Toy animals

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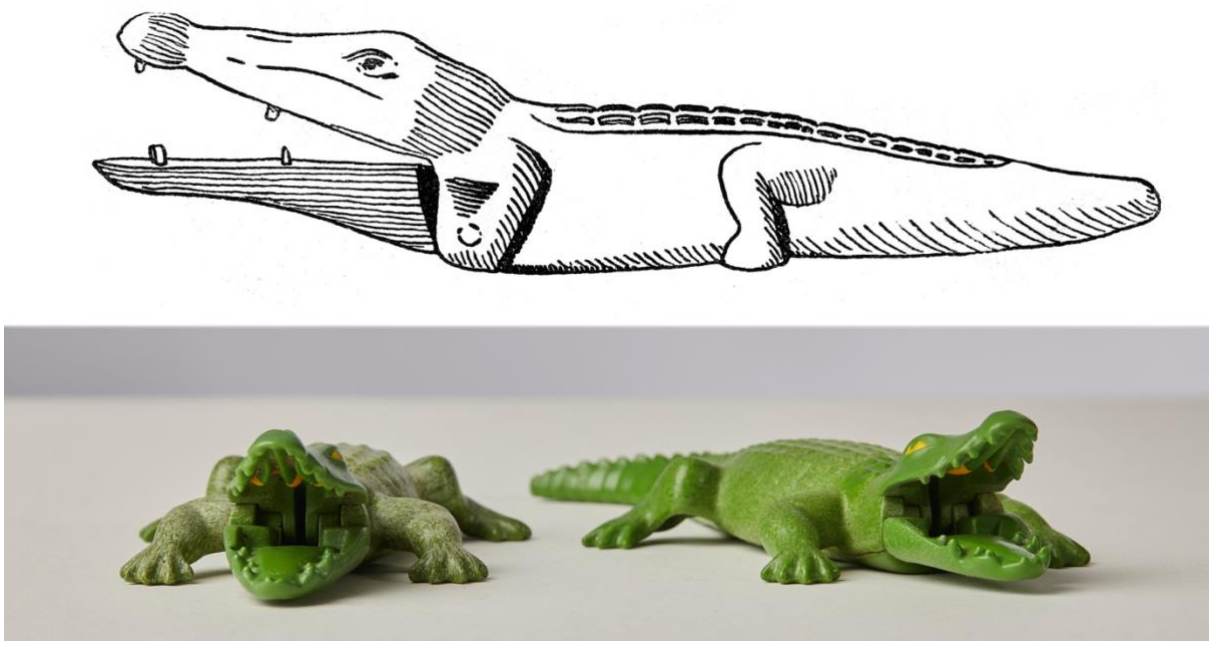
> [A]nimality and technology should be approached as two already entangled domains, rather than clearly demarcated categories.[i]



Toy crocodiles with articulated jaws. Egypt c.2500BCE; Playmobil c. 2005CE

Toy animals appear to be at least as old as dolls. The earliest animal figurines discovered date from 30,000 BCE in Ice Age Europe, for example a carved ivory mammoth less than four centimetres long, found in a cave in what is now Germany in 2007.[ii] A figure of a bird, again tiny at less than two centimetres in length, carved from burnt bone and carefully designed with an overlarge tail to balance it, and is the oldest Chinese artefact found, dated to over 13,000 years ago. Animal-shaped artefacts have been produced as multiples for both children's play and as funerary goods, or singly as a companion object or a wheeled pull-along device. Modern children's books and media are full of animated animal toys, but they attract little of the philosophical attention afforded to anthropomorphic dolls. When dolls and puppets come to life in children's and adult fiction it is with all the pathos of the desire to be sentient and biological, whereas the life of toy animals is generally unexamined,

