Digital Zoopoetics

Alinta Krauth

UNIVERSITETET I BERGEN
ORCID: 0000-0002-6523-3417

ABSTRACT

This article discusses the emergence of a genre of technologically mediated, computationally networked zoopoetic practices. I approach this discussion through an analysis of contemporary examples of zoopoetry, firstly drawing on print-based examples such as the poetry of e. e. cummings and the poetic animal dialogue of the novelist Laura Jean McKay. I then consider the ways in which digital technologies and digital aesthetics have the potential to add modes and imaginaries to zoopoetic authorial practices. I introduce digital zoopoetics through the creation of two related digital interfaces: *The (m)Otherhood of Meep* (2023) and *The Songbird Speaks* (2024-ongoing). These works invite new imaginaries for interspecies signal interpretation through machine learning technology by moving towards generative interspecies translation as its own zoopoetic form. From the practical contribution to zoopoetics that these works make, I offer a non-exhaustive series of suggested affordances of digital and computational aesthetics that come forth as representative of a digital zoopoetry form.

KEYWORDS

Zoopoetics, digital zoopoetics, animal studies, digital poetry, artificial intelligence, machine learning

RESUMO

Este artigo discute a emergência de um género de práticas zoopoéticas tecnologicamente mediadas e computacionalmente interligadas. Abordo esta discussão através de uma análise da zoopoética contemporânea, recorrendo primeiro a exemplos de literatura impressa, como a poesia de e. e. cummings e o diálogo poético animal da romancista Laura Jean McKay. Em seguida, considero a forma como as tecnologias digitais e a estética digital têm o potencial de acrescentar modos e imaginários às práticas autorais zoopoéticas. Apresento a zoopoética digital através da criação de duas interfaces digitais relacionadas: *The (m)Otherhood of* Meep (2023) e *The Songbird Speaks* (2024). Estes trabalhos convidam a novos imaginários para a interpretação de sinais interespécies por meio da tecnologia de aprendizagem da máquina, avançando em direção à tradução generativa interespécies como sua própria forma zoopoética. A partir da contribuição prática para a zoopoética que estes trabalhos fazem, ofereço uma série não exaustiva de sugestões de carcaterísticas da estética digital e computacional que surgem como representativas de uma forma de zoopoesia digital.

PALAVRAS-CHAVE

zoopoética, zoopoética digital, estudos animais, poesia digital, inteligência artificial, machine learning

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INTRODUCTION

This article discusses the possibilities and affordances of technologically mediated and computationally networked technologies for zoopoetic texts, inclusive of two examples of artificially intelligent (AI) animal signal interpretation devices that suggest additional modes for understanding zoopoetics. I approach this through an initial discussion of zoopoetry examples, drawing on the poetry of Edward Estlin Cummings (e. e. cummings) and the poetic animal dialogue of the novelist Laura Jean McKay. This is followed by a consideration of computational techniques and aesthetics for how they may add modes and imaginaries to zoopoetic texts, and for how they may contribute a novel reading of the *animot* (Derrida, 2008). I then introduce algorithmically-mediated zoopoetics through the creation of two related digital interfaces: *The (m)Otherhood of Meep* (2023) and *The Songbird Speaks* (2024-ongoing), shortened throughout to *OoM* and *TSS.* These interfaces use machine learning to interpret animal signals (vocalizations and bodily sounds)[1] of grey-headed flying foxes and Australian magpies into digital combinatory poetry, screen-based imagery, and animations. *OoM* and *TSS* rely on the audible nature of signals to function in real-time, augmenting interspecies experiences as they occur without aiming to replace them. These examples respond to Sean Morey's (2019) argument that artificially intelligent animal signal translation is the 'ultimate goal' for zoopoetic writing, helping authors to look towards animal rhetoric and signal semiotics beyond subjective interpretations. While Morey's speculations were as recent as 2019, he drew from science fiction examples to illustrate what this future practice might entail. Now, such technologies for experimental transcoding between animal and human forms of communication are in our grasp, as is the potential to critique their impact on zoopoetic aesthetics and meaning-making.

