the breeding project that I had stopped when I was twenty years old. Usually the horror of the deaths falls away to the background as I become captivated with a promising litter of eight-week-old rabbits or a pair whom I believe could create the next grand champion if bred together.

Upon awakening from the dream I find myself wishing that I really did have the progeny of the line of show rabbits that I had a hand in creating. During the entirety of my teen-age years, my passion was rabbit breeding – I raised, showed and sold purebred, pedigreed, French Lops, Mini Lops and American Fuzzy Lops. With the cooperation of the rabbits I was able to produce exceptional creatures, many of them even earned the official status of Grand Champion bestowed by the American Rabbit Breeders Association. Still to this day, I find that a perfect rabbit is one of the most aesthetic experiences. Directing a selective breeding project that produced incredibly aesthetic beings was even more satisfying. The daily caring for the herd of thirty to one hundred rabbits I owned was part of the joy. The part that changes everything, however, is culling.

Culling is the secret:

Culling is the unsavory, unspoken secret of selective breeding because it often involves killing. A planned killing has different names, based on the species being referred to: putting-down, selective termination and euthanasia are some. It is also the secret formula to efficiently create new breeds or altered traits in a population of living things. It is true that not all culls are killed - they are also sold or given away as pets - but because it is not always possible or practical to find a home for the undesirable, unselected animals in a selective breeding project, breeders do kill.

As a breeder, and as someone who has known many other breeders, I can say that most breeders love and obsessively care for their population of animals. However, it is not an unconditional love for every individual in the population. For example, in the creation of a new breed, such as the American Fuzzy Lop, those who have the best wooly coats and lopped ears are the keepers. Those whose wool is too short or thin, or whose ears tend to stand up instead of down, are culled in the interest of the project. Limited time, energy and resources prevent the support of the failed experiments. In a breeding project, culling is a way to ensure that the population of living things under one's care does not exceed the available resources, as these will be needed to continue to care for the living things that have 'made the cut". New varieties and breeds of animals and plants have been created this way for over ten thousand years. If culling could be eliminated from

breeding, I would be whole-heartedly practicing the pursuit of new breeds of rabbits.

Perhaps bioengineering technologies provide a more humane way to create unique living beings? As a radical speeding up of selective breeding, it does not engage in the same trial and error process of selectively breeding and culling thousands of living things over hundreds of generations. Although bioengineering clearly has many ethical issues, it has been presented as a clean way to improve the economic efficiency, the disease-resistance and overall health of domestic plants and animals.

I began to imagine what I would create if I were a genetic engineer and in 1998 I made a series of sculptures that allowed me to explore the idea further. In Hyper-domestic Cacti aesthetic ideals of nature are projected onto live and fictitious cacti. Taking existing examples of engineered cacti, such as grafted cacti and genetically-enhanced, spineless cacti, this body of work imagines the possible future permutations of these living forms. Perhaps the plants of the future will be engineered in ways that enable them to show us their emotions or reflect ours back to us. Indeed, it is possible that our new creations could affect us in ways that bring about a greater appreciation for, and conservation of, the non-human world.

Engineered for Empathy is a cactus I endowed with a green, pulsating heartbeat-like glow. Inspired by the creation of transgenic tobacco plants that glow with the genes of fireflies, it is a speculation as to what might be possible to engineer into future plant species. Beyond mere visual aesthetics or economic motivation, I imagined a plant that responds to humans and conveys emotions in ways understandable by us. This cactus is engineered to elicit empathy from humans, so that we will be compelled to care for it. Its signal to us is a glowing heartbeat that speeds up as a person comes near it. If the cactus is touched, its pulsing behavior changes to a frenetic flashing. Though visually and mentally satisfying at first, this project took an ironic turn when the live cacti I altered suffered an untimely death, most likely due to the operation of embedding forty-eight LEDs into it.

The Warm and Fuzzy Glowing Bunny

I was excited to learn about the transgenic rabbit transformed into an artwork by Eduardo Kac. He calls it GFP Bunny, as it has a Green Fluorescent Protein in its genes, which causes it to glow under a special kind of light. It was made in a lab in

France that had been creating a strain of GFP rabbits since 1998. So, while the technology is not brand new and the creation of the rabbit was not the work of the artist, the transformation of a transgenic lab rabbit into an artwork (and into a bunny named Alba) is quite interesting. It instigates dialogue about human/animal relationships and challenges notions of purity and naturalness. Kac's desire to bring the rabbit into a social sphere - to treat it as a pet living among his family - certainly focuses attention on how the rabbit is objectified by the scientific community it came from. It would not be given any special care, love or even a name in the lab. Kac has been attempting to persuade the lab that created the rabbit to allow him to bring it to his home in Chicago. It gives me a warm and fuzzy feeling to think that Kac might rescue this object rabbit and turn it into a social subject rabbit.

Nouvelle Culling:

In his writing about the GFP bunny project, Kac assures that the process of creating this kind of rabbit is safe and harmless.[1] The process used by the lab is called pronuclear microinjection and it starts with fertilized eggs from donor mother rabbits who have been injected with hormones to make them superovulate. Harvesting the embryos involves killing the donor mother rabbits.[2] The eggs are microinjected with the foreign DNA and, in an invasive surgical procedure, they are implanted into the surrogate mother rabbits. Of the fifteen to twenty embryos implanted in each mother, an average of three babies are born, and among the number of live births, only around 3% are actually transgenic.[3] The rest are the failed, culled animals in the experiment. Kac's GFP bunny was one of the very few lucky rabbits (and rabbit embryos) that did not get harmed or killed in her creation.

Learning about this process has changed my mind about creating my own transgenic rabbits. Even if I were provided access to biotech specialists and a lab, or given enough money to hire them to create rabbits for me, my past experiences with culling and responsibility prevent me from being able to create in this manner. My reoccurring rabbit dream/nightmare is a reoccurring reminder of the responsibility I felt - and still feel - for the animals I created, culled and cared for.

Alternative Collaborative Creating:

The process of breeding and raising animals feels like a collaborative artwork with nature. The process of culling requires shifting attention away from the individuals and objectifying the group so that tough decisions can be made that will advance

the project. Some human mothers-to-be, mainly those who have undergone fertility treatments, face a similar situation when they learn that they are pregnant with multiple live fetuses. Since the project of having one healthy baby is decreased in cases of multiple births, doctors often encourage parents to consider 'selective termination", the culling of some of the smaller or less healthy embryos in order to increase the chances of survival for the one or two embryos left in the womb; a place of limited resources.

If the project is not working toward the health of a human or animal, and is instead an art project, it can be difficult to justify. In other essays I have argued in favor of the kind of artwork that interacts with living things, as I believe it is an ideal way to explore important concepts of ecology and interconnectedness between humans and the non-human world.[4] One artist whose work exemplifies this concept is George Gessert, who has been breeding and hybridizing unique flowers as a genetic artform since 1982. His work with flowers highlights one way in which humans have interacted with the natural world for thousands of years. Gessert's breeding project however, stands out from other horticultural endeavors, as he is not breeding for traits that are considered economically valuable in the marketplace. He believes that 'Genetic art is not simply a matter of inscribing individual human ideas and fictions into the DNA of other beings." And that, 'On the deepest level, genetic art is about community, the community of living beings." [5]

My own desire to create artwork that interacts with the community of living things without hurting them has led me to design a sculpture to protect a spineless cactus. Rearming the Spineless Opuntia is a machine that protects a Spineless Opuntia, an actual cactus that has been altered by humans so that is lacks its spines. It is, therefore, easier to eat and to feed to cattle than its relative, commonly known as the Prickly Pear cactus. The metal armor built into the machine closes when people approach and opens up again when people move away from it. It signals a future in which humans will need to engineer increasingly elaborate remedies for ecological problems we are responsible for; much like the current creation of artificial reefs which are needed in populated costal areas to replace the natural reefs damaged by humans.

In a current attempt to collaborate with living things, I am designing shells for hermit crabs. Prototypes for Hermit Crab Shells is a project that began with computer-designed, rapid-prototyped shells, which I gave to seven Land Hermit Crabs[6]. Since they cannot grow their own shells they rely upon marine snails to produce the shells

they use to protect themselves. When they grow out of the old shell, or find another they prefer, they will move into a new one. So far, the crabs have rejected all of my designs. They have all elected to either stay in their own shell or to move into a natural shell. The crabs have essentially culled my designs. I am incredibly humbled by this experience, but at the same time I have been challenged to learn from my mistakes, to learn more about the crabs' needs and to try new designs. After the experiments with rabbit breeding, research into genetic engineering and the continued longing for other ways to engage and collaborate with non-human living creatures, I believe the feeling of humility is most appropriate.