as they adopt the non-reflective, non-existential role of the child's companion (for example, Winnie the Pooh, or Hobbes the tiger),[iii] or as one of a community of living toys of various types (for example, Enid Blyton's *Noddy* books, the *Toy Story* movies). Similarly, whilst zoomorphic machines are integral to the genealogy of automata they occupy more ambiguous conceptual and symbolic roles. The bird-shaped parerga ornamenting classical and medieval devices visually and aurally, Leonardo da Vinci's lost automated lion, and Vaucanson's digesting and excreting mechanical duck gather to them all the magic of the android, but to the manifestation of corporeal rather than cognitive life, instinct rather than reason. Today, animal-inspired robots and software systems model instinctive, social and 'swarm' behaviours, roaming the edges of critical and speculative thought on machine intelligence and consciousness. Videogame worlds are full of synthetic creatures for players to nurture and train, fight, or eat. Playful artificial animals offer rich possibilities for thinking and new modes of animate behaviour and human-nonhuman relationality, not least because they highlight beastly attributes repressed in the anthropocentric automata and writing on them, attributes such as herd or swarm behaviour, predation, being trained or nurtured, and evolution. Here I will focus on the toyetic genealogy of these twenty-first century digital and postdigital manifestations, offering an alternative animal perspective on questions of artificial life in play. I will draw on the history of animal toys to inform this account of the playfully zoomorphic as a particularly rich aesthetic and mechanical mode for exploring questions of play and imagination today. I map the child's toy and media environment as one populated with artificial animals, from toys to virtual creatures, and this discussion connects directly and builds on my exploration of the new simulacral and postnatural[iv] life of the artificial animal in its playful and play-like behaviour and habitats.

Synthetic wilderness

The long history of toy animals is inflected by economic, social, and industrial shifts. In recent centuries the German toy industry mass-produced animals from wood, ceramic, and textiles. New plastic materials were introduced in Britain and the US in the twentieth century and cheap zoo and farm sets produced, and Disney innovated with media tie-ins and merchandising - a process ramped up significantly in the post-War period with commercial children's television. Brian Sutton-Smith's proposition that twentieth century toys were a kind of generational apology to children for the loss of their outdoor social lives and their increasing domestication and privatisation pertains with the toy animal as artificial companion (cuddly toy), as models of environments (zoo, farm and safari sets), and as didactic and instructional media (alphabet blocks, illustrated books). As such, the animal-like play object suggests another distinct facet of this amelioration of loss: that of Nature in general and close contact with actual animals in particular. The factories that turned out artificial animals and animal media were integral to the seismic social and demographic shifts of industrialisation and urbanisation that largely separated - for the first time in

human existence - animals from the everyday lives of a large proportion of the population. By the inter-war years of the twentieth century even horses had largely left the city streets of Europe and North America as motorised transport took over, the urban animal's role transformed to that of domestic pet, exhibit in the new zoological gardens, or as toys and children's media.

This industrial-entertainment artificial animal would also be a peculiarly animate creature. Talking animals with human-like intelligence in fiction are evident throughout myth, fable, religious texts and magical thinking, but the bestiary of nineteenth and twentieth century literature and commercial media for children marks a new phantasmatic intensity. Lois Kuznets argues that the first interaction of human and nonhuman animal characters "at the same level of "fictive reality"" doesn't occur until the adventures of Lewis Carroll's Alice with the White Rabbit, Cheshire Cat and Caterpillar in the 1860s.[x] We might add the sometimes unsettling mix of human and animal behaviour in Beatrix Potter's characters at the end of the nineteenth century and Walt Disney's *Silly Symphonies* cartoons of the 1930s that conjured up a chaotic world of human-like animals and zany technology. With industrialisation, everyday experience with animals became predominantly artificial and mediatised, and toys and the toy-like took over. Elena Passarello links the domestic environment of her childhood - stuffed with animal-themed and decorated books, clothes, furniture, media and objects - to John Berger's mournful diagnosis of the modern urban experience as one of alienation from nature, with animals tamed as pets, constrained in zoos, or disseminated as media imagery.[xi] Passarello shares Berger's sense of loss, but her description of her animal-themed childhood - "a synthetic wilderness" - conveys a semiotic, developmental and imaginative richness that suggests there is more to the everyday postnatural than simply a faint and cruel compensation:

> According to my Peter Rabbit baby book, the first song I could sing was "Old MacDonald,' and I knew the word "kitty" by the end of my first year. For my birthday, Mom baked a chocolate cake in the shape of a cat with uncooked spaghetti in the icing (for whiskers). By then, I'd tell any interested party what the kitty said, what the doggie said, even what the fishy said. In my crib at night, I watched a mobile of padded quadrupeds spin to "Farmer in the Dell." My green bikini top was shaped into a pair of googly-eyed frogs, I wore a brown-checked dress covered with bespectacled owls to meet Santa Claus, and I was given for Easter a stuffed rabbit in a pink pinafore—my best friend, Tammy—that I rarely let go of through kindergarten.[xii]

