



THE UNIVERSITY of EDINBURGH
The Royal (Dick) School
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Free webinar

AI & Animal Welfare: opportunities and challenges

1 Oct 2026 (6-7pm BST)

Dr Jill MacKay
Senior Lecturer



"Image generated via Google Gemini AI.

Prompt: cartoon like silver tabby cat and black cat sitting at a laptop writing a scientific paper"



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Artificial Intelligence and Animal Welfare

Opportunities and Challenges of Emerging Technologies

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Session Key Messages

- AI fundamentally changes our interaction with information
- Animal welfare requires information
- In animal welfare we need to:
 - Identify risk
 - What information are you prepared to 'miss' through using AI
 - Enhance transparency
 - Ensure AI use is badged, and reported in a way others can use
 - Animal welfare is experience
 - It is the animal that matters



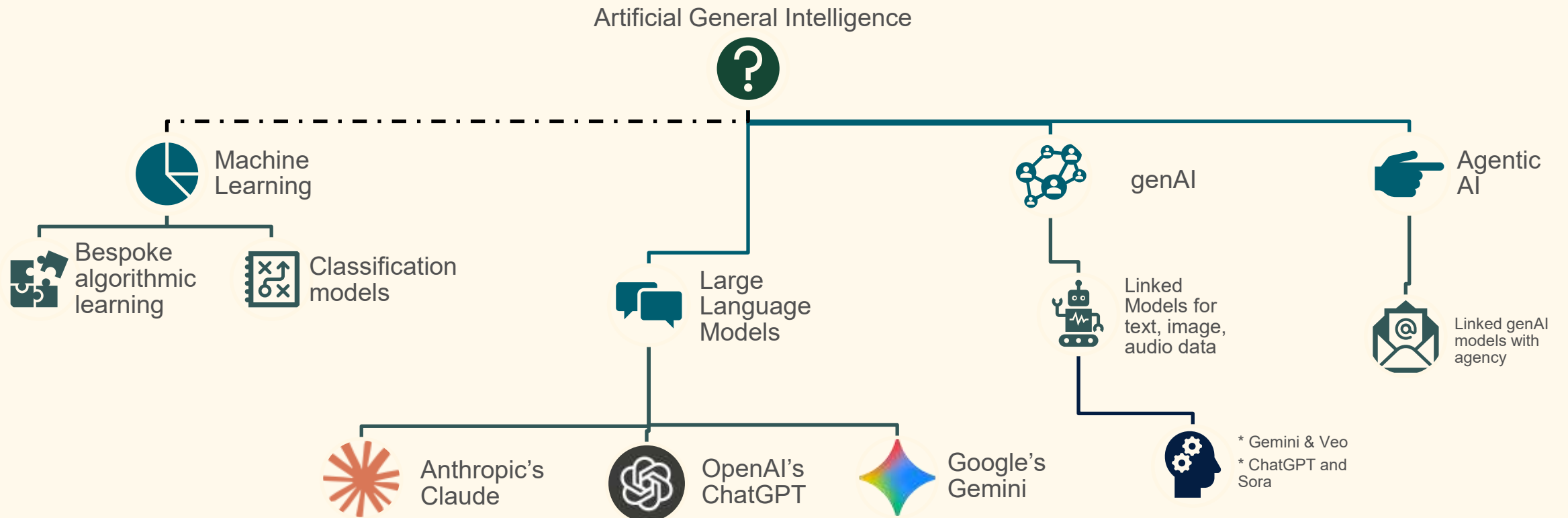
What is AI?



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What is AI?



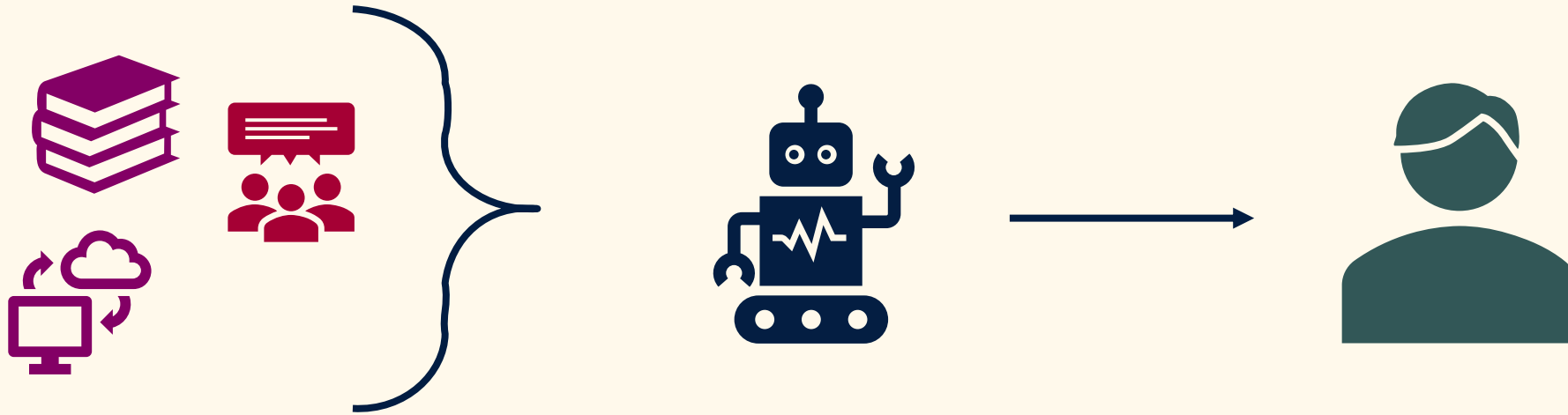
What is AI?

- A computer system which performs a task thought to require human-like intelligence
 - (https://en.wikipedia.org/wiki/Artificial_intelligence)
- Mostly works by taking very large training datasets (the internet) and predicting what comes next
 - Chang, 2023 <https://www.newyorker.com/tech/annals-of-technology/chatgpt-is-a-blurry-jpeg-of-the-web>
 - CGP Grey 'AI Doesn't Know Anything, it Just Passes Tests' <https://youtu.be/R9OHn5ZF4Uo>



What is AI?

- AI is a tool which selects information and returns it



Why does this matter for animal welfare?



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Five Domains Model of Animal Welfare

The five domains model of animal welfare ([Mellor et al, 2020](#)) provides a holistic approach to animal welfare.

It consists of four physical domains: nutrition, physical environment, health, and behavioural interactions.

And a fifth mental, or affective state, domain.

