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POSTER

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# Animal-centered design needs dignity: a critical essay on ACI's core concept

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## ABSTRACT

Despite a massive acceptance of ‘animal-centered design’ being at the very heart of Animal-Computer Interaction, exactly what it means to be animal-centered often remains vague. In this position paper, I question and critique what animal-centered design really means as it is used. I argue that even though the ACI manifesto and subsequent foundational works clearly set out a focus on animal user-centered design, much work since has adopted ‘animal-centered’ as being a synonym for ‘animal user-centered’. However, I argue, the fundamental essence of ACI’s intellectual origins in human-centered design’s preoccupation with human *values*, and in turn, human *dignity* – which set it apart from mere user-centered design, is lost in such a straightforward adoption of the term. I then analyze what it might mean to actually adopt a value-driven approach akin to human-centered design for animal-centered design, and how this might force us to move beyond the typical welfarist position dominant across most of ACI. Rather than consider the prevention of unnecessary suffering as a central goal of technologies developed by ACI researchers, I argue that technologies that preserve animal *dignity* as a core value is a more appropriate understanding of the term ‘animal-centered’.

## CCS CONCEPTS

- Human-centered computing → HCI theory, concepts and models.

## KEYWORDS

dignity, values, ethics, animal-computer interaction, animal-centered, animal-centred

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## 1 INTRODUCTION

Being ‘animal-centered’ is one of the core principles of Animal-Computer Interaction efforts, seemingly shared by most if not all

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researchers working the topic. Yet, like in many fields, we frequently claim the term as our epithet while not saying exactly what we really mean by it nor how it guides our actions. In this critical essay I go back to the roots of ACI and attempt to disentangle the variety of terms used, if it can be determined what people seem to mean by ‘animal-centered’, critically assess what animal-centered *ought* to mean, and propose a rethinking of an animal-*something* continuum of systems design.

## 2 WHAT ANIMAL-CENTERED SEEMS TO (NOT) MEAN IN ACI

The ACI Manifesto notes that it sets out to develop a “a user-centered approach, informed by the best available knowledge of animals’ needs and preferences, to the design of technology meant for animal use” [25][p. 72]. It continues to set out key courses of actions, and indeed ends on the question, “/.../ how are we going to develop a user-centered design process for animals?” This focus on building a user-centered design process for animals remains clear throughout Mancini’s work, including later foundational articles on ACI as a field [28] and articles on ethics for ACI work that contextualize ACI as “aim[ing] to take what in Interaction Design is known as a user-centred approach to the design of technology intended for animals, placing them at the centre of the design process as stakeholders, users, and contributors.” [26]

Indeed, the term animal-centered only appears briefly near the end of the ACI manifesto, where Mancini notes that “/.../ we could look at human-centered interaction design protocols and methods to assess which ones may or may not be relevant to an *animal-centered* design process”. [25][p. 73] (emphasis added) This is an important quote. The emphasis added reflects the *first* time that the ACI manifesto actually speaks of ‘animal-centered’ rather than ‘user-centered’, and it does so near its very end without giving a definition or clear justification for the change in terminology, nor discussing what fundamental implications the sudden shift from ‘user-’ to ‘animal-’ centered has. Mancini and Nanonni [29] have recently introduced four principles for ‘animal-centered research’ (emphasis added) rather than design—noting that animal-centered as a concept is defined by relevance, impartiality, welfare, and consent, potentially further confusing what exactly ‘animal-centered’ means in different contexts. In the journal’s same special issue, Ruge and Mancini [37] further propose a different ‘toolkit’ to support animal-centered *research and design*, providing several templates to establish ethical baselines across thirteen principles (influence, integrity, respect, freedom, honesty, interpretation, tranquility, inclusivity, care, compromise, equity, safety, and autonomy), although similarly they left ‘animal-centered’ undefined, deferring to the ACI

manifesto as its source. With such contrasting different conceptualizations of ‘animal-centered’ seemingly endorsed by the ACI Manifesto’s author, it is perhaps understandable that there is confusion and misunderstanding on what exactly ‘animal-centered’ is or ought to be.