Since Berger's essay "Why look at animals?" (written in the mid-1970s), the status of the animal and the natural environment has taken on a new urgency, with the ambiguous promises of genetic engineering and cloning, and the unambiguous threats of the climate crisis, loss of habitat and consequent threat of mass extinction.[xiii] From this perspective my

insistence here on the 'animalness' of zoomorphic artefacts, images and machines might seem perverse: to assert that whilst artificial animals are not animals, they are not *not* animals a blithe collusion in the anthroposcenic destruction of the biosphere. But the toyetic suggests otherwise: in the long history of animal toys and media, the distinction between a pre-industrial life with actual animals and a postindustrial life with artificial animals and pets is far from clear cut. The presence of graphic and plastic depictions of animals throughout organised human existence, culture, religion and play at the very least suggests that an everyday life with zoomorphic simulacra is not only a late modern phenomenon. This brings us to the question of what the status of an artificial animal is.

Why look at toy animals?

The artificial animal seems to have always been part of children's lives. At all times adults have fashioned, and children played with, small animal-shaped objects. Unlike the archaic jointed doll it is harder now to distinguish whether some stone age carvings of animals are ritual objects, ornaments or toys proper. However, given the anthropological insights that in preindustrial societies all such objects have the potential to move between these uses, it is safe to assume that many would have been played with. As Antonia Fraser tentatively suggests, "some of these animals may been ornaments rather than toys, but it is surely permissible to see in at least some of these figures a natural corollary to a child's love of pets - perhaps see these figurines [as] half way between toy and decoration."[xiv] Animal-shaped toys have been found in children's graves over millennia, suggesting loved playthings rather than ritual objects.[xv]

The earliest surviving animal figurines are often carved from ivory or bone—animal shapes in animal materials—in a primal synecdochical craft the significance of which at the very least indicates the integration of human and animal lives from the imaginary and symbolic to the material necessities of survival. Fraser suggests that the prevalence of particular types of animal in the archaeological record of toys and toy-like ornaments tends to reflect that animal's economic as well as symbolic significance for the culture: painted wooden or baked clay cows for Egypt, horses for North American peoples, and also for feudal Europe.[xvi] Some Greek horses and dogs have moulded or added panniers, emphasising the working relationships of travel and trade between human and animal.[xvii] I would note here too the technocultural variety of the horse in these examples: respectively agrarian (found along with model cattle), transportational (for nomadic peoples) and martial (usually with armour and mounted warrior or knight). Interestingly, the toy versions of medieval knights and horses were often in the form of the *ludic* dimensions of the feudal war-machine: jousting and tournaments. This said, it appears that all animals present in any particular people's environment have the potential to be rendered in ornamental and toy form, not only those of economic or technical significance, from vermin (a glazed composite mouse from XIIIth Dynasty Egypt in 2000 BCE[xviii] to predators (lions, wolves, bears, etc.). Bird-

shaped artefacts in particular seem near-universal, and are often distinctly toy-like. They are, as Fraser puts it an "archetypal shape of the toy world," due in part, she implies, to the simplicity of the bird form lending itself to an economy of manufacture: "the bird family of toys springs in essence from an egg shape with a head and tail added."[xix] The crafting of birds as ornaments and playful devices ranges from musical instruments from Mayan whistles to Greek pneumatic automata; Hopewell (Ohio) tobacco pipes to Central European folk-art animated pecking bird devices that were still being made in the 1960s.[xx] Nightingale-shaped clay whistles remarkably similar in form to pre-Columbian Mayan ones, were sold in early fifteenth century French markets.[xxi]

Animal toys offer a much wider and more ingenious set of mechanical characteristics and modes of animation than the simple jointed legs of archaic dolls. Wooden tigers and crocodiles from around 1100 BCE Egypt were constructed with jointed jaws, sometimes worked with strings. Wheeled animals also often incorporate string mechanics, across the globe, and across millennia - even if the string doesn't survive, holes in the horses' noses indicate the pull-along mechanism. Wheeled toys themselves have modelled animal-vehicle assemblages accurately (horses pulling chariots and carts), fantastically (an Egyptian limestone toy of an ape driving a chariot or a fifth century BCE terracotta figure of a man riding a goose),[xxii] or in the form of impossible assemblages: animals with wheels instead of legs - or where the horses appear to be *in* the chariot, animal and vehicle condensed into one wheeled body.[xxiii] This latter is a body-machine monstrous if taken literally, but in its toyetic mechanical economy the technical imperative abstracts and hence negates the mimetic impulse - a pure example of a toyetic simulacrum.