This article focuses on aspects of *zoopoetry* and animal dialogue as the creative outcomes of zoopoetic inquiry, while recognizing that zoopoetics is not always tied to these forms specifically. Through the practical

1 Many species use vocalizations and/or communication forms described in science as *signals*; visual, auditory, olfactory, or tactile cues tailored to the specific ecological contexts and sensory capacities of each species (Smith & Harper, 2003).

contributions of digital zoopoetry made through *OoM* and *TSS*, suggested affordances of computational technologies and aesthetics are offered to expand the zoopoetry maker's toolbox, and aim to add to the still in-process definition of digital zoopoetics in literary scholarship. In other words, I approach a zoopoetics actualized via machine interaction, sound recording, visual movement, temporality, sensor inputs, and the networked internet, assuming an inherent entanglement of technologies and the aesthetics they produce. While the term 'digital zoopoetics' is used throughout to refer to an emergent genre, the term is arguably also inclusive of cultural artefacts pertaining to the post-digital and the more-than-digital, in appreciation of a wider techno-zoopoetic landscape predicated on the communication technologies common to both creative practices and animal sciences.

1. ZOOPOETICS: READING AND WRITING THE ANIMAL

A connection between *poetic thinking* and *animal thinking* has been widely explored.[2] This connection has been given the term *zoopoetics*. Zoopoetics has emerged as the study of animal agency, communication, and meaning-making practices both *as* and *through* poetic and creative forms. As explained by Kári Driscoll and Eva Hoffmann, zoopoetic texts are not merely stories about animals, "they are texts that are, in one way or another, predicated upon an engagement with animals and animality" and "their 'poetic thinking,' (i.e., the way they reflect on their own textuality and materiality) [...] proceeds via the animal" (2018: 4). Prolific zoopoetry scholar Aaron Moe moves zoopoetics beyond thinking and into the body, where it functions as "the process of discovering innovative breakthroughs in form through an attentiveness to another species' bodily poiesis" (2013b: 10), inclusive of the study of animal bodies and communications as text, which Moe calls "gesture-as-poiesis" (2013b: *passim*).

While these definitions suggest zoopoetics is the study of more-than-human communications and bodily actions *as* text, as opposed to *through* text, written text is a common outcome of zoopoetic inquiry. Undertaking a zoopoetic inquiry to enact written text — for example, *zoopoetry* — includes the creation of "poems inextricably bound up with the intensity of animal poiesis — poems with gestures playing with an animal's gestures and vocalizations" and "poems borne out of respect, wonderment, and care for animals" (Moe, 2013b: 5). Moe sees poetry as a way of expressing a more-than-human ability for gestural communication, wherein zoopoetics

2 For example, see *The Animal that Therefore I am* (Derrida, 2008), *Speaking for Animals: Animal Autobiographical Writing* (Demello, 2013), or *Kafka's Zoopoetics Beyond the Human-Animal Barrier* (Harel, 2020).

could be likened to an entanglement of communicable gesticulations within and between species. The writer's methodology for doing so is led by attentiveness towards an animal's poiesis (Moe, 3013a; Moe, 2013b) that does not restrict the animal to characterization as metaphor or allegory (Driscoll and Hoffmann, 2018; McHugh, 2009). The attentive approach may be quite individual to each practitioner, with potential to involve direct interactions, observations, imaginative thought, assumptions and biases, scientific literature review, and other qualitative and quantitative ways to take notice of an/other.

Before the term 'zoopoetics' was conceptualized by Jacques Derrida (2008), Walter Benjamin (1934) suggested that engaging with animals themselves was not necessary when writing about them or from their perspectives. Rather, thinking-with-animals was a medium through which meaning came forth (Benjamin, 1934). This view epitomises what is both aesthetically potent and yet problematic about zoopoetics: outside of viewpoints such as Morey (2019), who imagines a poetics wherein animal voices are no longer interpreted/imagined but are somehow actualized, zoopoetics is still fundamentally problematized by an uneasy distinction between 'actual' and 'represented' animals. This distinction is further problematized by the still culturally present opposition of 'an animal' as an individual being and 'The Animal' as a cultural ascription that humanity still thinks of itself as distinct from. In examples such as the talking literary animal (Ziolkowski, 1983), the philosophical dog (Kuzniar, 2006), or the memetic dog (Jacobs, 2018), nonhuman characters remain represented versions of the actual, or what Derrida (2008) terms the *animot*. As the act of authorship is always already bound to human perception and contained within the entirely human Umwelt through which we experience the world, it is practically impossible to write about animals without reproducing the *animot*, as Matthew Senior et al. explore:

> The encounter with the animal produces language from the human side ... *Animot* thus means granting a kind of language to animals and developing subtle, poetic expressions that capture the proximity yet separateness of humans and animals, arising in moments when animal movements, paths, and sounds intersect with human displacements and language. (2015: 2)