Creating, Culling and Caring was published in Catts, Oron, ed. The Aesthetics of Care? Nedlands, Australia: School of Anatomy and Human Biology, University of Western Australia, 2002. The full publication is available online at: http://www.symbiotica.uwa.edu.au/__data/page/95975/AESTHETICS.pdf

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4. See Amy M. Youngs, 'The Fine Art of Creating Life, Leonardo 33, No. 5 (2000) and Amy M. Youngs, 'Commingling the Techno with the Eco, Nouvel Objet 6 (2001).

5. George Gessert, 'Notes on Genetic Art," Leonardo 26, No. 3 (1993) pg. 210.

6. Prototypes for Hermit Crab Shells began as a collaborative project with Matt Derksen, and was exhibited at Archetype Gallery, Dayton, OH. Nov 16, 2001 - Jan 31, 2002 as part of Intersculpt:Ohio.

What Gilgamesh and What Apes?

EXCERPT FROM 'GILGAMESH FOR APES' BY WILFRIED HOU JE BEK

Gilgamesh, the Sumerian epic that is regarded as the oldest piece of literature known, is here presented in the pictorial language used by American and Japanese primate centres teaching language to great apes. While reworking Gilgamesh for apes I was mostly thinking about the chimpanzees, bonobos and orangutans living at the Great Ape Trust in Des Moines, Ohio. It is far from certain what these apes would make of this text if it would be presented to them. Hopefully they would recognize the lexigrams as similar to those they have been taught to use, but I do not know if the convention of reading (from left to right and from top to bottom) means anything to them. Apes like to watch TV and they can understand a story. 'They especially like to watch interactions between apes as well as between apes and humans. Themes of danger and danger resolved rivet their attention', write Savage-Rumbaugh and Lewin in their joint book about bonobo-poet Kanzi. Gilgamesh must hold great appeal for them as it contains many moments of danger and of danger resolved, often through interaction between animals of apish descent. The very idea of translating human literature for apes seems so tantalizing that I don't think it can be done: somebody would have done it already and we would know about it. When Kanzi is watching TV all the information he needs he gets from body language and contextual clues, this suggests that Gilgamesh for Apes would be more successful as a film or as a theatre production. But I do present this version of Gilgamesh in the good faith that someday, many generations from now, some ape will enjoy the experience of reading this. Perhaps this story will appear to them like the Jabberwocky poem appeared to Alice (in wonderland): 'Somehow it seems to fill my head with ideas--only I don't exactly know what they are! However, SOMEBODY killed SOMETHING: that's clear, at any rate--'.

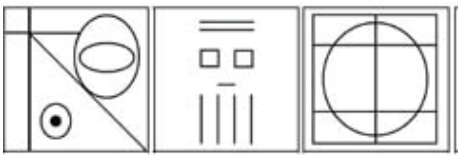
(Here are Gilgamesh and Enkidu.)

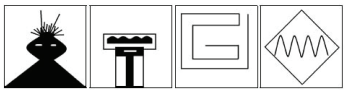
The Lexigrams

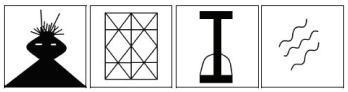
The vocabulary of Ape-Esperanto is 384 lexigrams big. The first 120 lexigrams were drafted in 1977 by Ernst von Glaserfeld. His beautiful collection of symbols, all combinations of the same small set of lines, rectangles and twirls, could easily have appeared on the sleeve of a Kraftwerk record. They are however hard to tell apart and once used in actual research they were found wanting.
If you study the three displays collecting all the available lexigrams, downloadable from the Great Ape Trust website, you will find a variety of designs enriching the original set: Japanese characters, English words and funky freehand drawings. The designers clearly had little concern for preserving the original consistency of style, and though sometimes ugly visually, practically they are the better for it. All in all the entire vocabulary looks like a mess, pardon me, like a real language. Most lexigrams carry the word for what they are meant to represent, in my amateurish redrawing of them in the lovely Microsoft Paint, these do not return. for food (noodles, jello, taco, burrito, M&Ms etc. it does makes you wonder about their diet), 17 are used for locations inside the primate centre (play room, Sue's office, etc.), 15 are used for names of staff and primates (Panbanisha, Liz, etc.) and 9 are unreadable or of (to me) incomprehensible meaning. I can imagine that a different tally (on another day or by someone else) might yield slightly different results. The way these lexigrams are actually used is, as far as I can tell, poorly documented. There is no guide or dictionary available and the correct

Gilgamesh is Big.

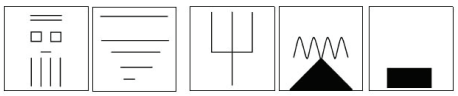

Gilgamesh has nest in house.

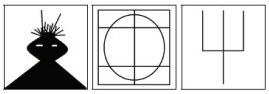

If Gilgamesh groom it hurt.


Enkidu has nest outdoors.


Enkidu wash(es) in River.

Gilgamesh fight like Enkidu.


Gilgamesh said, orang-utan go see Enkidu.


Enkidu groom(s) orang-utan.

Enkidu wrong ! Enkidu wrong !

For the rest of the Gilgamesh for Apes text, please refer to:
http://fightthegooglejugend.com/primatepoetics/primatepoetics.html

interpretation for some signs remains unclear. When pointing to the lexigram for 'like' does an ape understand it as 'being alike' or as 'liking something or someone'? Or both depending on the context? There does not seem to be a document to refer to. The real question is: do these lexigrams name enough of the world to allow translation of human writing in a way that someone we know to have full language competence (another human) can 'read' it. I leave it to the reader to answer this question.

I have invented three new lexigrams. One for Gilgamesh, a bony face and one for Enkidu, a shadowy trooper. The third one is for 'forest'. Kanzi is very fond of hiking in the woods but I have not been able to find a lexigram for it. I could have done without it all together but the strange, nearly criminal situation of a languagetrained ape not knowing the word for the place he or she is supposed to live in the wild persuaded me to add four diagonal lines to the symbol for 'outdoors' and instate this as the 'forest' lexigram. If it does turn out to exist, and I hope it does, I blame stupidity and blindness on my part.

The Epic

There does not exist one authoritative version of Gilgamesh. The oldest Cuneiform tablets date from around 2000 BC, while the youngest fragments date from roughly 130 BC. The epic comes to us in Sumerian, Akkadian, Hittite and Babylonian, all translations are in effect recreations from different sources from different times in different languages. From Nancy Sandars prose translation, published as a 1960 Penguin Pocket, I have selected three stories to retell: The Coming of Enkidu, The Forest Journey and The Story of The Flood. The English of Sandars is stately to the point where you wonder if she is not falsifying the original feel of the story with her exalted style. As they say, a myth is only a myth for as long as it is transformed to correspond with the symbolic world of the teller. There does not exist a 'correct' version and my version is therefore just as good as any other. The scarcity of lexigrams can only serve to condense the complexities of Gilgamesh into something more to the point. It begins as simple as I could simplify. Slowly, as Gilgamesh and his friend Enkidu discover the world, the storytelling changes. Repetition signals the passing of time (a device we find in the original), the structure of sentences becomes more complex, objects and persons cease to be named directly but are referenced to; the rhythm-wise the story opens with a steady metronomic beat which slowly morphs into a junglified breakbeat at the end. We are after all not only telling a story, we are also trying to explain what a story is and what it can do to a different type of mind.