Alongside artefactual animals, human culture has developed or engineered the animal as technology. Contemporary pets are the product of intense breeding techniques and cultural-technical conventions of pedigree to accentuate both aesthetic and affective traits, not least the production of 'miniature' and 'toy' breeds. Through millennia of breeding practices domestic animals have been invented, speciated, trained and husbanded as resource for meat, milk, eggs, feathers, hide and bone, and as working machines for ploughing, haulage and hunting. Whilst the 'pet' in its current commercialised and domestically-privatised form is a product of the historical moment of industrial urbanisation, the selection of some species and individuals as loved and loving companion animals seems deep-seated in human society - whether the adult hunter's favourite dog or perhaps the nurturing of particular lambs or calves. The prevalence and value of cats in Ancient Egypt is well-documented, and Fraser notes that Greek and Roman children were "enthusiastic keepers of pets."[xxiv] The fact that these pet-nurturing children also had access to a wide range of animal toys, from horses to deer, cattle, sheep, goats, rabbits and domestic birds, is intriguing, suggesting that even in Ancient childhood the distinction between actual and artificial animals was not absolute. Jen Wrye has argued that there is no essential 'petness' to human-companion animal relationships, indeed that the investment of

care and emotional attention to the nonhuman extends to inanimate or nonsentient entities (including virtual animals).[xxv]

Another area in which the natural and cultural aspects of the animal intertwine is in the notion of 'cuteness.' This is a key feature of the most stylised, toyetic (in the commercial sense), and simulacral of artefacts and images, for example *Beanie Baby* toys (Ty Inc. 1986 -) with their huge sparkling eyes, outsized heads and anthropomorphic smiling expressions, or nearly all animated cartoon characters since Felix the Cat in the 1920s. And yet, the physiology of cuteness appears to be hardwired to some extent within human and nonhuman animal predispositions, spurring the instinct to protect and nurture juvenile animals, from human babies to puppies, kittens, lambs, and so on.[xxvi]

Noah's Ark - the One and the Many

Human-shaped toys such as dolls and soldiers, and their modes of play, are constituted in part by a fundamental material distinction between the *singular* and the *multiple*. As well as the base fact of their quantitative difference, their significance and deployment in play is marked by very different imaginative and affective operabilities - and this distinction is at least as significant in animal-like toys. Compare the 'evocative' fabric bears and rabbits to the extensive wooden or plastic zoo, farm, and circus train sets, the latter token-like in that they function only in the playful practices of accumulation and collection, arrangement and cultural practices and sites of organisation (in domestic herds and flocks, with toy fences, barns and trains). In some ways the connotations and operations of animal sets are closer to those of toy soldiers than dolls, in that unlike the familial scale of the doll's house one can rarely have too big a zoo or farm.[xxvii] Premodern and early modern animal toy sets can also be quantitatively characterised: notably the European Nativity tableaux and Noah's Ark sets of the late Middle Ages and Renaissance. Nativity creches featured indefinite numbers of animal attendants, one fifteenth century Neapolitan scene included, along with the Holy Family, angels and shepherds "twelve sheep, two dogs, four trees and an ox and an ass."[xxviii] On the other hand, Noah's Ark sets, a key early product of the German toy industry from the sixteenth century, suggested, via the details of the Biblical story they illustrate, a potentially near-infinite series of (pairs of) animals, an encyclopaedic catalogue of known species. The multiple form of these toys demanded specialised modes of production, to the extent that they became known to German toy makers as 'misery beasts,' due to the amount of intricate and repetitive wood-carving work they required.[xxix]

The Noah's Ark was popular with well-off British Victorian families. It was generally only brought out on Sundays, and was the only toy permitted on the Sabbath, due to its clear Biblical and moral reference. In eighteenth century Puritan America, the Noah's Ark was one of the few toys permitted for children at all.[xxx] An article about a set in Winterbourne House in the West Midlands of England, bought in the 1870s, notes that the inclusion of