Where the views of Driscoll and Hoffmann, Moe, Derrida, and Senior et al. converge is via an attempt to resist the tendency to turn animals into metaphorical or anthropomorphized *things*, while pressed up against the limits of languages and human perception in our attempts to be attentive. Instead, zoopoetics attempts to design what I would call more-than-language engagements with text that "grant a kind of language to animals" (Senior et

al., 2015). These engagements are brought forth through three entangled stages of inquiry: a) the poiesis of the animal, external to the writing process, b) the attentive zoopoetic approach to recognizing and interpreting this poiesis, and c) the production of the creative artefact. These stages of inquiry encourage modes of authorship that appreciate the possibility of animal vocalizations and body language as texts.

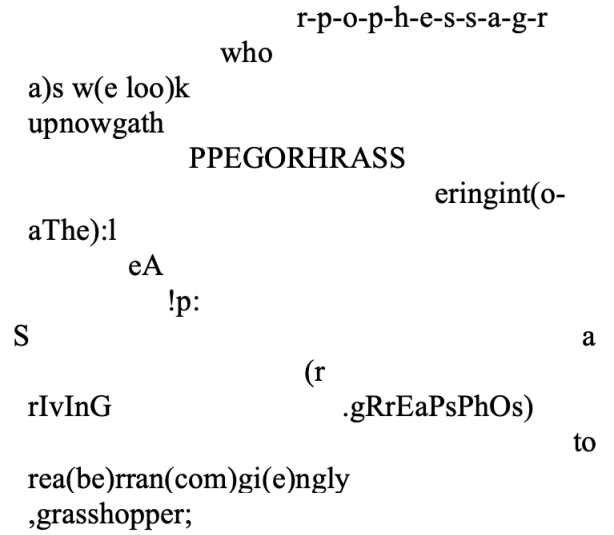
2. PRINT-BASED ZOOPOETICS

In order to recognize the affordances of the digital for zoopoetic writing, it is worth considering how written modes represent the communications or actions of other species, and what initial affordances are brought by visual and grammatical experimentation on the printed page.[3] Prominent examples of zoopoetics can be seen in the works of e. e. cummings, where concrete poetry and more-than-language thinking are employed to explore animal characters through embodied and sensory experiences (Moe 2013a; 2013b; 2015). cummings had a brilliant and multimodally-engaged mind, and his tendency to entangle modes of perception were embedded in the poetry he produced. He was not only a poet but a playwrite and painter who experimented with abstract styles throughout the 1920s. He attempted to transcode sensory perceptions within his paintings, expressing mathematical models as abstract displays, and interpreting synaesthethic experiences of sound as complex and colourful lines. He termed himself a 'poet&painter' (Cohen, 1987), and was subsequently termed by others as a poem-painter (Azma, 2002) who painted poems into existence by entangling textual, visual, and gesticular modes of communication. His tendancy towards producing an altogether synaesthetic, multimodal poetics was arguably fundamental to his contribution to zoopoetry as it allowed him to bring abstract and expressionist thinking to the study of animal characters.

cummings explored interactions with many species, with perhaps the best-known being a lively grasshopper in "r-p-o-p-h-e-s-s-a-g-r" (cummings, 1935):[4]

3 While there is a rich history of non-digital Avant Garde and postmodern writing that uses multimedia, visual poetry, the human body, props, and other ways of enhancing the meaning of text, this article maintains a more direct comparison between print examples and digital media examples.

4 Its partner poem "mouse)Won", seen on the very next page of *No Thanks* (1935) plays purposefully with an opposing design, avoiding visual movement in order to express the stillness of a dead mouse.



In "r-p-o-p-h-e-s-s-a-g-r", cummings experiments with a type of animal representation that is reliant on visual design and the (dis)arrangement of text. This arrangement directs how the poem is to be read, and in turn, has direct implications on how it signifies meaning/s. It is well-studied that "r-p-o-p-h-e-s-s-a-g-r" emulates the experience of looking upon the movement of a grasshopper as it springs around on its hind legs and *leA!p:S*. The purposeful visual disordering of letters calls attention to the struggle of language to capture the grasshopper's presence (Webster, 2000) without resorting to visual modes of meaning-making. Further, it asks the reader to do more perceptive work in order to greet the grasshopper; not only must the reader's eyes dart around and double-back as they might do so to follow a moving grasshopper, the reader must spend time and attention on the poem's modal presentation in order to build an understanding of its intentions. Only through the reader's effort in connecting modal combinations will a clearer, more comprehensive picture emerge.