Coming of Enkidu (Enkidu is Coming)

Gilgamesh, 'He who saw the deep', is a king and a god who lives in a palace in the city. He is all-powerful, a dictator, cruel because he knows his cruelty will remain unpunished. Every woman (Gilgamesh is not for the prudent) is forced to have sex with him the day that she marries. This is translated as 'If Gilgamesh groom it hurt'. Enkidu is a wild man who lives on the other side, together with the beasts in the forest. 'He was innocent of mankind, he knew nothing of the cultivated land'. Gilgamesh sees Enkidu in a dream. Apes, like all mammals dream, but can they remember them?? Gilgamesh sends a prostitute to the forest to sleep with Enkidu. When he falls for her charms it is his Paradise Lost: gone is his feral innocence, no longer is he able to live free and undomesticated. This is the key moment in the story but how do you go about telling this to an ape? And do you even want to? Let us save the apes from our idiotic moral values, besides, the idea of a bonobo problematizing sex is clearly ridiculous. In my version Gilgamesh sends an orang-utan to Enkidu and when they groom Enkidu becomes unhappy because he lost his joy in the outdoors. I do apologize, especially to all urangs, for this silly solution. When Enkidu finally goes to Gilgamesh he warns him on arrival that Gilgamesh should no longer abuse his power. Gilgamesh attracted to Enkidu's natural righteousness inclines. The two have become friends and now the god and the wild man set out on a both real and allegorical journey to become human. This symbolism is the reason for choosing Gilgamesh: read 'primatologist' for Gilgamesh and read 'ape' for Enkidu.

The Forest Journey (Go-To Forest)

Gilgamesh represents the corrupting effect of power, Enkidu the benevolence that same power can also be used for. The Forest Journey at first presents Gilgamesh on a power trip with Enkidu first trying to talk him out of it only to talk him into it when the catastrophe of monstercide is about to be circumvented. The exact motivations for Gilgamesh deeds are impersonal, he is driven by the gods of his bicameral mind (to borrow a term from Julian Jaynes). To us it all seems pointless and this is why it is pointless in my version. Gilgamesh needs cedar wood to enlarge his palace, but the forest he wants to plunder is guarded by Humbaba, a terrible monster, pure evil, who is left unnamed. When the monster meets Gilgamesh he pleads and prays that he is actually done with the forest and Gilgamesh is free to take from it what he needs. Why this sudden meek obedience? In the story it is because godsend winds have reprogrammed Humbaba, in my version it is because of the 'Hello Face', the natural authority of Gilgamesh. In response to the appropriate low ranking posture assumed

by the monster Gilgamesh changes his mind. Instead of hurting him (actually killing but murder does not have a lexigram) he wants to take him to his house. Enkidu however, because he is jealous, or maybe because he sees through the devilish plot of the monster, brings Gilgamesh back to his original thought: the monster is hurt real bad. 'Wood' I translated by combining the lexigrams for forest and stick, thus 'forest-stick'. This in the fashion of many apes observed to have invented their own names for objects by combining two words they already know.

The Story of the Flood (the Water-Blanket)

The Gilgamesh epic contains a flood story that is older than the one in the Bible. Most cultures have a flood story, presumably all based on the same pre-literate ur-myth. In my wilder moments I like to think that apes in the wild do tell each other stories and that the great catastrophe told and remembered by the story of the flood is also present in an ape story. Within the epic this story stands apart, it does not mention Gilgamesh and Enkidu is already dead. The gods are unhappy with the humans and they create a flood that covers even the highest mountain and wipes out the entire race of man. One man only is saved, the voices tell him to make a boat out of his house. Once the water covers everything, every day a different bird is released to find dry land, and for a long time the bird returns. One day the bird does not return and we know that the water is residing because the bird must have found a place to land. But once dried up the world has changed for good, its new, awful and yet sublime shapes, forever remind us of the power of the gods and the absolute need not to fall back into our old habits. That strange perpetual human desire to see the world destroyed! The story of the flood is impossible to tell in lexigrams and not just because nearly all important words are absent from its vocabulary. Instead I have taken the freedom to create a little lexigram prose-poem out of it, an opium dream for ape-literati, a mini-storm of words raging through the mind with unrelenting force, a firework display of what language can be, or in other words: a true piece of PrimatePoetics.

Enkidu is an Ape.

The Gilgamesh of the epic can be traced to a real Babylonian king. Nobody however doubts that the stories as they are found inscribed are based on stories much older than the earliest date for the kingship of Gilgamesh (2600 BC). The king has been written into it for political reasons. It is my belief that in The Coming of Enkidu, hidden under later paraphernalia, we find an ancient memory that dates back to the

time when the genetic lines of man and chimpanzee/bonobo had just separated or were about to separate. The period of active speciation in which fertile hybrids might still be conceived but in which the differences between the (almost) two species were obvious to both. Recorded in Gilgamesh is the shock of the human line suddenly realizing that the ape is not at a furry nephew or niece but another beast. Enkidu is an ape and Gilgamesh is a human and together they tried bringing their separating paths back into a joint future. All this in a Me Tarzan, You Enkidu kind of way.

PrimatePoetics as History

Oral history and mythology are usually believed to contain traces of events as old as 12.000 years, scanty evidence suggests that South- American folklore recorded events as old as 20.000 years, but here its ends. The identification of Enkidu as an ape suggests that hidden under a blanket of distortion and later additions literature does remember events that happened millions of years ago (the human line diverged from the great ape 6 million years ago). For this to be true we need more sources than just this one. Surprisingly Rumbaugh and Lewin have this to say: What were we like before we invented language? I thought of those vague references to 'dreamtime' people in aboriginal culture, and the reference in our own culture to the absence of 'knowledge of good and evil' before eve consumed the proverbial apple. I also recalled those references to some African and Indian cultures in which it is said that the older brother and younger brother decided upon different paths long ago when they first became aware that it was possible to control fire. It is said that the older brother elected to remain in the forest, following the old ways and eschewing fire and language. The apes of today are descended from older brother. Younger brother went out from the forest and kept fire with him, becoming the progenitor of all humans today. Could cultural myths such as these hark back to a murky time in our distant past when we possessed human minds but no language. A lingering memory of the human-ape before language can also be found in Jewish lore that tells that god, by way of damnation, changed the builders of the Tower of Babel into apes (and evil spirits, demons and ghosts). I like this story not only for the fact that it recognizes apes as part of our linguistic heritage, even if the role assigned them is that of the outlaw, but because it double-binds the first memory of the ape as different from us with the origin of horror.

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Miracles, monsters and disturbances

BY ELIO CACCAVALE & MICHAEL REISS

Modern science challenges many well-established borders. Genetics in particular raises the prospect of merging species, transferring DNA between species or questioning the very essence of a species. It is creating new opportunities, limited, perhaps, only by our imagination – or what we believe is acceptable: some real or potential applications of new technologies often raise a deep sense of unease. Although rational science can describe what is possible, perhaps, suggest Elio Caccavale and Michael Reiss, only the arts and humanities can truly articulate what the future might look like, by unleashing a creative process that integrates an emotional as well as a literal perspective on imagined future worlds.

The idea that there is a simple and obvious distinction between different species is deeply rooted in our culture. Yet modern biotechnology, with its ability to create chimeras (mixing embryonic cells from different species) and genetic hybrids (incorporating genetic material from different species into a particular genome), makes the self-evidence of this distinction problematic. Scientists can now manipulate the genetic information that plays a part in the developmental process of all life forms. Using sophisticated recombinant-DNA and cell-fusion processes, genetic information from unrelated species can be inserted, deleted or even stitched and fused together, creating forms of life that have never before existed. This has provoked deep anxiety among many people, an anxiety that has been variously described as a rejection of the 'unnatural' or a fear of the 'alien' or the 'dangerous'. On the other hand, from ancient times, our culture has been fascinated by creatures that combine varied features from different animals, or animals mixed with humans, such as griffins and centaurs. Such hybrids, or monstrous creatures, challenge our usual sense of categorisation and provide us with the stimulus for thinking about the truly fundamental aspects of both biological and physical human nature.

Increasingly, the news media and popular culture are alerting the public to the heated dialogue that is underway about what our near future might become. Daily, the miraculous scientific predictions and breakthroughs that were once the subject of science fiction are announced as realities. Each new announcement triggers hopes and fears

and guarantees further debate among humanitarians, profit seekers, legal experts, ethicists, politicians and the public. Science and art collaborations could have an important role in this ongoing exploration, creating images that literally give shape to intangible and complex concepts. Working with new languages and images, they raise questions about the social, cultural, ecological, economic and ethical implications of science breakthroughs. The works of many artists informed by science investigate issues and concerns triggered by the modification of nature, and provide the public with an opportunity to pay closer attention to advances in science and to reflect upon the boundaries between science and the human imagination. They consider how we shape nature to meet our desires and demands, manipulating genetic make-ups and changing the form and productivity of animals and other organisms.