animals such as tigers, elephants and polar bears echoed the contemporaneous fashion for importing exotic animals as pets and for menageries - proto-zoos closely connected with the culture and practices of the cabinet of curiosity. They often included stuffed and mounted heads of exotic animals, along with eye-catching shells and horns displaying the collectors' sense of worldly interest, wealth and celebrating Empire through animal tokens.[xxxi] For Dan Fleming, the Noah's Ark was the "...clearest relay point linking the 25,000-year-old miniature mammoth to sixteenth century German wood-carvers and the Britains plastic 'Zoo' range for the twentieth century."[xxxii] I would add to this the late twentieth century phenomenon of cheap sets of plastic dinosaurs - hugely popular with young children. Miniature and portable, offering near-infinite potential for collection, both of the toys themselves and paleontological knowledge - of dietary characteristics, long and complicated names of species, etc. Dinosaurs now feature prominently in recent proprietorial and mediatised fantasy worlds of mechanisation and cyborgisation, for example dinosaur-cars, numerous dinosaur-robot hybrids in TV animation and toy sets such as Tyco's *Dino-Riders* in the late 1980s and *DinoTrux* from 2015 (DreamWorks / Netflix). The mechanically augmented dinosaur and epic fantasy genre is pastiched in the 2014 Pixar short *The Toy Story that Time Forgot*.

If the injection moulded farm, zoo and dinosaur sets (like the soldiers next to them on the dime store shelf) greatly expanded the riches of the multiple toy for children, then videogames and digital playgrounds offered a new general economy of plenitude. *Pokémon* games, *Zoo Tycoon*, *Hungry Babies*, *Nintendogs*, *Club Penguin*, and *Neopets* promise the endless collection and accumulation of species, herds and flocks. The restrictions now are not those of material cost and floor space but artificially imposed rules for gameplay challenge and (in the online and mobile games) the commercial management of attention and engineering of microtransactions. This postnatural cornucopia suggests a postdigital retrospection on the character of quantity in the toyetic: the endless duplication or spawning of virtual animals in videogames draws attention to the material value and significance of predigital animal toys. These packs, flocks, herds and schools are evidence of a persistent cultural logic of the multiple, the token, the mass produced and standardised over the unique, significant and auratic. Whether that singular value is aesthetic, luxurious, religious or subjective-affective, it predates (in that it appears to always have been a factor of human culture) both money - the ultimate extensive substitute, and the much more recent commodity form. Whereas toy culture today emphasises the monadic privatised life of the only child and their singular transitional object, virtual animals and their ancestors in the Ark offer an alternative universe of multitude and extension, of relationality, configuration and (postnatural) ecology.

AI, red in tooth and claw

If play with the postindustrial and mediatised animal toy substitutes in the child's everyday life a stylized and artificial object for lived contact with actual animals, then it would follow that the manufacture of and play with virtual animals represents not only another big step away from relationships with biological animals, from nature, but also from millennia of hands-on play with toys as material and physical objects. By virtual animal here I mean primarily digital play objects and systems such as *Tamagotchi* and simulated animals in videogames, from characters such as Donkey Kong and Sonic the Hedgehog to the predatory or edible wildlife of adventure games, and from the trainable puppies of *Nintendogs* to the chatty villagers and islanders of *Animal Crossing*. Yet the paradox inherent in simulation can be applied here too, i.e., the closer a simulation models the complexity of its putative source system or world, the more mechanically elaborate it needs to be, and hence the more it takes on its own developmental and 'artificial' trajectory. We can flip this however: though the virtual animal is evidently a technical object that is highly complicated and emphatically synthetic, this complexity allows new levels in sophistication in the modelling of animal behaviour and human-animal relationality. Though a *Nintendogs* puppy cannot be held and stroked like a cuddly toy dog, it offers a playful simulation of pet ownership and interaction: feeding, care, training and visual and affective feedback and reward, one that is generated by the toy machine itself not (only) through the child's imaginative animation of it. The animality of virtual creatures then is not a given, it is an achievement that arises from the interplay of digital technology, imagination and the ludic framings of games and children's play. A significant aspect of this achievement is its instrumental role with game systems.

An ethology of the postanimal

The role of AI in the playful digital ethology is significant for three main reasons here. First, these creatures are the more recent descendants of a long toyetic and simulacral genealogy of mythic, fictional, and actual automata and robots. Second, critical attention to the central role of AI algorithms and procedures in videogames and smart toys reminds us of the differences and newness that these forms brought to children's play and toy culture from the 1970s on: self-moving animals (and dolls, vehicles, soldiers, buildings, etc.) that were once animated only by the hand and imagination with only a little clockwork or battery-powered assistance now have degrees of autonomy in movement and the capability to sense and react to their environment and their player. Conversations of a sort can be held, attacks launched, or companionship offered according to programmed and rule-driven 'instincts.' And third, for all their newness, animal NPCs and avatars - again like virtual dolls and vehicles - retain (or more accurately *mutate*) toy-like characteristics such as manipulability, control, and, often, an aesthetics of the miniature and the cute. It is this third aspect that I will explore now.