"r-p-o-p-h-e-s-s-a-g-r" is a pertinent example of Moe's theory that poetic form follows animal bodily communication in zoopoetics. It explores written language's arrangement and appearance as an experimental transcoding, where an experience of interspecies interaction is interpreted into text on a page. The more contemporary and less-studied example of Laura Jean McKay's *The Animals in That Country* (2020) further highlights an attentiveness to animals' communication methods in ways that may have genuine implications for the zoopoetic nature of digital animal signal translation. *The Animals in That Country* (2020) is a science-fiction novel about a zoonotic virus that causes humans to understand the signals of

other species. McKay's authorial process grapples with a question of how to fictionally represent the communications of other species as dialogue when restricted to written dialogic conventions. This difficulty in constraining animal communication to text is shown through the visual layout of animal character dialogue, defined by irregularity and continued use of parenthesized asides:

> **Gasping**
> **over the**
> **lock. (I'm**
> **mingy.) It'll call me and**
> **I'd like**
> **to get a drink of**
> **it.** (2020: 120)[5]

McKay's development of animal dialogue introduces an alternative use of free verse syntax and visual design to represent communicative bodily poiesis as poetic dialogue. She focuses heavily on punctuation and the visual design afforded by line breaks to perform this narrative function. This generates an awkward meter, through which McKay promotes the concept that her animal characters are using different sensory modes in tandem to produce each line. For the reader to believe that this is a multimodal interpretation transcoded into text, the dialogue is written as interpretable but puzzling — reminiscent of Wittgenstein's (1958) famous assumption that if a lion could talk, the words would not be comprehensible — allowing the reader to enter the character's struggle for comprehension (Browne, 2021).

McKay's repeated use of parenthetical asides ascribes cognitive depth to her animal characters, visualizing their capacity to communicate multiple related or separate messages and/or subtexts in tandem.[6] For example, in "Gasping/ over the/ lock. (I'm/ mingy.) It'll call me and/ I'd like/ to get a drink of/ it", parentheses are used to allow the animal speaker to momentarily self-reflect. The self-reflective aside "I'm/ mingy" could be read as being in(a)side the larger communication, directly between "lock" and "It'll call me and." Alternatively, it could be read as occurring a(long) side the communication, where "(I'm/ mingy.)" and "Gasping/ over the/ lock... It'll call me and/ I'd like/ to get a drink of/ it" are communications

5 The print version bolds animal language, whereas the eBook version does not.

6 McKay's novel alludes to this portmanteau form when her main character, Jean, describes *seeing* the dingo, Sue, speak for the first time: "I crouch. Really take a look at her. I've spent the last seven or so years staring at Sue, but I never saw her *white chest talk two ways*. One for the open road, the time of the whole world, the wild dogs out there. The other way for inside the cage, the safety of locked doors and a hand on her back." (McKay, 2020: 119, emphasis added)

being made simultaneously. Further examples can be seen in many of Sue the dingo's communications:

> **Stay.**
> **(Run from**
> **it.) Stay**
> **now.** (2020: 121)

And:

> **No whiskers on**
> **the inside. (Out.)** (2020: 120)

This dialogue suggests a complexity on behalf of Sue wherein she is communicating several opposing ideas at once. Sue can swiftly contemplate and communicate multiple potential outcomes of the same situation (stay or run) as well as communicate cultural beliefs about other species through her descriptions (no whiskers on the inside, only whiskers on the outside). The question of how to represent this complexity is achieved by McKay through cryptic parenthetical asides, using the constraints of printed text as a metatextual self-referent that acknowledges its own limitations in conveying Sue's communicative capacity.

The works of e. e. cummings and McKay bring forth techniques for imagining nonhuman communication methods, while simultaneously testing the limitations therein. Several of their techniques outlined in this section serve as useful precursors for exploring a born-digital zoopoetics: Firstly, both writers play with the visual aesthetics of poetry on the printed page. This is seen through the use of line breaks, blank space, and word placement, representing the need to pay attention and wade through misinterpretations of animal poiesis. Secondly, the use of punctuation to create asides and portmanteau sentences with simultaneous meanings communicates an intellectual depth not always given to animals in western culture. Furthermore, while parentheses are used by both authors for their common purpose of adding supplementary information without disrupting flow, they are also used to actively disrupt flow, cutting lines into multiple interrelated messages or creating cryptic visual clues. The culmination of the above techniques has the effect of turning text into a puzzle to be solved by the reader. While not immediately interactive, the works of cummings and McKay give the reader a sense that interpreting animal poiesis requires active effort in order to be appreciated.