When we look at work done within the field of ACI this terminology switching seems to be an endemic issue. The manifesto is frequently cited as espousing being ‘animal-centered’, when, as I have shown above, it clearly espouses being ‘user-centered’. Mancini herself seems to be one of the few who does not attribute different terms to her own writing, as e.g., in an ACI Conference publication on developing ‘Research Through Design’ she cites the manifesto stating it calls for “the development of design methodologies that enable animals to be involved in the design process as active participants and design contributors” [14]. That seems a fair and accurate claim of what the ACI manifesto actually calls for. But other works published in the ACI conference proceedings go beyond this, already citing the manifesto to claim e.g., that “The increased use of technology for animals raises many technological, design, and ethical issues that ACI seeks to explore *from an animal-centered point of view*” [18] (emphasis added). That is an evidently incorrect attribution to the manifesto. This phrasing might of course reflect the authors’ interpretation of what ACI as a field does, rather than what the manifesto had set out at its beginning. Nonetheless, it does further becomes evident that we seem to uncritically attribute the term “animal-centered” to research which has never actually used it as such. Consider e.g., Kresnye et al. [22] noting that “in ACI, methods focusing on animal-centered evaluations have been proposed [1, 14, 27, 28]”. Of those references, the first three never actually use the term “animal-centered” and the latter only uses the term to refer to other works. Instead, the first focuses on theoretical groundings of ‘interaction’ [4], the second is the Research Through Design example mentioned above [14], the third talks of wearer-centered design [32]; and the last talks of user-centered design and usability [36].

Consider also, the by now increasingly cited literature review aiming to “form the first grounding foundation of ACI technologies informing future research /.../” [20]. It starts off with yet another undefined subtle terminological shift, talking of moving towards an “animal-centric focus”. When discussing ACI research then they note, for example, that “A more animal-centric design perspective in these scenarios has been to deploy the technology and let the animal “become with” [102,120]” [20][p. 9]. Neither use that term—the first talking of user-centered work [46], the second being Haraway’s foundational work on interspecies relationships [19]. Another part of the review mentions that “grounded within the principles of animal-centred design, Johnston-Wilder et al. [41] and Mancini et al. [37] have created interfaces /.../” [20][p. 12]. There is no reference to what those principles of animal-centred design might be, but there does again seem to be terminological (and likely conceptual) attribution, as Johnston-Wilder et al. [21] *only* speak of a “canine-centered” interface or system, never once using the word design. Mancini et al. [27], similarly speak of “canine-centered”, and only use the term “animal-centered once” in its discussion, noting that “Similarly, we propose that favoring the development of indexical systems over symbolic systems has the potential to better contribute to the development of animal-centered approaches

and applications in ACI.” [27][p. 2681] Another mention in this review states that Westerlaken and Gualeni “developed and evaluated a tablet-based game for cats coined Felino. Felino was designed following an animal-centred perspective”. [20][p. 14] Yet, there is no mention of the term animal-centred. There is no mention of animal-centred whatsoever in Westerlaken and Gualeni [45], and indeed, they too cite the ACI Manifesto explicitly (and correctly) noting that it proposes a *user-centred* approach. It seems indeed that when works such as this review, or other ACI literature make statements such as “also taking a very animal-centric approach, Webber et al. [111],” [20][p. 17] while Webber et al. [43] only cited the ACI manifesto once noting it talks of animal-centred design, but otherwise making no use of the term animal-centric or centred. I am no stranger to adding to such confusion myself, having introduced ACI as being ‘user-centric’ to referencing papers with ‘animal-centered’ technologies without explanation in a single sentence [48]. I have at one point implicitly defined ‘animal-centered’ vaguely as systems that “place the animal in the center of an interactive development process” [41], while later on defining it just as vaguely in another way as “digital technology [...] that is also *for* animals—it has become animal-centered” [39].

These are by far not the only works or authors to leave what exactly animal-centered is undefined and make such uncritical attributions. As a research community, ACI seems to use variations of the term animal-centered without definition, while assuming others understand it in exactly the same way. But it is evident that is this not the case at all, and that in some cases it may be at conflict with the field’s conceptual and intellectual origins. That leads us to the first problem we need to acknowledge and deal with:

**Key take-away:** The term ‘animal-centered’ is mostly used without definition and frequently attributed to work which has not claimed it, so we cannot clearly determine what people mean by it.