The first four physical domains influence an animal's mental state.

The mental state of the animal, or how it feels, is the most important consideration for welfare, and this ultimately represents the animal's welfare



What is animal welfare?

- Four types of activities that affect animal welfare (Fraser & MacRae, 2011)
 1. Keeping animals
 2. Deliberate harm and cruelty
 3. Unintended harm through human activity
 4. Indirect harm through environmental change

<https://doi.org/10.1017/s0962728600003213>



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Human Choice and Animal Welfare

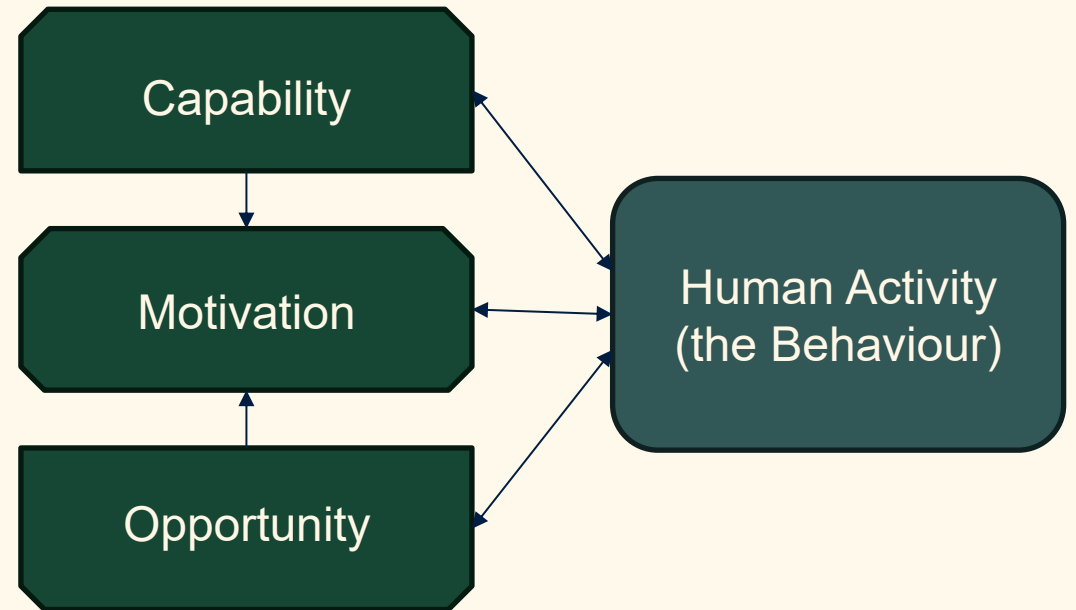
Human Activity
(the Behaviour)



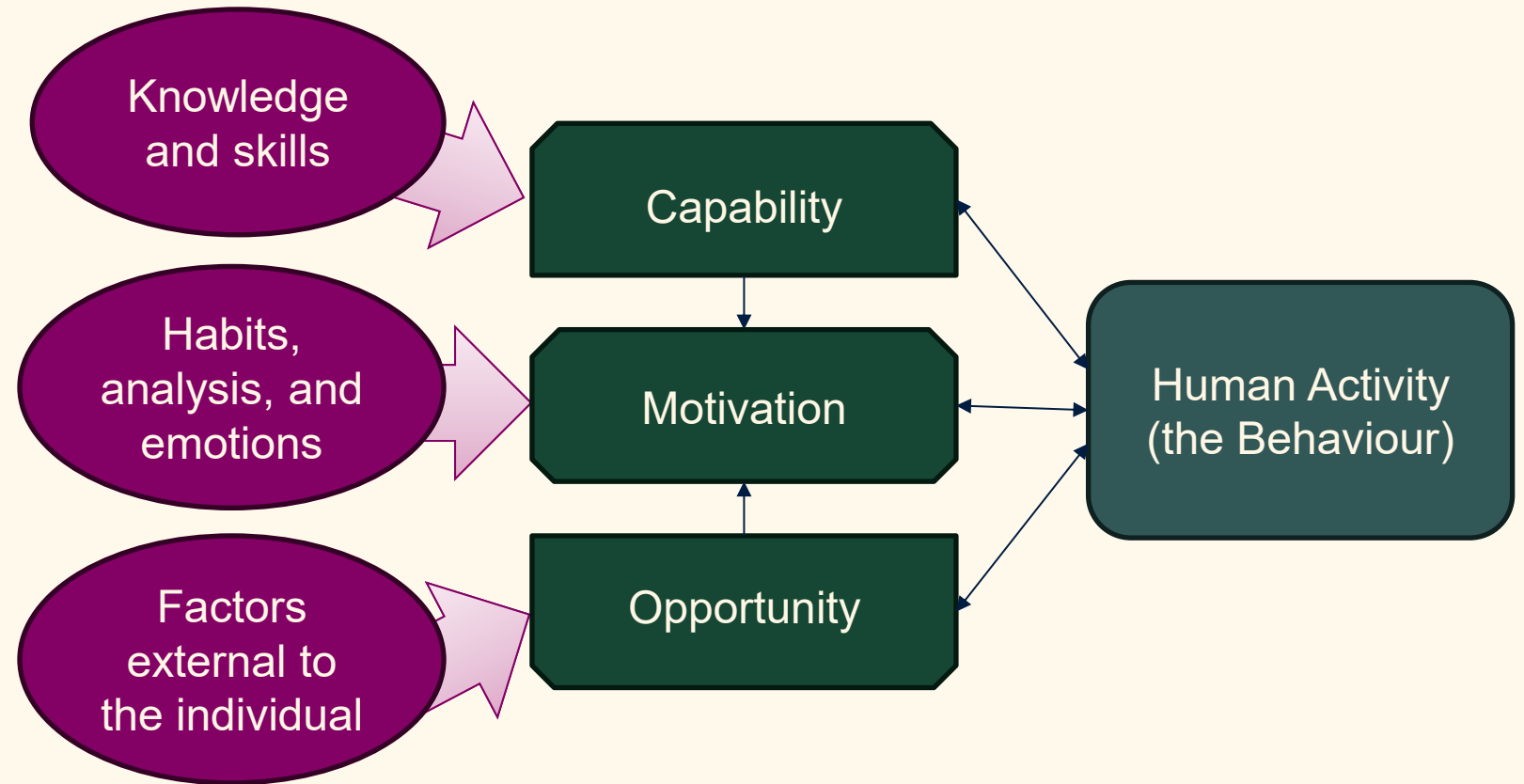
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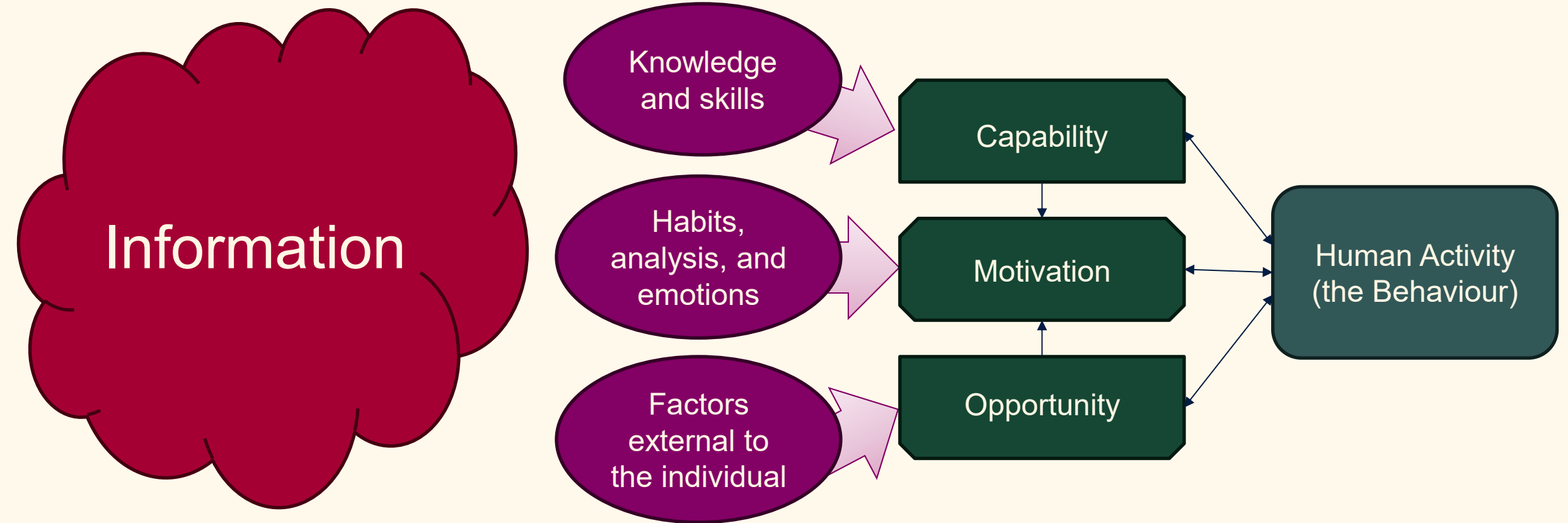
Human Choice and Animal Welfare