Clearly videogame avatars and NPCs, for all their thematic and visual similarities with physical toys, are quite different in material, imaginative and play terms. The child's hands cannot touch them directly, but at a remove, mediated by computer keyboard, touch screen, or game console controller.[xxxiii] Any tactile material qualities of surface (hard shininess, soft pliability) are presented only to the eye and not the fingers' nerve endings.[xxxiv] Smart toys such as robots and *Tamagotchi* appear at first glance to be handleable as if they were 'traditional' toys, but, like videogames, their salient mechanics and operations are removed from the immediacy of dextrous fingers. The *Tamagotchi* is effectively a tiny game console, its animal manipulated by button presses, and the main operations of the robot are pre-programmed and are performed automatically away from the hands. But key aspects of the manipulability and operationality of toys persist in the virtual playful object, and in some regards are accentuated and augmented. As we have seen, as virtual-mechanical devices they can perform sophisticated movements and enact spectacular or useful behaviours, and as AI-driven creatures they take on some of the cognitive, sensate, narrative, and performative functions from the child's playful imagination. The interplay of vision, touch and the physical characteristics of toy-like avatars can be rich and complicated: for example, the character Sackboy from the *Little Big Planet* games is depicted as a knitted toy with button eyes and a zipped torso. His smallness is suggested by the relative size of the stitches in his woollen body, and, as Emma Reay explains, as such he has a distinct haptic quality. His appearance evokes "memories of tactile sensations, and [his] textures seem to afford a kind of kinaesthetic object play."[xxxv] Interestingly, these simulated physical qualities, while removed from direct touch, can feature as significant characteristics within the gameworld. Sackboy is cute and pliable, but cuteness and pliability in actual toys often leads to cruel or destructive treatment in play, a "hug/harm" dichotomy as Reay puts it. In the game he suffers repeated death through cartoon-like destruction of his body through fire, acid and machinery, his "softness invites deformation and aggression."[xxxvi] Other toy-like characters and avatars carry connotative dimensions from their material form and scale into the virtual gameworld: "synthetic, lurid" *Pikmin* (cute alien hybrid animal-human-plant creatures) for instance "evoke the armies of identical, cheap, plastic figurines heaped in bargain bins near toyshop tills."[xxxvii] In the game they are disposable 'cannon fodder' reminiscent of actual toy soldiers and the virtual animals in the *Lemmings* games.

Virtual husbandry

This distributed imagination and operability holds true for all toy-like avatars, characters, buildings, and vehicles, but the virtual creature brings its own distinct capacities for playful action and behaviour - and wider ramifications for the toyetic operations of AI and A-Life beyond the microworlds of play and childhood.[xxxviii] To explain, I will return to the domestic animal and the pet, as actual and virtual creatures with distinct ethological characteristics. If the domestic animal and pet animal are the product of extensive engineering via breeding

practices, their everyday behaviours are often also determined by human artifice.[xxxix] The behaviour of pets is constituted through regimes of training, nurture, care, punishment, and reward. Dogs are shaped by routines of walking, playful activity, regulated excretion, affection, and attention. The agility practices of Donna Haraway's dogs are just a particularly developed and formalised extension of pet training, the achievement of complex manoeuvres honed over hours and hours of disciplined practice, channelled by the cultural conventions of canine agility as a sport-like activity.

The study and comparison of synthetic and biological animals also draws our attention to the huge and productive sweep of research and development of robotics and AI informed by animals, not as a points on the Singularity's teleological development, but as vital and productive models for all sorts of machines and systems in their own right. These range from the evolutionary algorithms and cellular automata of A-Life research to therapeutic, toy and companion robots modelled on dogs and seals, and from forms of movement and sensing inspired by the behaviour and capabilities of individual animals to modes of sociality and collective action driving flocking simulations and swarm robotics.[xl] A-Life evolutionary algorithms and simulated insect colonies have migrated into the everyday through games such as *Creatures* and *SimAnt*.[xli] The presence of anthropomorphic AI in lived popular and media culture via videogames and smart toys has been under-acknowledged. Even less noticed is the persistent figuring of AI as zoomorphic. Virtual animals complicate anthropomorphic visions of and linear predictions for AGI in both technoscience and consumer products, leading the imagination away from predictions for human-like or human-surpassing intelligence and consciousness or android robots and towards a more diffuse and distributed ethological investment in animal-like behaviours and affects. They suggest an alternative way of grasping existing and emergent human-nonhuman relationality, an ethology of new kinds of behaviour that are shaping the creative and political possibilities of the postnatural environment.