This might seem like a needlessly critical, nitpicky look at the exact words we use in our writing. However, what I intend to bring out here is the danger of ACI as a field having settled on particular words like ‘animal-centered’, while the *referent* of that word – that is, what it really is, is not the same for different people at all. Such polysemy is a common source of eventual project failure: superficial agreement rooted in matching terminology which hides unspoken conflicting conceptual understandings. We effectively seem to use similar jargon to signal how we are part of a specific community of thought or practice, while under the surface we very likely hold (sometimes radically) different conceptual understandings of exactly what it is that we talk about with those words. The danger of this for ACI as a field is that we risk never challenging ourselves about our most closest held assumptions, and in doing so, never grow our joint construction of what animal-centered design, and by extension the field ACI, actually ‘is’ or ought to be.

Perhaps more concretely, we should first ask ourselves whether the interchangeable use of ‘animal user-centered’ and ‘animal-centered’ is reasonable given ACI’s intellectual origins in the field of interaction design and what its ‘parent-term’ of human-centered design really means there. I will assess this in the next Section.

### 3 WHAT ANIMAL-CENTERED OUGHT TO MEAN IN ACI

Given the seeming origin of “animal-centered” actually simply being a repackaged (abbreviated?) “user-centered design, but with animals”, I will now turn a critical eye towards an important question: are “animal-centered” and “animal user-centered” design the same thing? Short answer, no, they are not.

To answer this question, we have to go back to the claimed intellectual roots of ACI in the Interaction Design field and look at its core discussion there: are “human-centered” and “human user-centered” the same thing? User-centered design is pre-occupied with involving (human) users actively in the design process to ensure usability, ergonomics, and so on. Human-centered design certainly needs to be (human) user-centered design, but it goes beyond this. Buchanan, for one, stresses the importance of talking of human-centered design, not simply reducing it to “matters of sheer usability /.../ when we speak of ‘user-centered design.’” He does so, because, human-centered design, in fact, has been argued to consider and support human dignity through the human-centered design process [10]—which must certainly be what sets it apart from non (human) user-centered approaches. Indeed, Buchanan noted that “Human-centered design is fundamentally an affirmation of human dignity.”

Indeed, looking at the history of “human-centered design”, through many iterations and different views, a core focus on human values has always been apparent [47]. Bannon’s re-imagining of what HCI makes a similar point. He notes that for the things we design, “solutions do not reside simply in ergonomic corrections to the interface, but instead require us to rethink our whole value frame concerning means and ends, and the place of technology within this frame.” [5][p. 50] That is, Bannon also tells us to not *a priori* consider technology a solution, nor that focusing on technical user-centeredness (i.e., usability and ergonomics) will offer us the answers we seek. We need to initiate a “bottom-up process of rediscovering our human potential and reconstructing the very foundations” Reimagining HCI, he concludes, is about encouraging “an openness to new forms of thinking about the human-technology relationship”—an even more complicated matter when animals become involved in a human-animal-technology triadic relationship [39].

Rouse offers a similar distinction between human-centered and user-centered design, noting that what sets *human*-centered design apart is its consideration of “concerns, values, and perceptions of all stakeholders in a design effort.” [35][p. 5]. Speaking of how human-centered design can navigate the systemic challenges of oppression inherent in different systems, Walton noted that “an explicit consideration of human dignity and human rights can help us navigate these complexities.” [42][p. 420]. Gasson [15] notes further the differences between user and human-centered design as the human-centered perspective considering social contexts—looking beyond one user at a time.

We can now set out an assumption of what ‘animal-centered’ ought to mean within ACI, given its positioning as deriving from Interaction Design and the intellectual and moral history that accompanies doing so. Why do I do so? Because the alternative of leaving it implicit will only lead to more confusion and superficial

agreement rooted only in terminological match, while having no clarity about researchers’ ontological commitment to exactly what animal-centered is.

**Key take-away:** Given its deference to ‘human-centered’ design rooted in the interaction design field, the term ‘animal-centered design’ should signal a focus on animal values that transcend mere matters of ergonomics or usability.

One might be tempted to argue that the focus on animal welfare inherent in much ACI work is exactly this consideration of animal values, but doing so would make another critical mistake of attributing an inherently human value (ensuring *their* welfare) as being a core value of those animals we design for—the very kind of ‘speaking for them’ we seek to avoid. Moreover, animal welfare is mired in considerations of human political power [3]. Modern animal welfare, indeed, might simply reveal its human origins by its focus on “appeas[ing] and deflect[ing] ethical concerns while facilitating the continued exploitation of [farmed] animals.” [12]. Moreover, technological innovations – the very remit of ACI, give rise to many problems where suffering may not appear readily prevalent, but other unethical and undesirable situations arise that the welfarist perspective alone is not adequately equipped to deal with [23].