Human Choice and Animal Welfare



Human Choice and Animal Welfare



AI Opportunities for Animal Welfare

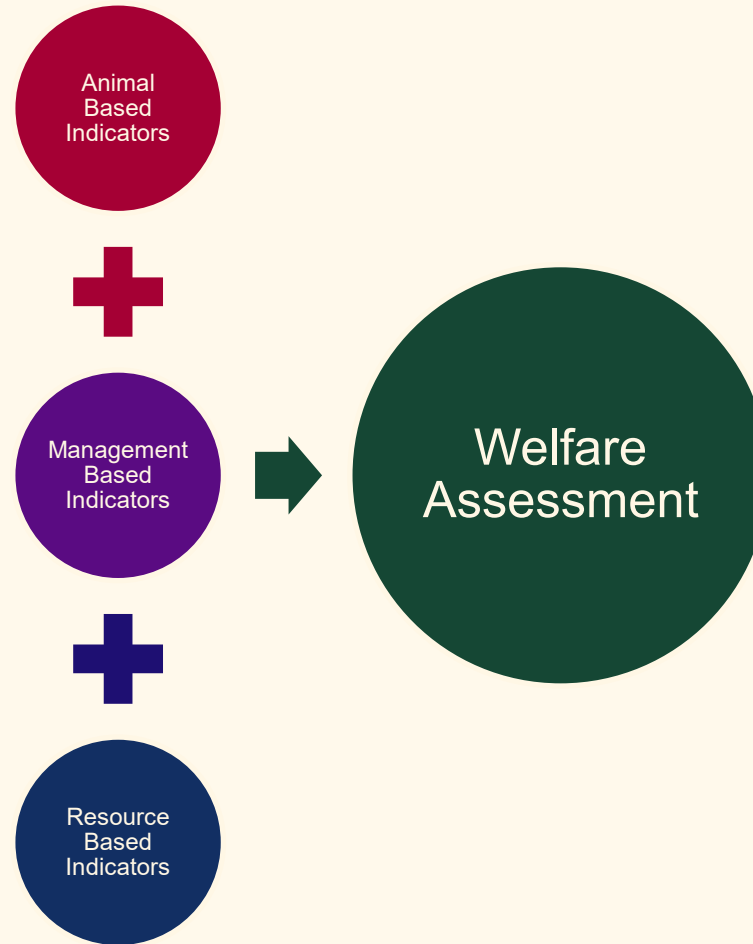
Animal Welfare requires information

- AI can support people to get the right information



On-farm welfare assessment

Knowledge
and skills

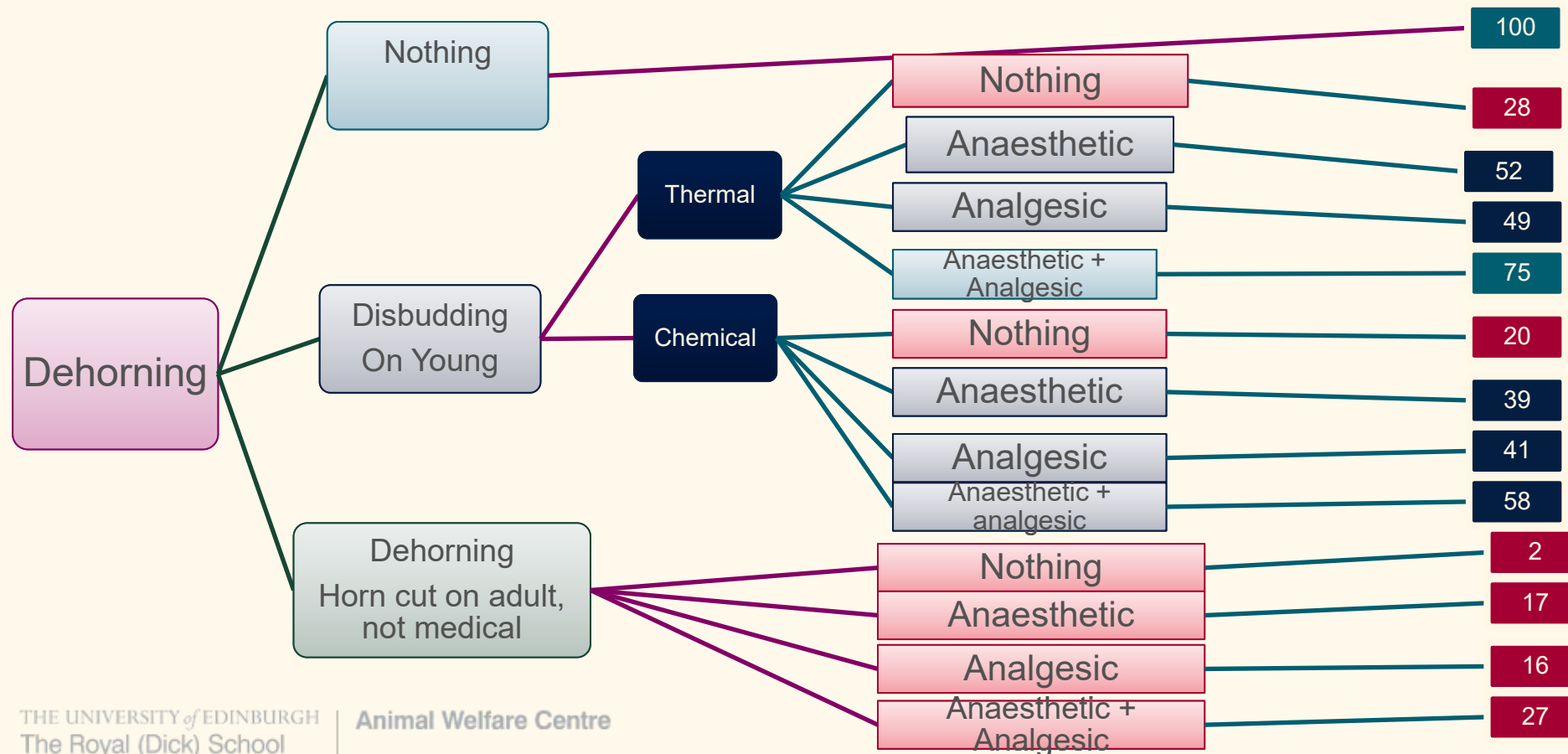


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Cattle Welfare Indicator: Absence of Pain Induced by Management

Management indicator, uses a decision tree approach.



Cattle Welfare

- Potential to integrate with sensor technology
 - Neethirajan, S. (2023) 'Artificial Intelligence and Sensor Innovations: Enhancing Livestock Welfare with a Human-Centric Approach', *Human-Centric Intelligent Systems*, 4(1), pp. 77–92. Available at: <https://doi.org/10.1007/s44230-023-00050-2>.
- Can train models to identify pain behaviour
 - Feighelstein, M. *et al.* (2026) 'Pain Assessment in Cattle: comparing performance of deep learning video-based models against veterinary experts', *Scientific Reports*, 16(9318), pp. 1–10.



Building Datasets

- Can use AI to retrieve and organise public information
 - E.g. Cobb, M.L. and Coghlan, S. (2026) 'Using AI agents to assemble population-level data for visibility and animal welfare insights: a case study of greyhound racing in the UK', *Frontiers in Animal Science*, 7, p. 1868726. Available at: <https://doi.org/10.3389/fanim.2026.1868726>.
 - Note methodological rigour and transparency

Factors
external to
the individual

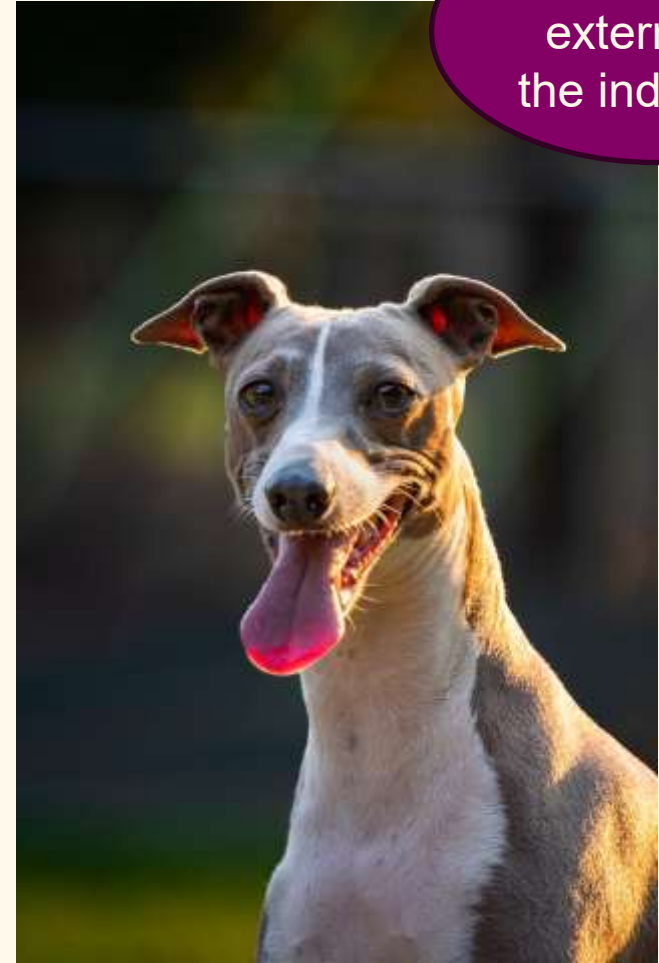


Image by [Storme Kovacs](#) from www.pixabay.com



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Replacing Animals

Habits,
analysis, and
emotions

- Can AI promote better welfare for animals in teaching?