3. BORN-DIGITAL ZOOPOETICS

The term 'digital poetry', also sometimes termed e-poetry (Ruzkowski, 2013), is used to denote poetics that require born-digital, post-digital, and/or more-than-digital technologies to produce multimodal, dynamic, and interactive reading experiences (Funkhouser, 2012; Naji, 2021). Making digital poetry is an act of releasing poetry from the confines of the printed page and into the virtual, where text, image, moving image, interaction, sound, gesture, sensor data, and technological systems can all contribute to meaning-making (Krauth, 2018; Nelson, 2021), and where such meanings can be updated, removed, replaced, or changed dynamically, based on reactions and interactions as they occur.[7] Poet Andrew Ruzkowski saw the benefits of digital poetry for ecopoetics[8] due to its potential to generate multi-sensory experiences, arguing that digital poetry is "an all-encompassing medium for eco-poetics; through the creation of e-ecologies, languages, and digital worlds, e-poetry immerses the reader in the senses" (2013: para 2).

Digital poetry is not inherently zoopoetic, however digital poetry production has the potential to positively address two problems that emerge across Sections 1 and 2 of this article. The first of which being that there are no 'actual' animals in literary texts (Derrida, 2008), wherein animal characters are always already speculative interpretations (Morey, 2019). Interactive and algorithmic technologies have the potential to challenge the idea that animals are prevented from communicating through literary texts. Abundant examples can be found of technologically expanded human/animal communication design (French et al., 2016; Hirskyj-Douglas et al., 2018), the development of computational outputs driven by animal agency and decision-making (Carter et al., 2015; Webber et al., 2020), the decoding of animal communication signals (Bakker, 2022; Hagiwara, 2023), and the use of artificially intelligent algorithmic systems for interpreting animal signals and bodily gestures (Andreas et al., 2022; Hagiwara, 2023). However, these examples do not purposefully invite zoopoetic inquiry, nor specifically question what role poetics could play within multispecies interpretation.[9] As technology's ability to engage and interpret other species' signals increases, so too does a need to consider the modes through which those

7 Before digital writing was a common-place, Avant Garde and postmodernist writers of the 20th century engaged in rethinking and deconstructing the technology of the page and its status-quo usage. The adoption of digital technologies allowed further convergence of sensory reading experiences via the digital page.

8 Zoopoetics and ecopoetics, while related, are separate disciplines in that one deals predominantly with animals, and the other with environments and environmental relationality.

9 A close example may include the human/dog 'cooperation game' writing in Krauth (2020), where texts are produced through computational engagement with dog body movements during play.

interpretations are presented — textually, visually, sonically, interactively, or otherwise — in ways that best invite nonhuman agency and intelligences, while subduing overt anthropomorphism.[10]

The second problem is that typeset and printed pages[11] create communicative limitations, causing zoopoetry to lean towards visual, concrete, and gestural modes. Zoopoetry maintains continued ties to written language while also desiring to move towards modal complexity that may better reflect the experiences of other species. The kind of zoopoetry created by e. e. cummings and McKay draws upon forms of visual communication pressed up against the limitations of language and the keyboard, jumping sideways like a wallaby caught off guard by a poorly-trained dog. "I want to break free!" screams zoopoetry: a tiger in a cage, an orca in a tank! If for both Moe and Morey (2019) zoopoetry is engaged in an animal form of rhetoric that can be speculative, multimodal, and potentially outside of language, then zoopoetry could arguably be suited to digital, algorithmic and/or interactive reading experiences that ignite a variety of sensory perceptions and use generative practices to update and change written and visual meanings as they occur.

3.1 *THE (M)OTHERHOOD OF MEEP* (2023): READING ANIMAL SIGNALS MULTIMODALLY

I have developed two works of digitally poetic algorithmic mobile applications that explore the two problems outlined above. The potential technological affordances that come to light from these two works are summarized at the end of this section for how they may be applied to further digital zoopoetic inquiry. The first is *The (m)Otherhood of Meep* (2023), a smartphone-based application that requires a touchscreen, a microphone, and an internet connection. Through the microphone, the work listens to and interprets the vocalizations of grey-headed flying foxes (GHFFs) as they occur, using an AI model trained to recognize GHFF vocalizations, and an algorithm that will choose an interpretation for each vocalization in real-time. GHFFs are a highly social keystone species known to science to have up to 20 distinct vocalizations within five broader vocalization types (Christesen & Nelson, 2000). Each vocalization has its own interpretable contextual meanings (Christesen & Nelson, 2000). *OoM* can currently understand six vocalizations,

10 There are certainly examples such as the *Meowtalk* (2020) application by Akvelon that prove how greatly the public want to directly engage with other species through digital systems, however the literary or poetic nature of *Meowtalk* is not its main intentions.