There is a clear candidate for a core value that not only seems easily understandable from a human point of view, but is arguably also something experienced by animals—dignity. Designing for dignity, though, leads to a host of issues we as a field need to deal with in terms of how we understand and design, which I will explore in the next Section.

### 4 WHEN ANIMAL-CENTERED MEANS ENSURING ANIMAL DIGNITY, WHAT CAN ACI DO?

Designing for animal dignity necessarily means going beyond the minimum animal welfare concerns of preventing unnecessary suffering. There are many who work on extending animal welfare to do exactly this, such as the recent conceptual frameworks by Webber et al. [44] similarly propose advancements to go beyond this minimum, as do other recent proposals by Mancini and Nanonni [29] which considers analysis of relevance, impartiality and consent, while Ruge and Mancini [37] consider influence, integrity, respect, freedom, honesty, interpretation, tranquility, inclusivity, care, compromise, equity, safety, and autonomy for the latter.

But is it enough to make such advances while staying tied to the concept of animal welfare? Research has shown that animal welfare legislation – the core means of preventing animal suffering in the real world, is frequently under-enforced [34]. If animal welfare legislation fails to be enforced and make an impact in the real world, is our effort making animal welfare ‘work’ perhaps not simply hitching our horse to the wrong wagon? As academics interested in ensuring animal dignity we might take a more radical stance, arguing for – gasp – animal *rights*, rather than welfare. As Francione has said, “we humans suffer from a form of moral schizophrenia;

we say one thing, that animals matter and are not just things, and we do another, treating animals as though they were things that did not matter at all.” [13] Abolitionism aside, animal rights as a topic is, of course, a contentious matter to be publicly associated with, if only for the negative connotations associated with animal rights campaigns of the past that have been described as “hav[ing] resembled a campaign of terrorism.” [30]

Let us simply consider what it means to focus on dignity, then. Researchers have argued in favor of attributing dignity to animals, perhaps based in increasing understanding that animal species exhibit moral behavior [6], and that there are “many contexts, including routine procedures in farms, labs, and in our homes, where humans potentially interfere with, hinder, or destroy the moral capabilities of animals.” [31] Animal dignity, indeed, is a concept that may “address some of the shortcomings in the current paradigm based in animal welfare”. [8] As Kempers argues, “.../ dignity does not need to be a monolithic concept applicable in the same way to all animals, but can be adapted to species-specific needs to flourish: dignity is therefore more of a sliding scale, depending on the breadth and width of the needs of each animal species.” [8] Dignity goes further than the minimum of animal welfare, as protecting dignity means animals should be “protected from unjustified interventions on their appearance, from humiliation and from excessive instrumentalisation.” [11] Quite frankly, I would agree with Schaber that animals have dignity exactly because “[t]hings can happen and be done to them which are good or bad for them” [38]

One country – Switzerland – has already adopted the concept of ‘dignity’ in its animal welfare legislation [9], which might give us some further insight into operationalized concepts that could inform true animal-centered design<sup>1</sup>. Article 3(a) of the Swiss Animal Welfare Act of 2005 [1] both defines dignity and gives a clearer itemization of what must be avoided:

“dignity means the inherent worth of the animal that must be respected when dealing with it. If any strain imposed on the animal cannot be justified by overriding interests, this constitutes a disregard for the animal’s dignity. Strain is deemed to be present in particular if pain, suffering or harm is inflicted on the animal, if it is exposed to anxiety or humiliation, if there is major interference with its appearance or its abilities or if it is excessively instrumentalised;” [1]

Of course we conceptualize these from a human point of view – what is humiliation to a dog, for example? But they already force us to ask more critical questions than merely asking how we can avoid unnecessary suffering, and force us to reconsider our relationship with the animal. To that extent, this concept of dignity may hold far more power to guide technologists than the mere notion of preventing suffering that animal welfare gives us. The Swiss Animal Welfare Act of 2005 has been discussed thoroughly in literature exactly because of this introduction of the concept of dignity. Lansink [23] gives a thorough discussion (see also Bolliger [9] for further commentary), on the exact legal interpretation of the terms used by Art. 3(a). They explain that an animal is humiliated when

<sup>1</sup>I am fully aware of the irony of arguing for a move beyond animal welfare (legislation) and subsequently being inspired by an operationalization in an animal welfare act. It is what it is.