Dog & Child Interaction, Gemini & Jill MacKay <https://jillymackay.com/post/teaching-with-ai-images/>



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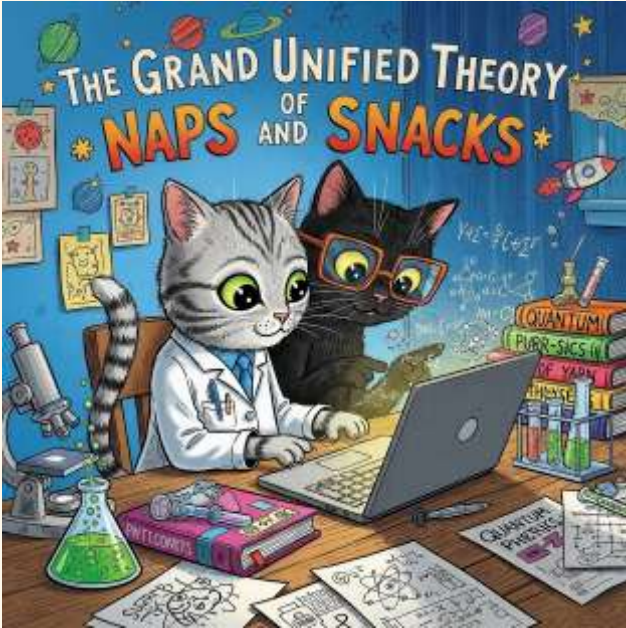
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MacKay, Connelly, Doyle & Rhind: Teaching Tip Using Artificial Intelligence Generated Media in Veterinary Teaching, under review in Journal of Veterinary Medical Education

AI Challenges for Animal Welfare

Animal welfare requires information

- AI can prevent people from getting the right information



Jill MacKay and Google Pixel 'Create Studio', 10/11/2025

Prompt: cartoon like silver tabby cat and black cat sitting at a laptop writing a scientific paper



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What Choices Does AI Make?

Habits,
analysis, and
emotions

- AI makes choices about how it represents animals in media



Loeb, J. (2026), Video nasty?. *Veterinary Record*, 199: 154-155.
<https://doi.org/10.1002/vetr.71111>



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MacKay, J.R.D. and Connelly, L. (2026) 'Tail wagging cats: Veterinary implications of AI-generated video', *Veterinary Record*, pp. e1–e6. Available at: <https://doi.org/10.1002/vetr.70973>.

Animal Welfare Experts vs AI

Knowledge
and skills

- Recruited 20 animal welfare experts via email & social media
- Showed them 6 AI Generated videos
 - 2 x cat, 2 x dog, 2 x rabbit
 - Each species had a positive and negative welfare condition
- Asked them to consider welfare, and to discuss videos