This intersection of contemporary science and contemporary artistic responses to such science opens up new educational spaces. Issues to do with the crossing of species boundaries and other sorts of genetic transformation are rich in educational potential. In part this is because such issues, while current, tap into deeper fears about losing what it is that makes us human and distinguishes us from other animals. In large measure too it is simply that science here is seen as it operates at the frontier of knowledge, rather than in the rather ossified form it generally takes in school science lessons. This provides an open-endedness to science that can be attractive to many for whom science is all too often boring or irrelevant. This chapter therefore seems to explore how education about science can draw richly on practices in art and design. Such practices can help learners explore the moral and social implications of new technologies and enable all of us to reflect on what is possible and what is desirable.

Evitables and inevitables

Collaborations between artists and scientists in education can draw on related work in laboratories and in the cultural sector. In these contexts, science and art collaborations quite often speculate about these new parameters of life and these expressions of scientific creativity with a mixture of awe and concern. Two closely related categories of artist working on hybridity can be identified: the evitables and the inevitables. A good example of the inevitables is Chicago artist Eduardo Kac,[1] who is known worldwide for his 'GFP Bunny'. The project consists of a GM rabbit named Alba, which was created with the help of French scientists[2] who injected the DNA for green fluorescent protein (GFP) of a Pacific Northwest jellyfish into the fertilised egg of an albino rabbit. The project comprises not only the creation of the fluores-

cent rabbit but also the public dialogue generated by this and the integration of the transgenic animal into society. Kac had intended to take custody of Alba, but because of growing concerns for her welfare and the (allegedly) potentially devastating effect the bunny would have on the ecosystem if she were to escape and reproduce, she was not released to Kac.

The idea of taking Alba into a domestic environment places genetic engineering in a social context in which the relationship between the private and the public spheres are negotiated. In other words, biotechnology, the private realm of family life and the social domain of public opinion are discussed in relation to one another. Kac has created digital manipulated photos (photo) of the rabbit so that she appears greener than is physically possible even for the Pacific jellyfish itself. Reproductions of the photo of Kac's green rabbit have been published in newspapers and exhibited in art galleries, and have no doubt contributed to the public engagement discourse on transgenic animals.

The ecologist Ignacio Chapela[3] points out that the rabbit photographs were digitally altered and explained that rabbits cannot have green corneas. Chapela does not make this point to comment on Kac's project, but rather to argue that green fluorescing rabbit pets are not inevitable. By pointing this out Chapela shows that the press don't mind about the veracity of an image – a digital manipulation is better if it is more sensational – and that the French scientist's refusal to release Alba from the laboratory is an example of this very sociocultural phenomenon.

The Australian artist Patricia Piccinini[4] is an example of the evitables. She creates humanoid sculptural installations to confront us with images of a future where human gene technology gives us the ability to create genetic hybrids and chimeras. One particular project shown at the Australian Pavilion at the Venice Biennale in 2003 included a variety of bizarre, genetically engineered beings that are strikingly different from what we know but, at the same time, strangely familiar. 'The Young Family' sculpture series consisted of a human sow primate with arms and legs who suckles a litter of human piglets as she lounges on a leather sofa. The mother's tarnished skin has the unsightly wrinkles, red blotches, moles and imperfections we might find on our own bodies. Her hands and feet could belong to a grandfather. Human traits aside, she looks more or less like a pig – despite the strikingly tender maternal gaze she casts upon her offspring.

While 'The Young Family' may be warning the public, it also radically overestimates the control we have over biological systems. In her art Piccinini creates organisms

that cannot feasibly be produced in actuality, producing a delusion of comprehensive genetic knowledge and control. It is what we do not know that is truly dangerous. Her sculptures have the opposite effect of their intended shock-and-awe tactic; by contrast, actual images of genetically engineered organisms look banal. Think, for instance, of ordinary-looking goats produced by the Canadian biotech company Nexia Biotechnologies.[5] Nexia has spliced spider genes responsible for webs (one of the strongest fibres known in nature) into the genome of a goat. When the goat's milk is processed, the result is BioSteel, a substance that can be spun into a thread that has the tensile strength and flexibility of a super spider web. The potential applications range from medical applications to bullet- proofing and sports equipment.

Hybridity

In our own work on hybridity, biotechnology can be seen as an experimental ground where the most advanced technological innovation clashes with more human aspects and concerns, such as ethics and social conduct, and where the evitable meets the inevitable. The myBio project6 exhibited at the Science Learning Centre London explores the emergence of biological hybrids in biotechnologies, and our human, personal, moral, aesthetic and sociocultural responses to them. The creation of any kind of hybrid begins to challenge species boundaries – in particular, an entirely new resonance on how we learn and form categories about 'the human' and 'the animal' is brought about. Our work on hybridity builds on recent creativity and scholarship in design, bioethics and historical and anthropological studies in the human, the animal and the monstrous, providing tools for investigating our moral, social, cultural and personal responses to the strange and different in human biology and also 'trans-human' creatures. The result is an increase in teasing out and provoking discussion regarding genetically modified human–animal hybrids in existing and near future biotechnology. In particular, what is sought is an understanding of the relationship between children's learning in the categories of animal/human and the extent to which such categories can be considered merely contingent and revisable in the light of technological change.

There are two main areas of research interests that have contributed to the outcomes of our collaboration. The first investigated the emergence of biological hybrids in biotechnologies, with particular respect to the breeding of GM animals and xenotransplantation. Focusing on the implications of the techniques that have already entered the public domain, we examined the impact of such innovations as the BioSteel goat developed by Nexia Technologies, the transgenic ornamental fish

developed by Taikong Corp.,[7] the low-fat pork in pigs developed by Kinki University[8] in Japan, the transgenic pigs for xenotransplantation developed by NexTran,[9] the featherless chickens developed by the Hebrew University School of Agriculture[10] in Israel (photo) and the Enviropig[11] developed by the University of Guelph in Canada.

The second area of research interest focused on the educational material culture that uses the playful and abstract language of educational dolls to help facilitate children's understanding of biologically, socially and culturally complex concepts. A wide range of such dolls have been developed: sex educational dolls, race equality educational dolls, disabled educational dolls, medical condition educational dolls. As yet, though, there is a remarkable dearth of information as to the consequences of using such material. A search on Google Scholar for 'educational dolls" (22 September 2007) revealed just 12 hits – all of which are for patents. Our supposition, despite the current lack of scholarly evidence for this, is that dolls may be powerful enablers of exploration and learning. We note that the value of puppets in science education is beginning to be explored.[12]

Learning from companies and organisations that produce educational dolls and using their established visual imagery, we made 12 myBio dolls that could symbolise possible biofutures and introduce children to the emergence of biological hybrids. The dolls include: myBio boy and myBio pig, which demonstrate the physical transfer of the organ from the animal to the human; myBio bunny, myBio glowing fish and myBio jellyfish glow bright green when illuminated with a UV light, demonstrating how scientists have used GFP as a fluorescent indicator for monitoring gene expression in living organisms; myBio reactor cow shows how cows can produce proteins in their milk for pharmaceutical drugs (this is symbolised by the 'milk thread' attached to the cow's udders); and myBio goat has a spider web attached to the udders, demonstrating one animal making the natural product of another. We have used the myBio dolls to present scientific information through the channel of the narrative. Starting with a series of 'What if?' stories, the narrative process gives children a common language for talking about biotechnology. 'Suppose that your life could be saved by a pig, what would happen to you and the pig?" or 'Imagine you could have a glow-in-the-dark rabbit, would you relate to such a rabbit differently than a conventional one?"

We are particularly interested in children's responses to the impact of biotechnologies, affected as they are by the aesthetic of new scientific creations (think for instance of a glow-in-the-dark bunny) that can make the concept of hybridity excit-

ing. Much of the academic reaction to recent biotechnological developments across species boundaries has been ethical. Careful ethical reflection and analysis is important, but we believe that artistic presentations and reactions have much to offer. In particular, they can be more open-ended, demanding much of the viewer, and then they rely on faculties other than the cerebral, thus engaging us on a greater number of levels and facilitating the tangibility of abstract concepts. Here, then, we see art not as a decoration of science but as a necessary partner if we are better to imagine how we were, how we are and how we will or want to be.

As part of the myBio project we also instituted a workshop with medical and product design students at Central Saint Martins College of Art and Design (part of the University of the Arts London). The students worked together in interdisciplinary groups. Their objective was to explore animals by proposing hypothetical hybrids and animal products. The hybrids proposed had to perform in new ways, and, as such, create new effects, phenomena and behaviours. After creating their hybrids, the groups were asked to develop hypothetical, yet feasible, social scenarios based on their initial ideas, that is to consider what people would do with their hybrids. How would new social behaviours emerge around their hybrids? What would be the physical consequences of their hybrids? And what new points of interface would exist between the hybrids and people?