it is “perceived and treated in a way that completely disregards its moral status as a living being that should be respected for its own sake” [23] Such humiliation can be caused by: “(a) mechanisation of the animal; (b) making fun of the animal; (c) portrayal of the animal as inanimate, objectification; (d) measures associated with a complete loss of control (cyborg).” [23]

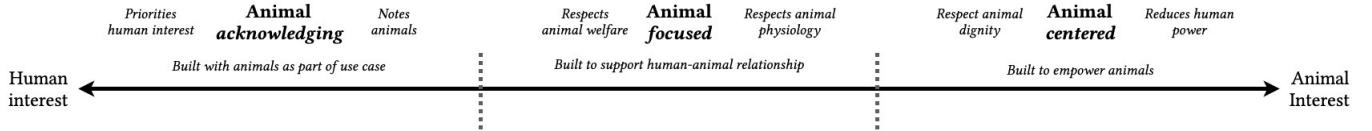
These matters, again, force us to both critically reflect on the impact we as designers of technology might have on both the animal, and the human-animal relationship, fundamentally going beyond mere pre-occupations with ensuring the animal can survive in a given environment. I find “major interference with an animal’s abilities” to be particularly significant for ACI researchers and technologists, as we should read this not purely as an animals ability to maintain its normal physical behaviors, but to ensure that its natural social context, the human-animal relationship, is not radically altered. Consider, for example, the increasing prevalence of technology that (even if partially) substitutes humans in human-dog relationships [40]. Designing technology exactly for this purpose, or not critically questioning that it might lead to such, certainly interferes with an animal’s natural ability and expectation to have interspecies relationships, and, to us, reduces its dignity.

The concept of animal dignity shows further utility when we think of the affordances it gives to animals. Dignity as a concept has been used to argue that augmenting an animal’s capabilities beyond which that which its species is naturally capable of equally presents a breach of its dignity [16]. This obviously raises questions for designers of animal-centered technologies whether technologies per sé pose this question – does it fundamentally transform the animal into something it is not [23]?; or whether it only holds for those technologies that become an inseparable part of the animal.

I argue that the remit of ACI – designing and deploying new technologies to improve the world for non-humans, *requires* us to adopt this notion of designing for dignity as necessary for considering the unique challenges that technology brings to doing justice to animals’ lives. Thus, I would strongly argue for an adoption of ‘dignity’ as the core natural principle of ACI, guiding and testing what it means to be animal-centered, as it is exactly this concept which is needed to deal with technological innovations affecting animals where animal welfare and the ending of suffering is no longer sufficient as the core test of whether we do justice to animals with our technologies [23].

**Key take-away:** The focus of ACI on developing new technologies for and with animals make a dignity-focused approach more suitable than traditional animal welfare in forcing designers to properly engage with the anthrozoological and societal implications of technology for animals

This, of course, raises yet further questions of exactly how we should think of ourselves, whether different kinds of designs *can* still be seen as animal-centered, and perhaps whether we should even think in discrete terms, which I discuss in the next Section.



**Figure 1: A rethought spectrum of animal-something design from human to animal interest, and the rough stages we might pass through.**

## 5 DESIGNING FOR DIGNITY

If we are to make a change to the way we design technologies, to focus on dignity as our core principle and test of whether the things we design are ‘animal-centered’, what changes do we need to make? This is a question with profound implications to which I do not profess to have an *a priori* complete answer—it is one for the entire field of ACI to engage with, criticize, test, and refine.

What I offer here so far is an initial reconsideration of the spectrum of animal-*something* design of technologies, the core thresholds that seem to pass through (see Fig. 1), and perhaps mostly importantly: a starting set of questions designers of animal-centered technologies ought to ask themselves before even considering deploying any technology into the wild (of real-world human-animal relations).

What we see, is that much of the work already done in ACI clearly does engage well with animals and protecting some of their interests – although not exactly centering on them yet. We as a field have broadly moved beyond merely *acknowledging* animals as constituents of (socio-)technical systems, and have *focused* on them to ensure their welfare, make sure that physical interfaces are optimized to their physical bodies and mental capacities, and so on. They might even be built to support existing human-animal relationships, whether that is in our homes, at work, in zoos, or even farms. But that does not mean they ensure, let alone respect, those animals’ dignity. Lawson et al. argued that technology for pets was “exploitative and entangled in human-centric values” [24]. It lacked animal dignity, and in turn, human dignity. This is exactly where I see less work is in what a rethinking of animal-centered focusing on dignity means: technologies that explicitly reason about the extent to which they impact an animal’s dignity, for better or worse.