Animal Welfare Experts vs AI



Prompt: Realistic photo of an English lop bunny in a house with positive welfare

Nanobanana, Fast Generation, Est. Date
02/03.2026 User: Jill MacKay

https://osf.io/2qf35/overview?view_only=f58bbe74cc4f4fd0b6c662f9b3597230



Prompt: Realistic photo of an English lop bunny in a house with negative welfare

Nanobanana, Fast Generation, Est. Date
02/03.2026 User: Jill MacKay

https://osf.io/2qf35/overview?view_only=f58bbe74cc4f4fd0b6c662f9b3597230

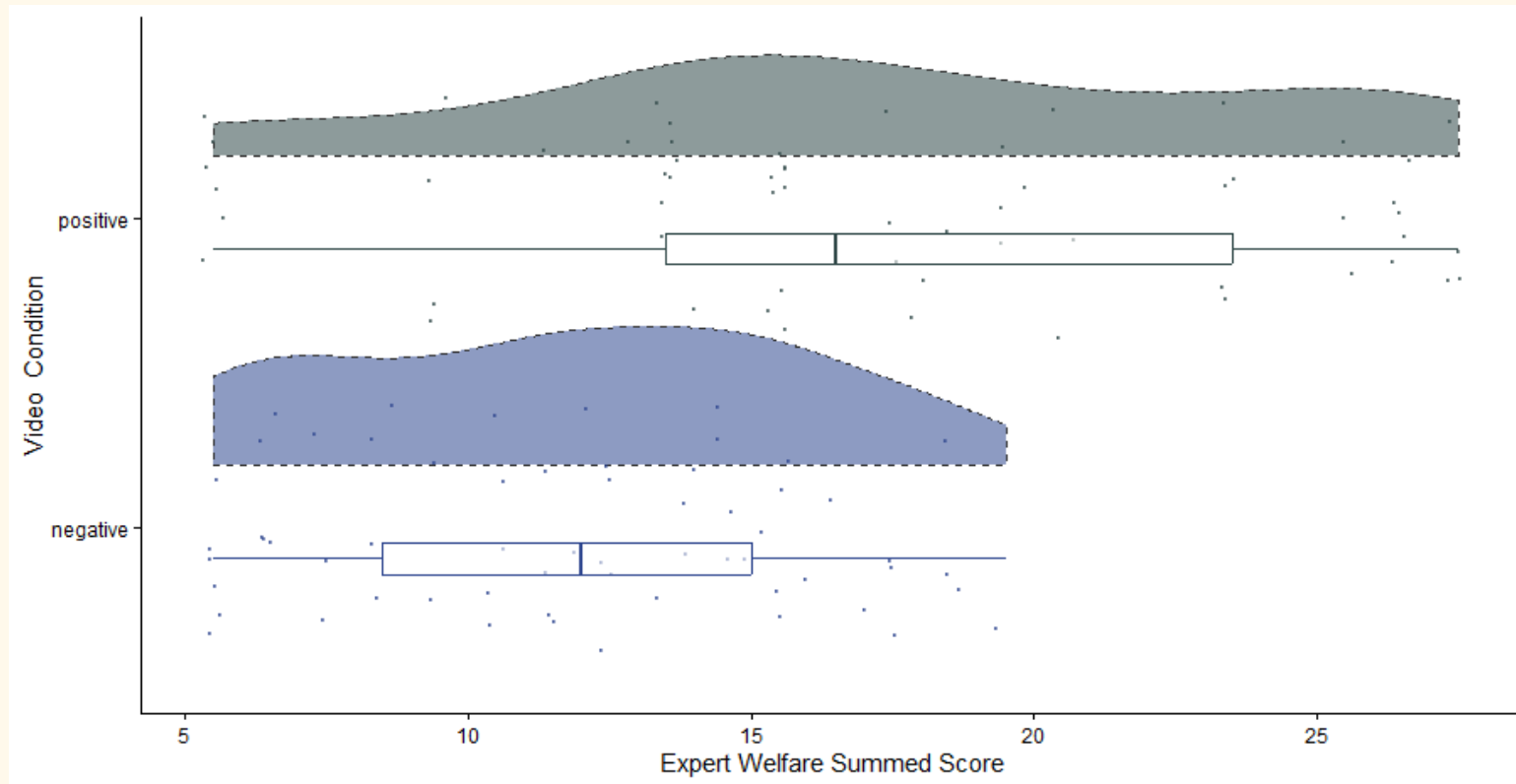