11 I make this distinction as it was the printing press that arguably constrained the visual appearance of text in comparison to the more multimodal experience of reading illuminated manuscripts.

inclusive of one vocalization per type, plus a seventh audible bodily gesture. While the database of interpretation options is written by the human author, the machine must recognize the vocalization and choose the 'correct' corresponding interpretation/s.

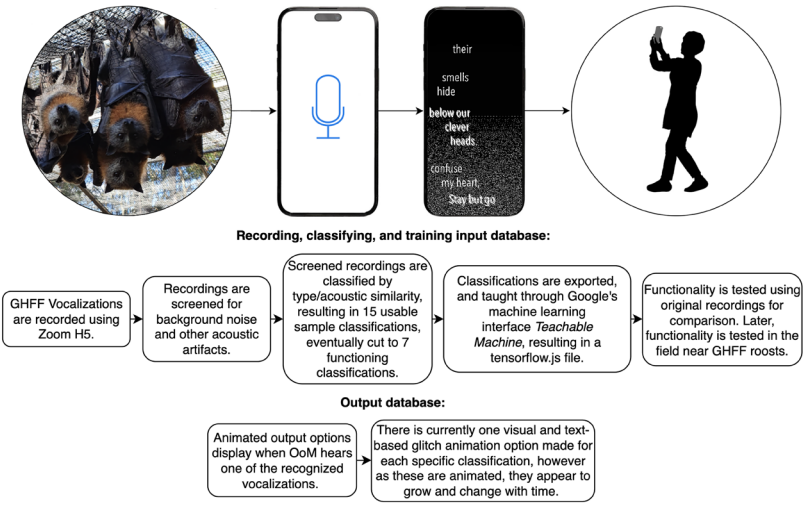


Fig. 1: OoM technical process. © Alinta Krauth.

OoM constructs possibilities for algorithmic and human creativity to co-design interpretations of animal signals, while aiming to maintain the subjective depth offered to animal characters by a zoopoetic approach. Because the contextual meanings of GHFF signals have already been decoded by zoologists such as Christesen and Nelson (2000), *OoM* can move beyond a process of decoding and focus instead on the subsequent phase of questioning how decoded signals are interpreted and presented to human audiences. What is perhaps most aesthetically prominent about *OoM* is that its output is to be read multimodally.[12] The work's algorithm can transcode audible GHFF vocalizations into visualizations, animation, screen interactivity, and deconstructed texts. Each vocalization is imagined as the equivalent to a complete multimodal sentence, where through continued listening to bat communications, sentences are replaced on the user's screen in a combinatory manner, overlaying visual and textual meanings dependent on the vocalization being heard. For example, corresponding with a GHFF 'alert' signal, animated flashing red dots and animated

12 While the work relies on sound inputs to interpret, it does not include sound outputs. *OoM* imagines the user to be potentially physically close to the animals in question — a situation in which sound would present an intrusion for the animal.

text. “ Danger! / is (near!) / (is near)” then replaced with a line such as “(i have asked you so many times / to leave me (be)” is displayed in Figure 2. Location is a further mode employed in this work, wherein the location in which a user listens to bat vocalizations, and the sights and sounds within that location, become part of the multimodal construction of meaning. The result of which is that the screen is never divorced from its surroundings, augmenting a locative context, rather than replacing it.[13]

Fig. 2: OoM hearing GHFF alert vocalization. GHFF’s can be seen in the background of the image. Location: Public walkway. © Alinta Krauth.

While still inclusive of written text, *OoM* makes use of glitch animation and disarrangement in order to explore a digitally deconstructed aesthetic inspired by cummings and McKay. This glitching allows signal interpretations to change dynamically — often times becoming more or less visually obscured during the reading process — creating a purposefully challenging and temporally-dependent reading experience. *OoM* does not reject page-based zoopoetics outlined earlier, it retains thought-provoking comprehension, asides, paratexts, and experimental visual arrangement, as interpreted within the context of an animated glitch aesthetic. These choices intend to suggest that interpretation between species is, despite Morey’s hopes, still not an exact science; instead, it appears as challenging, puzzling, shifting, glitching, and momentary.