If we let ourselves be inspired by the concept of dignity as found in Swiss law, there is a clear starting point for the questions we could constantly and critically ask ourselves: do these technologies humiliate the animal? Does it interfere with its natural appearance or abilities? And indeed, as I discussed before, the majority of the questions might come in the operationalization of whether the technology fundamentally humiliates the animal: does the technology unnecessarily mechanise the animal, make fun of it, objectify it, or *cause it to lose control*? I emphasize the question of causing it to lose control, as this is a particularly difficult and important question we need to address. Lawson et al. [24] once even went as far to propose dog-centered communication technology ought “to be free of human interference,” an argument, when taken to its logical conclusion might present us with a rather humbling scope of domains in which we can still claim to do ‘animal-centered’ design work.

The notion of control also shows how the concept of dignity goes beyond that of simply minimizing animal suffering, as, for example,

controlling lighting in hen houses to optimize egg production [17], may not cause unnecessary suffering, but certainly is associated with a loss of control over their natural behavior. Technology that causes an animal to lose control is thus not simply a matter of, say, cages that restrict them from naturally moving around, or shock collars that stop dogs from natural behaviour like barking – for us it is technology that fundamentally alters for the worse, or entrenches, power imbalances in human-animal relationships. Consider, for example smart feeding systems, now increasingly used both with companion animals, as well as farming animals. The motivations may be different – with our dogs and cats we might use smart feeders to ensure they can eat while we are away at home and reduce their reliance on us, with farm animals we might use smart feeders to optimize feed release and reduce operating costs. For the farm scenario, we could fairly easily argue that there is a loss of control as the animals manipulated exactly when to eat, and how much to eat. For the companion animal scenario, though, we are likely to feel that it increases an animal’s control by reducing reliance on their human caregiver. But does it actually do so? Does it reduce a dog’s reliance on their humans merely by shifting who controls their food from its human caregiver to a technological proxy? Does it complicate the control process and the power here as a technological middle man which in itself may fail – and they have failed and caused pets to starve, as media reports showed [2], cause both animal *and* human caregiver to lose control? Even such a simple example shows that when we use the concepts of dignity, technology that seemed to obviously be a good thing, may very well reduce animals’ dignity.

From a practical point of view, the additional questions we might have to start asking ourselves truly deal with no longer allowing ourselves to assume we cannot predict the outcomes of technology, and critically assessing and predicting how technologies will change animals and humans’ joint realities:

- To what extent will this technology fundamentally alter the natural behavior an animal can, and will, engage in?
- To what extent will this technology fundamentally alter the human-animal relationship it normally exists in?
- To what extent is control over natural behavior lost or gained, or shifted to additional technological actors?
- To what extent does the animal (and/or the humans naturally co-existing with the animal) become reliant on the technology?

Simply put, the guiding question might be something akin to “is this effort going to put technology into a human-animal relationship to address what is fundamentally a question that needs to be answered by rethinking that human-animal relationship?” Further critical work, both looking at ACI research that has been done, and

that being done, will be needed to understand exactly what questions to ask, and equally as important, *when* to ask those questions to guide our design processes towards ensuring the dignity of the animals involved. This emphasizes the need to also critically reflect on the relationship we have with domesticated animals that we have shaped towards our needs over centuries, from companion to farm to working animals, and to what extent we can still speak of an ‘animal’ that exists out of the context of its human dominion.

**Key take-away:** Designing for dignity means being constantly, and critically, pre-occupied with conceptualizing exactly how a technology slots into a human-animal relationship and how it affects the control and power that both human and animal have.