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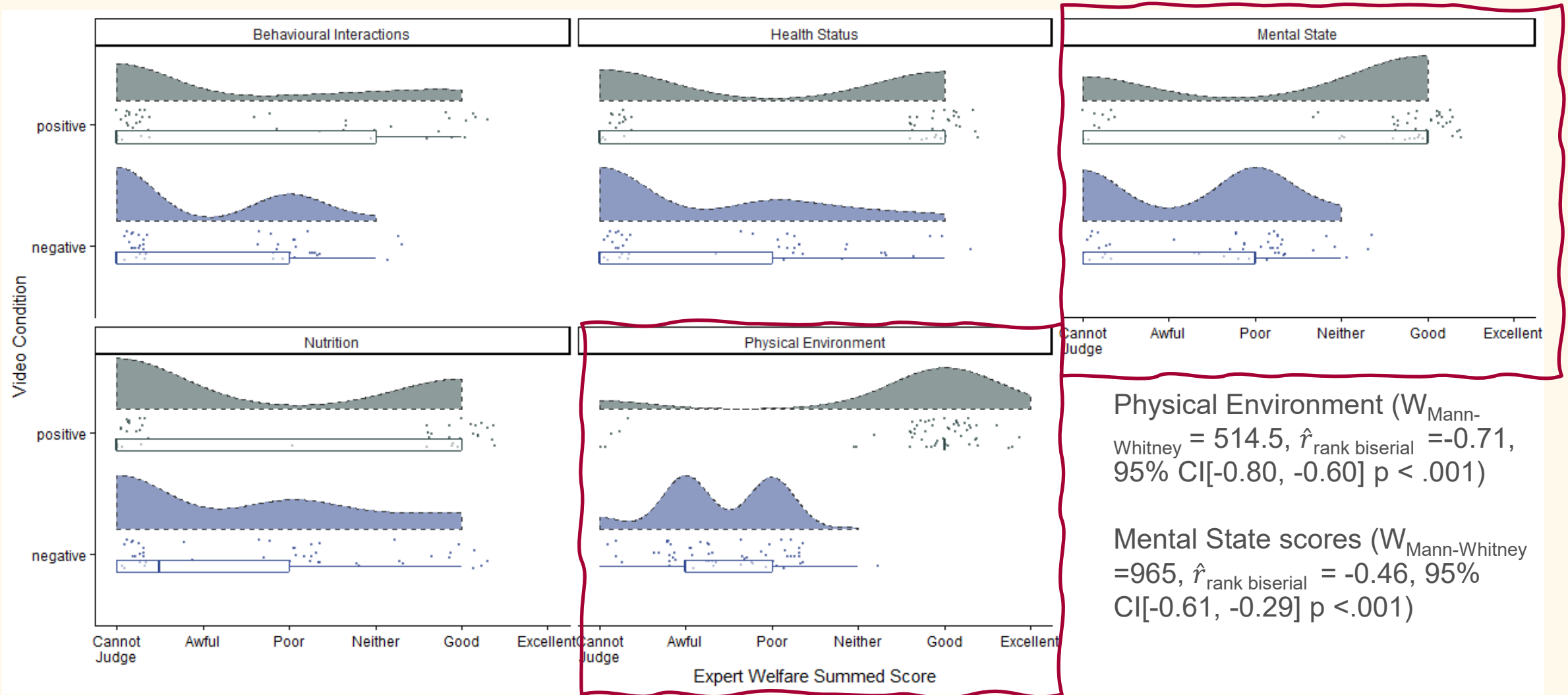
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Does genAI Understand Animal Welfare?

- Experts rate AI's depiction of 'positive' welfare as significantly different from 'negative' welfare ($t_{\text{Welch}}(98.22) = -5.52$, $\hat{g}_{\text{hedges}} = -1$, $\text{CI}^{95\%}[-1.38, -0.62]$, $p < .001$)



Does genAI Understand Animal Welfare?



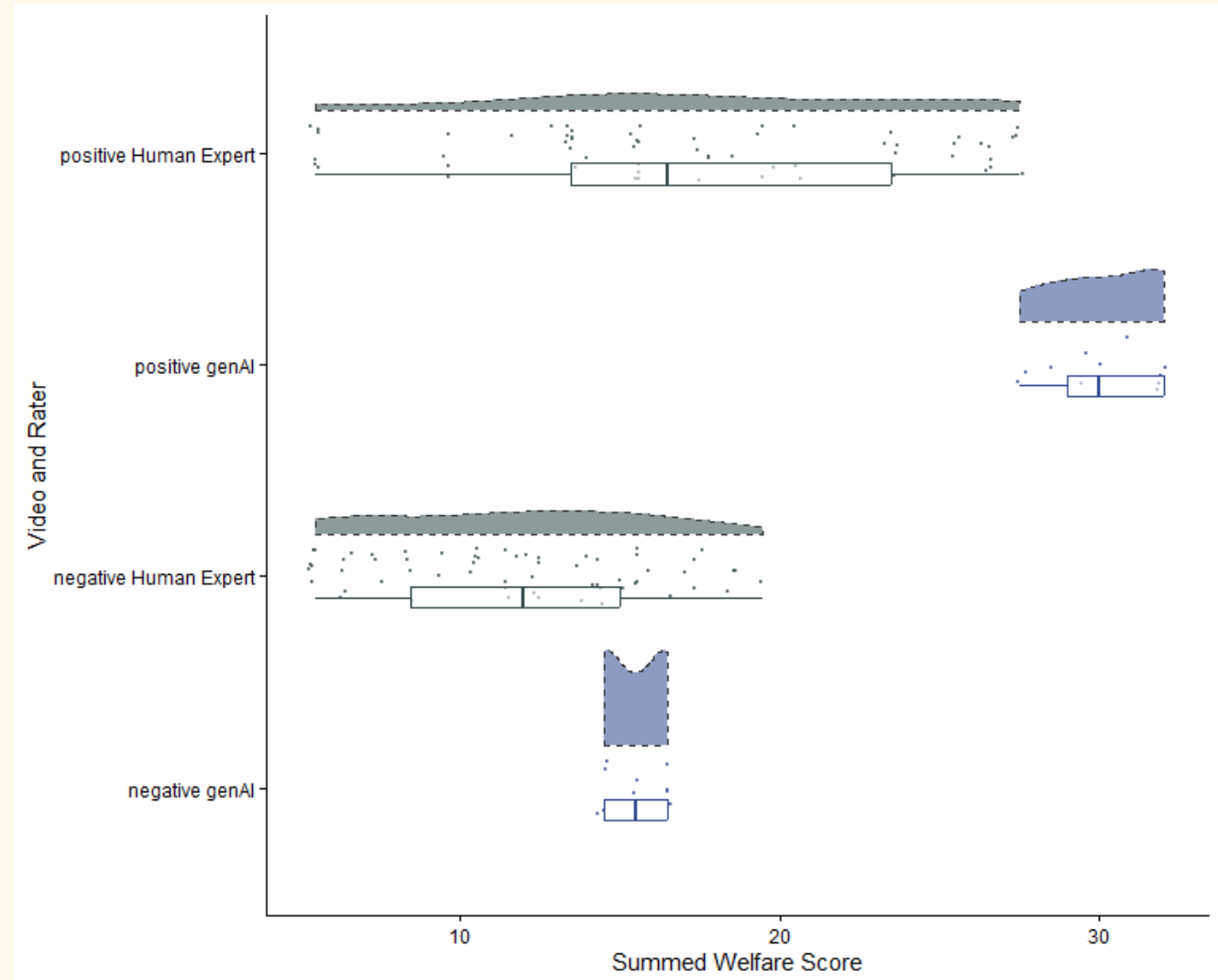
Does genAI Understand Animal Welfare?