From this perspective, toy animals in videogames and smart toys are not trivial phenomena peripheral to the significant advances in technoscience but resources for innovation in, and dissemination and domestication of modes of being with, animate machines. As such, the postdigital toy animal fits my synecdochical and historical claim: that the toy can be the material and imaginary precursor of technological paradigms and not just post hoc representations of them.[xlii] But, at the microlevel of children's everyday lives and environments, the virtual animal's habitat is at once thoroughly postdigital and technologically asynchronous: a Furby sits next to a teddy bear on a shelf in a bedroom decorated with *Paw Patrol* posters, wooden zoo animals and plastic dinosaurs are ordered, named and animated by playful fingers and voices as *Neopets* and *Minecraft* wolves wander the computer screen.

[i] Thomas Apperley and Nichole Heber, "Capitalizing on Emotions: Digital Pets and the Natural User Interface," in *Game Love: Essays on Play and Affection*, ed. Jessica Enevold and Esther Macallum-Stewart (Jefferson NC: McFarland & Co. 2015), 159.

[ii] (https://www.world-archaeology.com/world/europe/germany/prehistoric-figurines-from-swabian-jura/)

[iii] See Louis Kuznets, *When Toys Come Alive: Narratives of Animation, Metamorphosis, and Development* (New Haven CT: Yale University Press 1994), Chapter 3, on the companions of Christopher Robin and Calvin as literary transitional objects.

[iv][iv] I'm using the term 'postnatural' in a way analogous to the 'posthuman' of critical posthumanism. That is, it does not assume the end of the biosphere, rather it signals an emerging environment of biotechnology, catastrophic climate change and (as in this chapter) prevalent artificial systems and entities that are natural-like in their affectual and experiential dimensions and that fundamentally challenge established distinctions between the natural and the artificial. On the other hand, it acknowledges that human existence has always been predicated on the technical manipulation of the natural environment and, for at least 28,500 years, on the domestication, and hence transformation of animals. To adapt Bruno Latour's famous phrase on modernity: We have never been natural.

[v] D.W. Winnicott, *Playing and Reality*, (London: Routledge 2005 [1971]).

[vi] Tracy Gleason, "Murray: The Stuffed Bunny," in *Evocative Objects: Things We Think With*, ed. Sherry Turkle (Cambridge MA: MIT Press 2011), 173.

[vii] For example, John Betjeman's Betjeman's ode to his teddy Archibald, kept into adulthood:

Archibald, my safe old bear
Whose woollen eyes looked sad or glad at me.
Whose ample forehead I could wet with tears,
Whose half-moon ears received my confidence,
Who made me laugh, who never let me down.

(In Antonia Fraser, *A History of Toys*, (London: Weidenfeld & Nicolson 1966), 11.

[viii] Kuznets, *When Toys Come Alive*, 16.

[ix] Gleason, "Murray," 172. See also *Unbox: The material-semiotics of tea with Mrs Nesbitt* in Chapter 2: Dolls.

[x] Kuznets, *When Toys Come Alive*, 138-139.

[xi] Elena Passarello, *Animals Strike Curious Poses.* (London: Penguin Random House 2017), 175; John Berger, *Why Look At Animals?* (London: Penguin 2009 [1980]).

[xii] Passarello, *Animals*, 175-6.

[xiii] I would note that, for what it's worth, commercial children's culture is beginning to acknowledge the finite, material and fragility of the environment. For example, in the late 1990s Action Man was re-imagined as a non-military character with ecological overtones.

On the other hand, there has been a rather insouciant mixing of the animal and the machine since the late 1970s in American popular culture, for instance Max, a cybernetic German Shepherd in the TV series *The Bionic Woman*, or the technologically augmented dog pack in Pixar's *Up!*)

[xiv] Fraser, *History of Toys*, 26.

[xv] The tiny scale of many early figurines also suggests a non-ornamental and non-ritual use - these could be objects to be held and treasured, hidden maybe - with the sense of the intimate and secret that would characterise the aesthetic of the miniature millennia later?

[xvi] Fraser, *History of Toys*, 26-27.