Although none of the participants knew each other prior to the event, there was free and fertile exchange of ideas and roles throughout the workshop. This led to a breaking down of traditional interdisciplinary boundaries, thereby facilitating an open and inspirational dialogue between design, art and science. The students responded positively to the workshop experience and they have expressed strong interest in being involved in other sciart workshops. We see every reason to expect that similar responses would be found in schools and colleges with students across the 11–19 age range, because it would enable them to draw on their own ideas and subsequently to reflect on these and debate them.

Miracles or monsters?

The word ‘miracle’ comes from the Latin miraculum, meaning an object of wonder. To this day the word retains its two main uses: on the one hand, a technical, theological term meaning an event that cannot be explained by the laws of nature and therefore provides evidence for some divine (i.e. supernatural) intervention; on the other, its more everyday usage simply meaning something ‘remarkable’ or ‘wonderful’. This

everyday term is nearly always understood positively, so that we say it was a miracle that a family survived a horrendous car crash, not that it was a miracle that another family sheltering under a tree in a thunderstorm was killed by lightning.

It is the everyday usage that is more important, of course, in the new technologies – we are not talking here about the formal proof of three important miracles that the Roman Catholic Church requires before the process of canonisation can be completed. However, the everyday and the eternal cannot so easily be separated; we stand in awe of non-supernatural miracles even when they are rooted in the realities of nature. Such miracles challenge our understanding and enlarge our vision.

But in many people's eyes – and one of the advantages of sciart dialogue is its shift from the cerebral and verbal to the visual and splanchnic – tomorrow's biotechnological products threaten to be monsters not miracles. Monsters, like miracles, come in various forms. But just as we see miracles as generally positive, for all the neutrality of the etymology of the term, so monsters are generally perceived to be negative. Like miracles, monsters are rare, but when perceived they shock, they terrify, they disgust.

Historically, as Harriet Ritvo argues in her suitably titled The Platypus and the Mermaid: And other figments of the classifying imagination,[13] only a small divergence from what seemed natural sufficed to make a monster – and the same is true today. It can be a thin line between ugliness and monstrosity. However, ugliness sits within the normal range; a monster sits apart. A naked cat may be ugly in many people's eyes but a lamb with five legs is a monster, a 'sport of nature'. It is this 'apartness' that is crucial in understanding the common, visceral reaction to that which is monstrous – a term applied not only to entities but also to actions. So slavery, child warfare and the force-feeding of geese to produce pâté de foie gras can (should) be described as monstrous as they sit outside our common perceptions of what it should be to be a human, a child or a goose.

As is well known, monsters fascinate. We know of the awful times Joseph Merrick, the Elephant Man, lived though because of his deformity but while we may regard with condescension the thought of Victorian freak shows, we do well to remember the contemporary fascination with conjoined twins – e.g. Abby and Britty Hensel, Lori and George (aka Dori and Reba) Schappell – as evidenced by the many TV documentaries and newspaper and magazine articles they inspire. Such examples can be both attractive and repellent to young people; certainly, they question our existing classifications.

Broadening from unusual humans to unusual animals, monsters that failed to sit tidily within established categories caused problems for those taxonomists keen to produce an ordered classification. As is well known, the arrival of the first specimens of the duck-billed platypus (Ornithorhynchus anatinus) in the UK at the end of the 18th century so astonished naturalists that the specimens were widely regarded as fakes. It was presumed that someone had sewn a duck's beak onto the body of a beaver-like animal. Today we understand the platypus as one of the five extant species of monotremes (the other four are echidnas) found in Australia. Uniquely among mammals, monotremes lay eggs rather than producing live young; they also, and again incongruously, have electroreceptors to help them detect their prey. Adult platypuses are also most unusual among mammals in being venomous.

Disturbances

The more bullish of today's biologists are fond of saying that we are on the threshold of a new age; that contemporary applications of biology are about to make the same sort of difference to our ways of living that the agricultural revolutions of several millennia ago, the industrial revolution of the 19th century and the communications revolution of the late 20th century made. Analyses of such prophecies have tended to focus on whether or not such a biorevolution would be desirable. Would it lead to improved human health and increased crop yields or to new diseases and the extinction of certain plant species? Would it result in more or less human happiness, to greater or less inequality among people? But there is another way of examining the implications of developments in today's biology, and that is to look at their meanings. What might be the effects of the widespread use of genetic engineering, cloning, stem cell technology and so on on how we understand ourselves and the rest of nature? Such questions about the significance of new technologies received a powerful articulation before the advent of genetic engineering from Heidegger, who argued that in technology we make objects according to some blueprint that we determine. We design things to satisfy our purposes rather than allow our purposes to be affected by, and find creative expression through, the qualities of the objects themselves.[14]

For this reason an approach that explores the emergence of biological hybrids in biotechnologies, and our human, personal, moral, aesthetic and sociocultural responses to them, is to be welcomed. Nowhere are these issues raised more sharply than in the new 'hybrids' of genetically modified animals. It is important to remember that not all genetic engineering entails moving genes between species. For example, the

genetic engineering of yeasts to 'improve' breads and beers involves using the tools of genetic engineering to move genes between strains or varieties of yeast but still within the one species. Here genetic engineering is being used to speed up a process that could equally be carried out by conventional breeding – the essence of a biological species being that within it individuals are able to breed among themselves. Unsurprisingly, this use of genetic engineering has raised little controversy and – more importantly for the questions considered here – little disquiet.

Those instances of genetic engineering of most concern both to the general public and to members of pressure groups opposed to genetic engineering involve the movement of genes between species, often between completely unrelated species. For example, genes from scorpions have been moved into viruses in an attempt to make such viruses more toxic to insect pests, and genes from humans have been moved into pigs in the hope that organs from these pigs might be suitable for (xeno) transplantation.

In any useful sense, moving genes from scorpions to viruses, and from humans to pigs, is unnatural. The question is, how concerned should we be at this breaching of species boundaries? Does it matter that plant crops contain bacterial or animal genes if the result is that their yields are greater? Does it matter that certain bacteria confined to fermenters in pharmaceutical factories contain human genes if the result is that life-saving and health-restoring medicines, such as insulin, are produced? Does it matter that pigs are being genetically engineered with human genes in the hope that their internal organs may be used for human transplants? And, almost irrespective of whether it matters, in some absolute sense or not (if such a perspective exists), how do we feel about the dissolutions of these boundaries?

One interesting psychological point is that as we grow up the boundaries between species help us to organise our understanding of the natural world. Children learn from their infancy about living things in their immediate environment. In particular, they learn about animals, learning both to recognise different types of animals and what their basic names are. It has been argued that the concepts 'animal' and 'plant' are fundamental ontological categories – that is, categories used by children to organise their perceptions of the world in which they live. Certainly for most children, animals form a significant part of the world around them, whether as wildlife, pets or zoomorphic toys. It is therefore unsurprising that names for familiar animals form a large part of the vocabulary of young children.

Boundaries serve to divide entities into categories; in this way a boundary enables

classification. It can make us secure and helps us structure our world. Of course, such security may be prejudiced. The strict boundaries that once divided men and women in terms of how each of us might spend our time are changing fast. Activities such as cross-dressing make little sense to some people, are deeply disturbing to others, are political statements by some and are essential to a few. One can ask whether it is wrong to eat animals that have been genetically engineered to contain human genes.[15] This question may soon become pressing as the number of animals with human genes continues to increase.

At one pole are those who argue that eating an animal, or a plant, into which a human gene has been inserted has nothing whatever to do with cannibalism. Cannibalism is about eating human flesh, not eating minute amounts of DNA that once came from just one of the 30 000 or so human genes and is now merely a copy of that original human gene. Further, every baby who breastfeeds eats large amounts of another human's (i.e. its mother's) DNA.

Those who object to inserting human genes into animals that are subsequently used for human consumption may argue that the parallels with cannibalism cannot so lightly be dismissed. Although Imutran, one of the companies at one point actively engaged in xenotransplantation research, has argued, 'This involves changing only 0.001 per cent of the genetic make-up of the pig,"[16] it could be argued that the actual percentage of change is not of prime importance. After all, if one is unfaithful to one's spouse on only 0.5 per cent of nights, is this ten times better than if one is unfaithful on 5 per cent of nights? Reverting to traditional anthropological concepts, one either exists in a state of purity or impurity – there are no halfway positions, no no-man's-lands gradually to be traversed. Similarly, just because a baby less than a year or so old does certain things with its mother doesn't make it right for the rest of us to do those same things with its mother.