- genAI mainly depicts welfare as being about physical environment and mental state
- How does it assess welfare?
 - Gave Claude, Copilot, ChatGPT and Gemini the same questionnaire



Does genAI Understand Animal Welfare?

- genAI rated positive media as more than two standard deviations more positively than human experts
 - $(t_{\text{Welch}}(59.45) = 12.68, \hat{g}_{\text{Hedges}} = 2.61$ [95% CI 1.99, 3.22], $p < .001$)
- genAI rated negative media as a little over one standard deviation more positively than human experts
 - $(t_{\text{Welch}}(61.43) = 6.11, \hat{g}_{\text{Hedges}} = 1.23$ [95% CI 0.78, 1.68], $p < .001$)



Does genAI Understand Animal Welfare?

Knowledge
and skills

- No
- Animal welfare experts disagree with genAI on animal welfare measures
- When genAI creates positive and negative welfare videos, animal welfare experts only considered Physical Environment and Mental State to be significantly different
- When genAI is given the same task, it is more certain and more extreme than human experts



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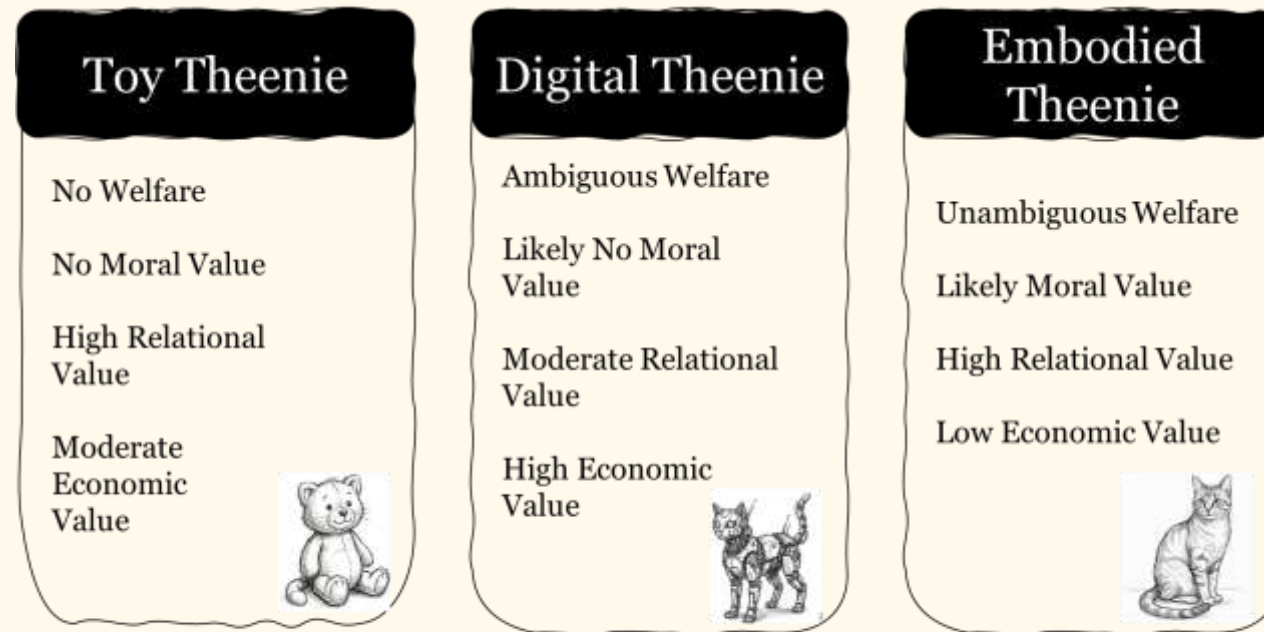
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MacKay, J.R.D., Connelly, L. and Doyle, R. (2026) 'Do Androids Dream of Electric Sheepdogs? Animal Welfare Experts And generative AI Disagree on Companion Animal Welfare'. Zenodo. Available at: <https://doi.org/10.5281/zenodo.22009763>.

Do we need AI Welfare?

Factors
external to
the individual

- **Figure 1:** Welfare, and value status of three representations of animals, a toy, a digital creation, and the embodied animal. Note, images are created via generative Artificial Intelligence.