[xvii] Fraser, *History of Toys*, 52.

[xviii] Fraser, *History of Toys*, 24.

[xix] Fraser, *History of Toys*, 30.

[xx] Fraser, *History of Toys*, 35.

[xxi] Fraser, *History of Toys*, 63.

[xxii] Fraser, *History of Toys*, 28.

[xxiii] such as an Athenian clay chariot with large wheels illustrated in Fraser, *History of Toys*, 46.

[xxiv] Fraser, *History of Toys*, 47.

[xxv] Jen Wrye, "Beyond Pets: Exploring Relational Perspectives of Petness." *Canadian Journal of Sociology*, 3, no.4 (2009).

[xxvi] Joyce Goggin, "'How Do Those Danish Bastards Sleep at Night?' Fan Labor and the Power of Cuteness." *Games and Culture* 13, no.7 (2018), 747-764.

[xxvii] I would note here that the shabti funerary figures of Ancient Egypt: dolls included herds of domestic animals to support the deceased in the afterlife along with the human slaves and servants.

[xxviii] Fraser, *History of Toys*, 71.

Some creche scenes in medieval Nuremberg incorporated live birds "whose panic gave life to the figures in a series of jerky movements" Fraser, *History of Toys*, 71.

[xxix] Kerrison 2020

[xxx] Fraser, *History of Toys*, 90.

[xxxi] Ruby Kerrison, "Noah's Ark: A Toy with Contemporary Relevance." (Winterbourne blog 2020).

[xxxii] Dan Fleming, *Powerplay: Children, Toys and Popular Culture* (Manchester: Manchester University Press 1996), 85.

[xxxiii] One exception here is the racing game. Play with toy racing sets such as Scalextric is effected through the remote operation of the cars via hand-held trigger-like controllers. So games such as *Gran Turismo* or *Mario Kart* could be considered mechanically closer to their toy forebears.

[xxxiv] Even the familiar haptic feedback of the 'rumble' feature of game console controllers tends to simulate physical phenomena such as friction and impact, not touch as such.

[xxxv] Emma Reay, “Cute, Cuddly and Completely Crushable: Plushies as Avatars in Video Games.” *Journal of Gaming and Virtual Worlds*, 13, no.2 (2021), 140.
[xxxvi] Reay, “Cute, Cuddly and Completely Crushable,” 142.
[xxxvii] Reay, “Cute, Cuddly and Completely Crushable,” 140.
[xxxviii] see Seth Giddings, “Pokemon Go as Distributed Imagination,” *Mobile Media and Communication* 5, no.1 (2017), 59-62 for an account of ‘distributed imagination’ in postdigital play.
[xxxix] Though in thematic and agonistic terms there is a clear distinction between the feral, dangerous animal and the domestic or companion animal in videogames, there is in fact no wilderness in virtual worlds, no ‘wild’ animals: all animals and their behaviour are constituted only in relation to the virtual world and the player, are always already domesticated. In a gameworld, combat with and the killing of virtual animals is reminiscent of other bloody modes of formalised or ritual play with animals: dog-, bull- and cock-fighting, fox hunting and so on. We might loosely separate this broad, antagonistic mode from a similarly broad category of cooperative relationality. Whilst the former, if taken as a model for AI-human relationality globally and historically, resonates with SF dramas of malicious machine sentience and robot supremacy, I would argue that both offer alternative imaginative and empirical resources for figuring and developing the postnatural intelligent environment.
[xl] Jussi Parikka, *Insect Media: An Archaeology of Animals and Technology* (Minneapolis MN: University of Minnesota Press 2010).
[xli] Sarah Kember, *Cyberfeminism and Artificial Life* (London: Routledge 2003); Parikka, *Insect Media*.
[xlii] This article connects directly with my chapter, “The Achievement of Animals: An Ethology of AI in Videogames,” in *Einspielungen: Prozesse und Situationen Digitalen Spielens*, edited by Markus Spöhrer and Harald Waldrich*:* 115-140 (Springer, 2020). The original essay explores in more detail the implications of taking the animality of AI and A-Life entities as real and not metaphorical or symbolic for both playful-entertainment and more serious developments in AI. It also addresses in more detail ontological questions of the synthetic animal itself: what kinds of speciation gives rise to it, what habitats and what kinds of behaviour shape its existence, and how might the status of *animal* be achieved from the assemblage of code, digital hardware, animated imagery, lived popular culture, bodies and minds in play.