13 In the Australian context where this species lives, it is common to hear flying foxes in the evenings from a variety of urban, suburban, rural, regional, and remote locations.

3.2 *THE SONGBIRD SPEAKS* (2024-ONGOING): ALGORITHM VS. ANIMOT

I followed the creation of *OoM* with *The Songbird Speaks* (2024-ongoing), captured in use in Figure 3. *TSS* is conceptually similar to *OoM*, made as a listening device for the vocalizations of Australian magpies, capable of interpreting these into on-screen multimodal poetics in real-time. Australian magpies are known as incredibly impressive singers, able to create improvised 'warbles' whose apparent meanings and contexts scientists are still in the process of learning (Roper, 2007). The Australian magpie's songs are combinatory, in that they recombine and remix their own phrases to create vocalizations that can appear to be novel as the song progresses (Walsh et al., 2023). *TSS* explores this through the development of a large output database of textual and visual choices, based on a trained audio input database of "sixty-eight different magpie song-bits, such that if a magpie were to sing in listening range of the device, it could give interpretations for any vocalization combinations that audibly correspond with those sixty-eight options" (Krauth, 2024). The significance in training an algorithm on 'song-bits' rather than complete vocalizations, is in its movement away from considering vocalizations as akin to complete sentences, as seen in *OoM*, to considering 'bits' as the potential for individual magpie words and phrases. These 'bits' are smaller units that can be recognized by the device in different structural orders to deliver greater variety in interpretable meaning.

Fig. 3: TSS in use in a suburban garden where magpies can be heard. © Alinta Krauth.

In Figure 4, I outline the technical process of creating the most current version[14] of *TSS*. In comparison to *OoM*, *TSS* has a much larger output database of potential textual and visual options that its code can choose between when recognizing a song 'bit'. Each of the sixty-eight bits within the work's

14 At time of writing, the most current version of this artwork is unpublished and ongoing, with an earlier version being published in *The Digital Review* (Krauth, 2024).

input database has ten of its own unique interrelated interpretations. This allows for the kind of real-time on-screen adaption that would be impossible to reproduce in print, as the database arrays in *TSS* can change and update in a manner responsive to what it hears.

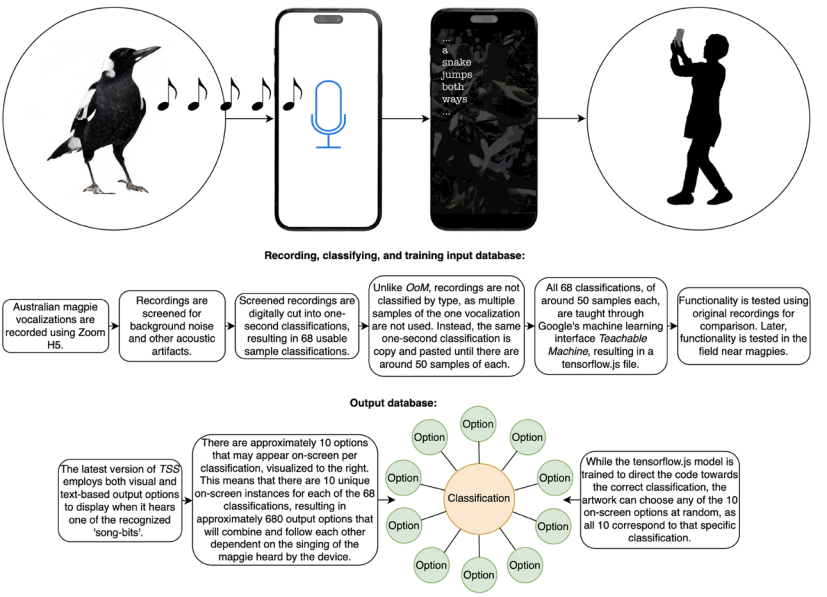


Fig. 4: TSS technical process. © Alinta Krauth.