We need new ways of exploring the meanings raised by genetic engineering and other modern biotechnologies. Rational words are needed but are not enough. This is why an approach through art and design can be so valuable. The two of us are particularly interested in the potential of such artefacts to help both students and teachers develop their thinking and, as importantly, their affective responses. Most of us now need fewer boundaries than our ancestors did. Just as symbols (e.g. blood) can be, in different contexts, either defiling or sanctifying, so a boundary can serve either to maintain order and strengthen that which it encloses or to lead to disunity. Increasingly people find themselves uncomfortable with boundaries that

seem to lack a rational basis. Why shouldn't people of the same sex be able to get married if they want to? Why shouldn't women be front-line soldiers? And yet, are all boundaries to be crossed, all divisions eroded if they cannot be defended on rational grounds? Is incest between freely consenting adults to be permitted if they use reliable contraceptives? Is it morally right to move genes between species? And whether it is or is not, how do we feel about it? As Catherine Booth said, 'If we are to better the future we must disturb the present."

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The myBio project is realised through the collaboration of Elio Caccavale (Royal College of Art) with Professor Richard Ashcroft (Queen Mary, University of London) and Professor Michael Reiss (Institute of Education, University of London).

A Pig Saved My Life

BY ELIO CACCAVALE

The small Texan town of Garland is an unlikely place to find the cutting edge of medical science. Home to just 2,000 people in neat tree-lined streets bordered by wooden houses it's a friendly, but perfectly unremarkable place. At first sight, the young man sitting at his computer at home in Colgate Lane seems as undistinguished as the rest of the neighbourhood: tall, pale and thin with fashionably cut blond hair and a single ear- ring. Though part of a loving family, the only unusual event in his life was that at the age of six months his grandparents adopted him and became his legal parents.

On Wednesday evenings he accompanies them to Bible readings at the Calvary Baptist Church, a short car journey away. The family are cornerstones of the church community. On other evenings the house is regularly filled with the sound of grandmother Charlotte playing gospel music on the piano. Grandfather Ray, a retired policeman, spends much of his spare time helping to refurbish poor churches around the area. There are bibles on the bookshelves and family photographs smile down from the walls.

But one photo which Ray has framed with special care gives a clue to why the young man at the computer is remarkable. It's a picture of a pig called Wilbur. Christian churches all over the world have held Thanksgiving services for the life of Wilbur the pig, because Wilbur saved Robert's life.

Robert is the first person in the world to have been plumbed into a genetically modified pig organ and lived to tell the tale. He has come closer than anyone alive today to having an organ from another species implanted into their body, a 'xenotransplant'.

Doctors carried out the pioneering but highly controversial operation after Robert's own liver failed. He urgently needed a transplant to save his life, but no human liver was available, so with his grandparents' permission the medical team went into action. They brought a genetically modified (or transgenic) pig's liver in a basin to his hospital bedside and connected it to Robert's system using plastic tubes. For almost seven hours his blood was pumped through the pig's liver, cleansing his body of the poisons building up because of his own failed organ.

The pioneering procedure continued until a human liver became available for transplant. The operation, known as a 'liver bridge' almost certainly saved his life. It was a

major, confident step towards the day when herds of genetically modified pigs may be bred to provide life saving hearts, kidneys, lungs and livers for transplantation into humans. The operation was to be part of a series of trials run by Nextran, one of the leading xenotransplant research companies.

Research into xeno technology is continuing apace. Science fiction has become science fact. Crossing the species barrier will be one of the first great medical milestones in the 21st century. It will also be the crossroads where many of the techniques which will transform medicine in the third millennium, meet. Genetic modification, gene targeting and cloning all come together. If successful, xenotransplantation will rank alongside the first heart transplant and the first test tube baby in terms of its effect on millions of lives.

Many people feel it is immoral and unethical to use pigs as production lines for spare parts for humans. Supporters of xeno say if it's fine to breed pigs for the breakfast table, then why not for the operating table? The arguments take place against a background of a huge shortage of organs for transplantation. In the UK alone someone dies every few hours because of the lack of an organ for transplant. When xeno becomes commonplace people need no longer face an uncertain future on a waiting list, or have to spend months in hospital. Their condition could be monitored regularly and when the time was right for a transplant, they could undergo the operation without delay.

Xenotransplantation does raise social and ethical dilemmas that make each one of us question just how far we are prepared to go in pursuit of a long, active life. We have long treated animals as things for our convenience, and for the last thirty years we have been applying our latest scientific techniques to make them serve our ends better. Genetic engineering, revolutionary as it may be in one sense, is in another sense just one more way of using animals for our purposes.

We can either leave science to make the decisions about xeno on our behalf, or we can join the debate. It isn't too late to be heard. Scientific issues are important but not nearly as important as the ethical, social and cultural implications for society.

Utility Pets

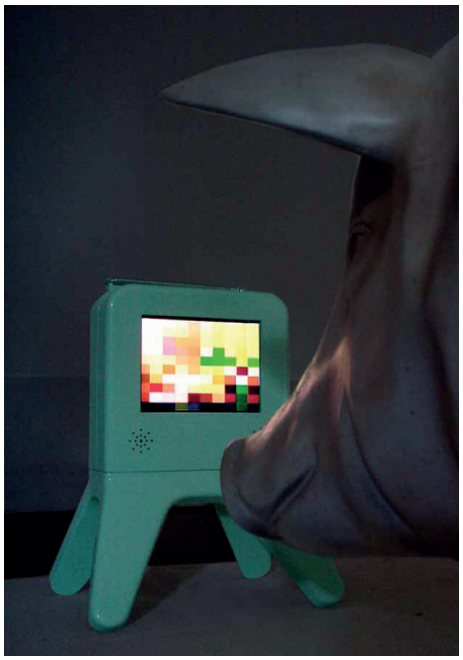
Utility Pets is an experimental project that uses hypothetical products and a social fiction scenario to draw attention to the ethical consequence of xenotransplantation

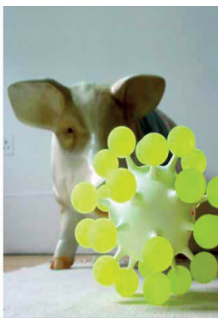
— the transplantation of animal organs into humans. Emotional and material considerations are important in our relationship with animals, just as they are with people. However, they also provoke conflicts. The wired and wonderful ways in which human beings have resolved such conflicts provide the central basis of research for the Utility Pets project.

Pigs are considered by animal experts to be more than twice as smart as cats, and infinitely more trainable. They enjoy playing and generally get along well with other domestic animals. Pigs can be clean pets. They will stay tidy if they are bathed and groomed. Considering pigs can be ideal pets, the idea of having animal farms to supply human spare parts seems highly questionable. In organ farms pigs would suffer the cruelty of battery farm treatment, a situation at odds with our bodies and times.

I have imagined a social scenario where the organ recipient has a close relationship with his organ donor. This is expressed through physical objects as well as through the special care the animal receives. The pig is taken home and given a good quality life until the day of the organ replacement dawns. Suffering can be avoided while animal products are produced. We can assume that the evil of factory farming can be replaced with an enjoyable existence for the animal.

The social scenario proposed highlights an emotional exchange, where both benefit, owner and pig. If the medium of design is placed where science meets our lives, where





ethical and moral abysses spring wide open, it can offer a platform between reality and fiction where we can freely discuss how we were, how we are and how we will or want to be.

The Utility Pet products include a low-resolution TV exclusively for pigs, which they can control by themselves: a pig toy with a microphone and a radio handset allowing the owner to listen to the pig enjoying itself; a smoke-filtering device allowing a person to smoke in front of the pig without it suffering the consequence of passive smoking; and a comforter — a psychological product made from the snout of the sacrificed pig, which serves as a memento after the xenotransplantation has been carried out, and helps people come to terms with the contradictory feelings generated by this complex situation.