NB: 'Toy', 'Digital', and 'Embodied' illustrations were created by Google Gemini 3.1 Pro
Initial prompt: *generate me three black and white sketches, A cat shaped cuddly teddy bear A cat shaped robot And a sleek cat*



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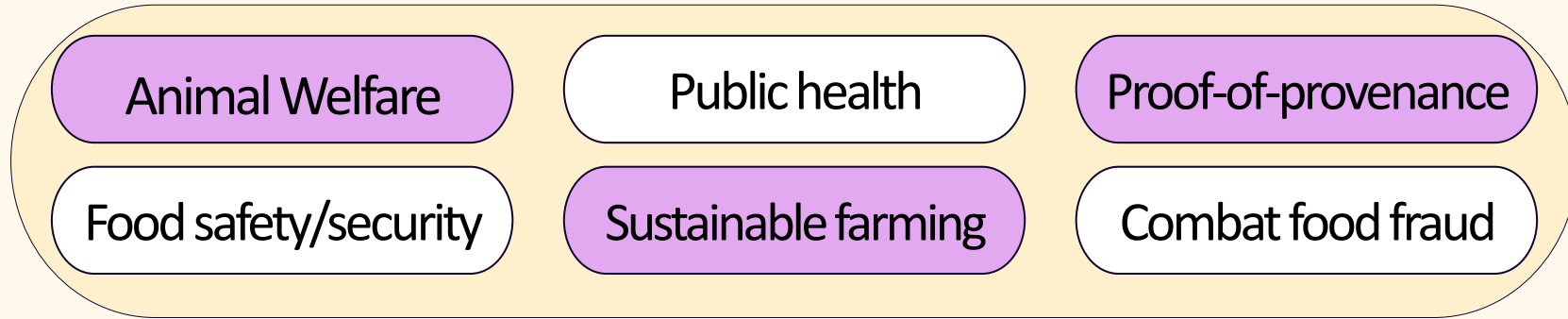
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Mackay & Connelly, From Bot-Farm To For-You-Page Fork: Consuming The Whole
Digital Animal, under review in Journal of Business Ethics

Other Work in AI and Animal Welfare

Animal Welfare Centre team members

‘Fingerprinting’ livestock – using unique physical traits to assign digital identities for secure individual tracking



Robust, reliable on-farm records of the animals must be captured to guarantee acceptable outcomes here.



“True digital twins” – Ensuring individual animals & processed products are represented as accurately and reliably as possible.

Key aims of this traceability system:

- Integrate **machine-readable biometrics** with **tamper-proof record-keeping** to document the true life-history of individual farmed animals.
- Transform farm assurances to verifiable evidence.
- Optimise supply chain management strategies.
- Improve public engagement with the livestock sector.



Dr. Timothy Wiese
Postdoc at the Digital One Health Laboratory, Roslin Institute, UoE



Associate Prof. Adrian Muwonge
Lead at the Digital One Health Laboratory, Roslin Institute, UoE



Prof. Michael Kozicki
Professor of Electrical, Computer, and Energy Engineering, ASU



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Exploring Conversational AI in Companion Animal Bereavement

Evelina Vaki

IAWEL MSc Project

Overall aim:

- To explore bereaved companion animal guardians' experiences of using conversational AI following companion animal loss.

Research objectives:

1. To examine the motivations and circumstances underlying bereaved companion animal guardians' engagement with conversational AI during bereavement.
2. To explore the perceived roles and functions of conversational AI in processing, expressing and making sense of companion animal loss.
3. To examine the perceived benefits, limitations and concerns associated with conversational AI during companion animal bereavement, including how its use interacts with interpersonal, professional and veterinary sources of support.
4. To consider the implications of these experiences for companion animal bereavement support, human–animal relationships and animal welfare, and for the responsible development and use of conversational AI.



Evelina Vaki and Eevee



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Artificial Intelligence: postgraduate student perspectives on use, potential concerns, and considerations for the curriculum

Louise Connelly, Victoria Lindsay-McGee, Fiona Borthwick & Susan Rhind

- PGT use of AI correlated with workplace use
- Confidence in AI use varied amongst students and types of use
- Students strongly desired teaching on aspects of AI use
- AI & Own Work Declaration Form – OER at victorialindsaymcgee.com/oer/ai_owd



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Recommendations for AI in animal welfare contexts

Identify risk

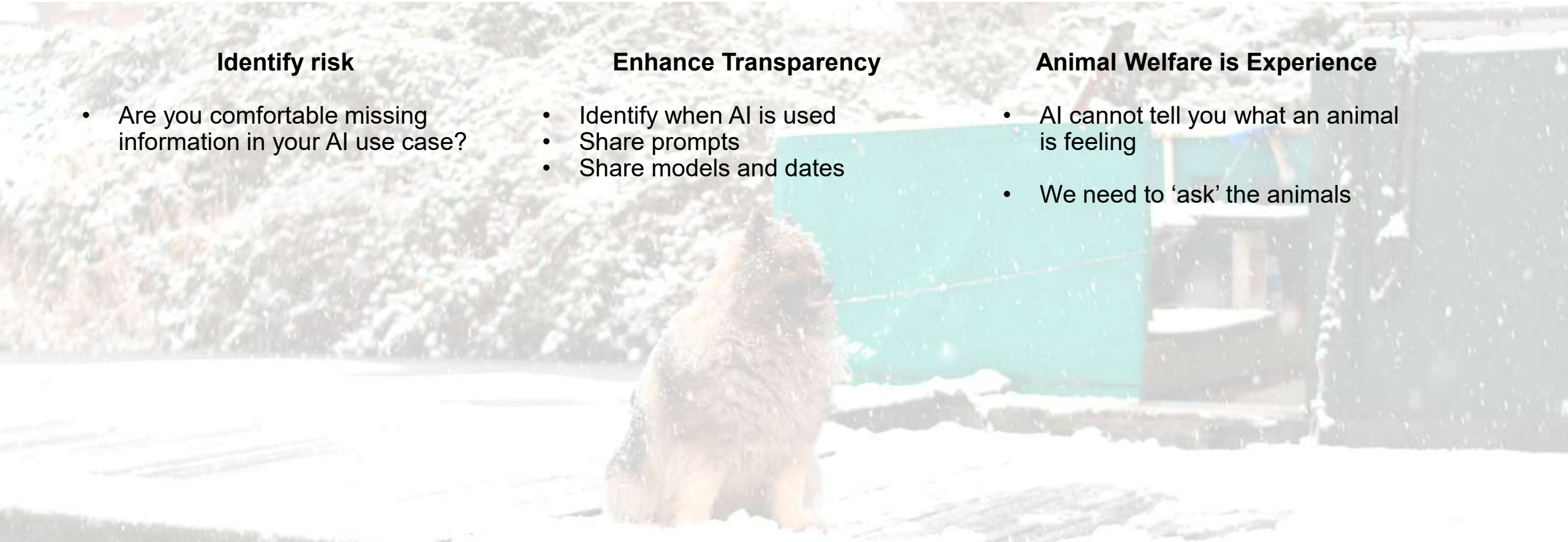
- Are you comfortable missing information in your AI use case?

Enhance Transparency

- Identify when AI is used
- Share prompts
- Share models and dates

Animal Welfare is Experience

- AI cannot tell you what an animal is feeling
- We need to 'ask' the animals





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Thank you and questions!

Improving the lives of animals through
global animal welfare education,
research and outreach

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