TSS and *OoM* offer ways to engage with a question of the actual versus the animot, demonstrating how digital zoopoetry can function not as an all-consuming engagement for the reader, but as a companion interface that sits *between* and *beside* the reading/listening human and the vocalizing animal. In doing so, digital zoopoetry adds modes and imaginaries to the reader's observation of an animal as it occurs, rather than placing itself as the main object of study. Indeed, without vocalizations within hearing range of *TSS* and *OoM*, they simply will not function and cannot be read as intended. Instead, the reader must experience the animal, the vocalization, and the on-screen interpretations in parallel, allowing the multimodal poem to unfold directly from the animal's voice. This sets digital zoopoetics apart from earlier printed examples: through being captured by the page, cummings's and McKay's works can be studied, read deeply, and given sole focus by the reader. By contrast, *OoM* and *TSS* are read in a fleeting manner as vocalizations occur, where whole sections of their databases may remain unexplored by the reader, emerging only in collaboration with the specific context in which both human and animal find themselves. This form of digital zoopoetry is completely dependent on animal agency, serving only as

an interpretive expression of an animal's signals, and never as a replacement for them.

TSS and *OoM* suggest techniques that have the potential to expand current understandings of zoopoetics. Each technique raised above is briefly summarized below for how they may cement digital zoopoetics as a form:

1. Artificially intelligent models (Input databases): The potential advantages of machine learning for recognizing animal signal data are vast and already under development, leading to a question of whether the results of such could be considered zoopoetic. Models that have been trained on animal signals, such as the models created for *OoM* and *TSS*, represent a new direction for zoopoetics that connects the animal signal itself to the generative database arrays outlined in point 2 below. Engagement with artificially intelligent models leads to a poetics capable of dynamically recognizing signals as they occur.

2. Combinatory and/or generative output databases: Language databases, or in this case, databases of human-written combinatory 'bits', visualizations, and animations, can respond to animal signals as they occur with the help of the algorithmic models outlined in point 1. Database arrays can allow for updatable, fluidly presented meanings and the possibility of multiple poetic interpretations on behalf of the human poet, leading to multimodal poetry that might look or read differently each time it is engaged with.

3. Digital multimodal reading experiences: Interpretations of animal signals into English written words, while potentially poetic, may never be able to encapsulate the presence of animals or their communication methods. Presenting vocalizations through multiple sensory modes, while no more scientifically exact than writing alone, may offer avenues for further embodied and experiential interpretation on behalf of the reader.

4. Location and augmented reality (AR): Locative art and/or poetry is characterized by its use of site-specific inquiry, allowing simultaneous engagement with a poem and its surrounding environment. This is reflected in *OoM* and *TSS*, where both require the user to be physically present in areas where vocalizations may be heard. Locative and AR techniques add to the multimodal reading experience outlined in point 3 by opening the reading experience to the specific physical contexts in which human and animal lives intersect.

5. Expanding print-based techniques: None of the points raised above aim to dismiss the observations made in Section 2. Digital zoopoetics can instead extend on the techniques outlined in Section 2 by introducing the dynamism afforded by computation. Digital works of zoopoetry do not need to avoid written text entirely, unless this is the creator's aim.

4. FUTURE STEPS FOR DIGITAL ZOOPOETRY

There are many potential examples beyond my own that appear to employ a sense of digital zoopoetics. For example, María Mencia's *Birds Sing Other Bird's Songs* (2001) shows early thinking in digital zoopoetry, highlighting ways in which animal signals could be represented through other media. More contemporary examples may include Marshmallow Laser Feast's *In the Eyes of the Animal* (2023), a series of interactive 3D open world environments speculating on animals' perceptive sensibilities. Or *Unseeing elegy of the tetrachromats* (2021) by Jessica Williams, Alex Last, Roger Alsop and Mathew Berg who employ multimedia installation to imagine the sensory lifeworld of birds. Examples such as these use a variety of digital affordances to interpret nonhuman communications or experiences to human audiences and are deserving of future analysis with respect to the ways in which they may expand an understanding of digital zoopoetics.

Inviting the potential for 'real' animals as responsive speakers in zoopoetry requires real-time, fast-acting, intelligent systems that augment our experiences with other species, rather than replacing them. I have aimed to begin a conversation around the affordances of digital technologies and techno-aesthetics that could be seen as relevant to zoopoetics, in order to work towards a definition of digital zoopoetics as a more-than-textual, born-algorithmic approach to languaging *with* the agency of other species. I have suggested that works of digital zoopoetry have a computational aesthetic requiring multimodal readings that ignite the reader's senses, drawing on digital affordances such as animated modes, databases, machine learning techniques, and real-time augmented experiences that aim to draw attention to the communicative poiesis of other species. I have suggested ways in which digital zoopoetry does not reject the written word, but rather, expands upon the relevant philosophies put forward by Derrida, Moe, and others. This analysis is by no means exhaustive, instead, it invites further research by scratching the surface of digital zoopoetic possibilities.

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