From the V2_ Archives: Squids

BY LOUIS BEC

A machine picks up in its own code a code fragment from another machine
— G. Deleuze & F. Guattari[1]

As a paranaturalist zoosystemician, I'm haunted by squids[2] (Superconducting QUantum Interference Devices). I tend to describe these objects as 'pseudo-machines' that have undergone a curious theoretical and technical 'naturalization' process. These acronymic[3] pseudo-machines are to my mind unclassifiable in current physical, mental, biological and communicatory terms, but I believe them to be gifted with strange powers, being able to compress the heterogeneous, chimerize the disparate, superfluidify communication and pervert the parameters on which the modeling of aliveness in artificial life depends.

They present as epistemological nodes uniting the 'near-technique of aliveness and the near-aliveness of technique' and provide the signs of a new relationship between the machine and nature.

1. Could these pseudo-machines take the form of an 'enriched near-aliveness,' producing a meaning 'surplus' in technically bolstered living matter?

2. Could they be produced by biotechnical artifacts which rechannel their functional mechanisms into the creation of a curious feedback loop leading to a 'cybernatured' aliveness?

3. What kind of mutagenic agent would make the transit in this shift from cognitive organism to technological device? Contaminated information?

4. What exactly is the nature of these underlying 'embryo-technological' functions? Could they be pre-adaptive agents, encysted within organic functions and stealthily putting future permutations out of phase?

The presence of these pseudo-machines gives rise to a number of considerations in the fabulatory epistemology field:

▪ We are in the process of abandoning a 'paradigm' that takes the technical artifact as an aid principle for the biochemically and biophysically alive and for an ecosystemically given natural setting.

▪ The strategies for maintaining the viability of the alive and of its natural setting are thus out of phase.

▪ The old methodologies now seem inappropriate and in some cases obsolete. However, via different assistance programs, they still allow biotechnology, artificial organs, behavioral robotics, artificial ecosystems and so on … to compensate for shortcomings and disturbances.

▪ The machine/nature relationship is now being built around a 'Technobiome.'

▪ This latter is being developed out of multiple technological devices which extend the intentions and the adaptive and inventive activities of the alive.

▪ These devices are progressively proliferating and diversifying. They are surrounding the alive with a network of steadily more innervated and interactive artificial operators; this gigantic techno-fantastical swelling tends to become an autonomous system which gives rise to an expanding, evolving, cognitive, self-organizing logic in which the communication aspect plays a decisive role.

▪ This is why, from here on in, Machine/Nature interactions happen via Techno-zoosemiotic instrumentation. The technological, methodological and instrumentological tools used here are interfaces for the modes of interchange between biosphere phenomena and living species as a whole.

▪ Thus the new task of the alive, and of humankind in particular, is to hook a programmed technological biodiversity plan into an interlinked semiosphere riddled with signs and signals, in a way that lays the foundations for a systemics of the alive.

In the present case, the study of squids represents a decisive step towards getting a handle on the new situation. Squids are detectors of electromagnetic fields. Their acronym points up the possession of biological and zoological functions, in particular those of a cephalopod equipped with specific communicatory aptitudes. In addition, their superconductivity is a major innovation in the area of information exchange. It means we can envisage resistance-free electricity and communication flow. This ac-

ronymic reduction and loop-creation clearly point up new machine reconfigurations.

The first sighting of these pseudo-machines took place during a zoosystemic study of the behavior of Loligo vulgaris, more commonly known as the squid.[4]

The study gave rise to modelings called the 'Poikiloligoidal Aberrations of Loligo appoplanensis,' which aimed to show the phases of development of a 'metalanguage' using the communicatory potential of the Loligo's morphogenesis and phylogenesis.[5]

This marine invertebrate's chromatophoric and bioluminescent communication codes make it simultaneously a semaphoric and a techno-cephalopodic object. This led me to digitize these cutaneous codes, with the aim of setting up a 'dialogue' with these cephalopods by using an artificial skin to manipulate the chromatic and formal parameters involved.

The second meeting took place in the course of my current study of electric sensoriality. Here I am trying to establish whether the central role of the electric sense in the contemporary technological world can be seen as compensating for the absence of the electric sense from the human sensorial range. This time the model was an electric fish, Gnathonemus petersii, which uses inbuilt radar to move about in the muddy, congested waters of African lakes and electrocommunication for exchanging information with other members of its species. This fish, girded with technological devices for sending and picking up electric messages, is in itself a concatenated behavioral technology object, which is also simultaneously a cognitive transmitter and receiver. The data gathered and the modelings and experiments so far carried out with this 'apparatus' -- Ichthyophony[6] and Logomorphogenesis[7] for example -- have opened up new pathways in the various areas of technozoosemiotics.

The Ticks[8] (Transferers of Information to Creaturely Kin) and Rays (Releaser Assistance Yielders) I am currently working on can be regarded as prototypical extensions of the same order.

The third and last indication shows up transversally in the development of an Upokrinomenolgy. The basic work of the zoosystemician consists of modeling arbitrary zoological systems in which Upokrinomena develop in the form of singular zoologies, curious biologies and aberrant technomorphogeneses; this work gives rise to an intermediate construct, a rebellion in parallel, an autonomous annotation of the alive. The deliberate search for a Hypozoology -- a zoology whose emergence from

under the appearances of objective zoology broadens and reveals the 'hypocrisical'[9] sphere of the alive -- has made visible the complexity of the crafty dialogue the alive carries on with the alive; this would have been impossible without a technological infrastructure.

The zoosystemician then got to wondering what ability Artificial Life had to produce concepts and devices with a real aptitude for processing the 'Machine -- Nature' connection. Analysis revealed that biomimetic near-alive modelings were wide off the mark. By simulating life as it is, they neutralized the inventive and heuristic side of the artifacts of life as it might be. These modelings aped the life of the ape, while ignoring the deviant -- cognitive -- ape. The resultant artifacts were unable to get free of the theoretical and methodological substratum inherited from biology and positivist epistemologies and could not come up with new forms of inventive adaptation suited to the systemic and technological changes taking place in the biosphere.

Analysis of the move by biomimetic modelings towards a computerized world is a major step.

▪ The aim is to promote a proliferation of digitized biocultural organisms in communication networks.[10]

▪ These are the preconditions for the implementing of a technological biodiversity program, with the creation of as yet unknown life-forms and post-biological virtual worlds.

▪ Only a new, totally and genuinely artificial space, a technobiomological[11] environment favorable to techno-ecosystemic niches[12], can make this possible.

It is conceivable that in this environment riddled with electric signals, flows and symbols, the system as a whole will create a hybridized natural setting and thus become a comprehensive built-in assistance machine.

The alive is also present in the network environment in another way.

'Bits of the alive'[13] are embedded in the core of complex technological constructions so as to use the metabolic, biochemical and electrical properties found there.

As opposed to nanotechnologies directly implanted in organisms to make up for

physical and mental deficiencies, the new ventures into hybridization of the alive inject aliveness into the network via the very computers used. With a view to building computer components, certain laboratories[14] are currently testing the properties of biological molecules, notably proteins stemming from the bacteria Bacteriorhodopsin which, via an intramolecular light-activated displacement, functions as a commutator.[15]

In this instance the machine is aided and oversized by the alive. Thus an aliveness artificialization loop seems to take shape around an intimate, computerized co-evolution.

Squids And Technozoosemiotics

Squids are pseudo-machines with variable semantic and technological geometry. They are the outcome of an acronymic technomorphogenesis and present themselves as a taxidermized designation, the dermis of which is made up of alphabetical terms. The dermis covers a superconductive electronic measuring device activated by quantum interference. Reduction to an acronym is a trick that allows chimerization of zoological appearance by creating access to the functions of quantum physics. This acronymic teratology also duplicates the cognitive capacity for information storage. On the one hand it recalls animality -- the behavioral attitudes and aptitudes of a species as classified in the evolutionary taxonomy of living things; and on the other, a superconductivity technique with a remarkable capacity to combine several quantum effects, of which resistance-free electricity flow is the most obvious.

This virtual object maneuvering in the world of words constitutes an entity whose stunning coherence neatly generates a complex information exchange loop, linking signals that are syntactically and semantically different.

Loligo vulgaris has managed to get rid of the mollusc's shell that kept it in the dark, prison-like world of muteness. By swallowing it, it transformed itself into a translucent invertebrate vertebrate and thus opened its body to the delights of chromatophoric communication with its fellows. The terminologically incarnated dermis that is the squid's surface recalls with great precision the logophoric, virtual appearance of a cephalopod destined, in its undersea world, to fulfil a very characteristic communicatory function.

Under the chromatophoric dermis lies a multiplexed superconductive physiology,

a squid 30 micrometers long swimming in liquid nitrogen at a temperature of 77° Kelvin, or -196° Celsius.

This packaged metabolism behaves as a detector of electromagnetic fields and its functions are those of a nifty Superconducting QUantum Interference Device at large in the English linguistic universe. It is capable, for example, of detecting variations in the magnetic signals of the human body's electric currents. A squid placed against the head of a patient suffering from focal epilepsy picks up infinitely small magnetic fluctuations that reveal the brain lesion behind the affliction. Where the brain is concerned, these weak signals have a swing of only a few femtoteslas. The squid can construct a behavioral map, just as the zoological squid does with its chromatophores, and then communicate via a computer the types of brain lesions detected, in the form of a skin of digitized images made up of signals that would formerly have passed unnoticed.

To take a further example, it can also measure the minute disturbance due to the gravitational wave of a supernova when this is picked up by a five-ton aluminum bar suspended in a vacuum chamber and maintained at a temperature close to absolute zero.

The squid is thus a 'bio-physical' ploy allowing mind-boggling linkages between magnetic fluctuations in outer space, the imperceptible quiverings of the alive and maybe even the premises of eventual communication with other forms of intelligence in the galactic universe. It offers the hostile terrain of the infinitely cold as a venue for absolute communication -- the resistance-free smoothness of superfluid superconductivity -- with no graininess in the messages, no noise and no code perversion.

It is the ideal, practicable metaphorical venue for interspecific communication -- the venue for technozoosemiotics and the communication of intelligence in its tiniest nuances, the miniaturized setting in which cryogenized codes develop.

As a surplus information interface, squids are part of technozoosemiotic relevance in that this latter encompasses and transcends the ethological, cognitive and zoosemiotic condition. They provide the means of approaching the 'why' of ecosystemic information surplus processing, as well as the methodological and instrumental 'how.' The alive no longer appears as a material, autarkic unity, but as part of a network in which it forms an integration point for energy and above all for information. It is located at the intersection of multiple exchanges which link it to all the components

of its biomass and of the natural and technological environment it constructs by producing a heterogeneous information surplus. But if this surplus is to take a hand in the alive's reciprocal activities, it must be processed by devices, by constellations of a syntactic and semantic nature that are irrevocably linked to the world of species itself, just as the other ecological factors are.

The need for machinic assistance results here from a broadening of the technical processing of the surplus of available information.

In this tissue of interactions, just what path does meaning take between signal, sign and technical device? The question of the siting of pseudo-machines -- of their ontological location -- arises within the different integration levels marked by the presence of living species. The result is that these technological devices have triggered a turnaround in regard to that basic contrast between sign and signal as a fundamental factor distinguishing human from animals. The notion of signal as something typically ethological -- active but surplus-free -- is now obsolete. The information provided by the alive is made up of innumerable clear or not-so-clear connotations, always found in association with denotations. In these cases, it is no longer possible -- as it is with a strictly utilitarian machine -- to seize the exact potential of the extra assistance provided by symbol manipulation.

How are we to evaluate the reciprocal aid resulting from this insertion of the different?

How are we to gauge the intermediary role of translation, and the relevance of what is added or subtracted to the interweavings of the information transferred?

If we broaden our view to include relationships with other 'natural or artificial' forms of intelligence functioning in or on other life-support systems, we observe that over the last fifty years humankind has made an unprecedented effort to further modes of communication between all living.

In spite of results that still leave a lot to be desired, experimentation goes resolutely ahead, using the appropriate cognitive methods and technological tools. This enormous effort at getting very different communication procedures under way between men and animals is now well established in the scientific domain. Ethology is working on certain forms of language-learning for chimpanzees, while research into animal cognition models such social-animal behavior as the building of bird and insect[16] nests.

Ethologists and psychologists have also come up with various techniques for getting information from animals. Their range of methods runs from repeated observations designed to discover the pattern of a given behavior to multiple conditioning and teaching techniques that include language-learning[17] via appropriate tools -- keyboards, screens, plastic symbols -- and interactive technological devices.

The example of the robots that show bees where to find food is an excellent illustration of this approach. Experiments using a robot[18] have shown that bees can hear and that their auditory system picks up the sounds associated with their dances.

Observation of the behavior of bees in the presence of a robot that sings and dances like one of their scouts has revealed that these insects simultaneously use sounds and dance movements to show their fellows where food is located. Experiments with a multi-motor robot that dances and emits sounds have been successful in indicating the pathway to food, with most of the bees who witness the dance managing to home in on the bait.

And so it is just as if, via distributed intelligence, the ongoing artificialization of the alive is channeling new potential for exchange and assistance among all parts of the alive.

Technozoosemiotics is working to this end. It is situated at the cross-roads of semiotics, ethology, the cognitive sciences, technology, computer science and artistic activity.

As an integral part of Zoosemiotics, which studies the signs developed by living species for intra- or interspecific communication, Technozoosemiotics contributes via technological and instrumentological means to the creation of digital interfaces, of transduction and transcoding areas between kinesthetic and paralinguistic systems, and of strings of signs that might possibly be intelligible between different living and artificial species. So it represents one of the fundamental elements of the Animal/Machine/Human relationship in respect of laying the basis for a communication continuum for the alive.

It postulates an aliveness logic whose long-term aim is to establish an interspecific communication covering all the living organisms of the biomass, with the possibility of humankind as one of its operators.

Functioning diffusely and permanently, this transversal interspecific communication

could end up by laying the foundation for a new ecosystemic, geopolitical, geocultural and economic approach. And -- who knows? -- if the concept of culture comes to include animal protocultures, could it then be extended to all forms of intelligence in the biomass?

However, any type of interspecific communication will always require the discordant interpolation of a 'translator/transductor' to come up with the offshoots of a metacode.

It's in this sense that squids are heuristic. Already they're signaling the NATUROMACHINES of the future.

REFERENCES AND NOTES:

1. Fabulatory epistemology involves introducing into the domain of knowledge the inventive, imaginary dimensions of face-to-face discussion, in a way that sends out their multiple reflections and endlessly reinvents their meaning.

2. Electronic devices using superconductors, squids are used as magnetic field detectors.

3. Acronym: word formed from the initial letters of other words.

4. A regular little writing set, the squid encloses a transparent pen and a sac of sepia ink; its body is the case.

5. The evolution of Loligo vulgaris shows that it moved from the calcareous-shelled mollusc stage to a translucent communicative state after consuming its own shell.

6. Ichthyophony: an experiment which made it possible to 'converse' with electric fish by telephone.

7. Logomorphogenesis: the act of making a 'discussion' between three electric fish physically perceptible via the emergence of a variable three-dimensional model.

8. An allusion to J.V. Uexküll's famous tick in 'Mondes animaux et mondes humains,' édition Gonthier, Paris.

9. Related to 'hypocritical'; from the Greek hypokrites, an actor or pretender, one who criticizes from behind a mask. Hypocrisics is a critical method used by fabulatory epistemology, but with none of the habitual moral overtones.

10. See the work of Thomas Ray in his Tierra project. This new environment possesses a physical layer made up of cables, Hertzian circuits, optical fibers, satellites, computers, microprocessors and so

on.

11. Technobiomological: relating to the study of technobiomes.

12. Ecosystemic niches: technological spaces housing modelings of artificial life in the network.

13. Thanks, Aristotle!

14. The Keck Center for Molecular Electronics, the Syracuse University Information Center.

15. In the case of stable-state molecules, we can encrypt binary figures and make components that are smaller and a thousand times faster. Hybrid biomolecular liaison techniques are used with semi-conductors to make logic gates.

16. See the work of Guy Théraulaz and Eric Bonabeau in 'Intelligence collective,' Hermès, 1994.

17. Jacques Vauclair: 'Cognition animale,' Presses Universitaires de France, 1996.

18. Carried out by Wolfgang Kirchner at the University of Würzburg, Germany and William Towne of the University of Kurztown, USA.

Final Word

Suggested further reading:

The Architect and the Bee, by Tim Ingold (essay)

When Species Meet, by Donna Haraway (book)

Cabinet Magazine, Issue 4: 'Animals' (magazine)

The Postmodern Animal, by Steve Baker (book)

Next Blowup event:

August 25 2011: Every Artist, a Journalist

www.v2.nl/events/blowup

COLOPHON

July 2011, Rotterdam.

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