These are not new questions or thoughts. In fact, they are questions that have been raised by the likes of Weizenbaum since the 1970s (and subsequently ignored by many technologists). I certainly agree with Weizenbaum that we can look back at technological advances, *and their subsequent abuses*, to conclude that

“it is not reasonable for a scientist or technologist to insist that he or she does not know — or can not know — how [a technology] is going to be used” [7]

## 6 CONCLUDING THOUGHT: WHAT DOES THIS MEAN FOR ACI?

I have developed an argument showing that a not insignificant portion of ACI research over the past years should perhaps not (yet) be called “animal-centered” for its lack of dealing with animals’ dignity that one would expect from the concept’s intellectual roots. While ironically the ACI manifesto called for the development of technology to give a voice to animals, to give them power to communicate with humans and find a balance of power and reason in such relationships, the field of ACI seems to have walked a different path in allowing humans to alleviate fundamental issues in human-animal relationships with technological ‘fixes’ that allow us to comfortably avoid addressing those issues at the core of the relationship. Dignity, as I have discussed it here is, of course, only one of many potential ways we can ground our field, and it requires thorough discussions and explicit definitions to ensure we do not simply adopt another term and use it with different meanings, as might already happen among professionals engaged with animals [33]. Regardless of what path ACI takes towards its future, being clear and explicit about our assumptions must be part of it.

## REFERENCES

- [1] 2005. *Animal Welfare Act of 16 December 2005 (AniWA)*. <https://www.fedlex.admin.ch/eli/cc/2008/414/en>
- [2] 2005. *Pets ‘go hungry’ after smart feeder goes offline*. <https://www.bbc.co.uk/news/technology-51628795>
- [3] Jerry L Anderson. 2011. Protection for the powerless: political economy history lessons for the animal welfare movement. *Stan. J. Animal L. & Pol'y* 4 (2011), 1.
- [4] Fredrik Aspling and Oskar Juhlin. 2017. Theorizing animal–computer interaction as machinations. *International Journal of Human-Computer Studies* 98 (2017), 135–149.
- [5] Liam Bannon. 2011. Reimagining HCI: toward a more human-centered perspective. *interactions* 18, 4 (2011), 50–57.
- [6] Marc Bekoff. 2004. Wild justice and fair play: Cooperation, forgiveness, and morality in animals. *Biology and Philosophy* 19, 4 (2004), 489–520.
- [7] D. Ben-Aaron. 1985. Weizenbaum examines computers and society. *The Tech* 105, 16 (1985).
- [8] Eva Bernet Kempers. 2020. Animal Dignity and the Law: Potential, Problems and Possible Implications. *Liverpool Law Review* 41, 2 (2020), 173–199.
- [9] Gieri Bolliger. 2015. Legal protection of animal dignity in Switzerland: Status quo and future perspectives. *Animal L.* 22 (2015), 311.
- [10] Richard Buchanan. 2001. Human dignity and human rights: Thoughts on the principles of human-centered design. *Design issues* 17, 3 (2001), 35–39.
- [11] Samuel Camenzind. 2013. Dignity of creature: beyond suffering and further. In *The ethics of consumption*. Springer, 279–283.
- [12] Matthew Cole. 2011. From “animal machines” to “happy meat”? Foucault’s ideas of disciplinary and pastoral power applied to ‘animal-centred’ welfare discourse. *Animals* 1, 1 (2011), 83–101.
- [13] Gary Lawrence Francione and Robert Garner. 2010. *The animal rights debate: Abolition or regulation?* Columbia University Press.
- [14] Fiona French, Clara Mancini, and Helen Sharp. 2017. Exploring research through design in animal computer interaction. In *Proceedings of the Fourth International Conference on Animal-Computer Interaction*. 1–12.
- [15] Susan Gasson. 2003. Human-centered vs. user-centered approaches to information system design. *Journal of Information Technology Theory and Application (JITTA)* 5, 2 (2003), 5.
- [16] Sara Elizabeth Gavrell Ortiz. 2004. Beyond welfare: Animal integrity, animal dignity, and genetic engineering. *Ethics & the Environment* 9, 1 (2004), 94–120.
- [17] AL Geng, Y Zhang, J Zhang, HH Wang, Q Chu, ZX Yan, and HG Liu. 2022. Effects of light regime on circadian rhythmic behavior and reproductive parameters in native laying hens. *Poultry Science* 101, 5 (2022), 101808.
- [18] Reinhard Gupfinger and Martin Kaltenbrunner. 2019. Animal-Centred Sonic Interaction Design: Musical Instruments and Interfaces for Grey Parrots. In *Proceedings of the Sixth International Conference on Animal-Computer Interaction*. 1–11.
- [19] Donna J Haraway. 2013. *When species meet*. Vol. 3. U of Minnesota Press.
- [20] Ilyena Hirschy-Douglas, Patricia Pons, Janet C Read, and Javier Jaen. 2018. Seven years after the manifesto: Literature review and research directions for technologies in animal computer interaction. *Multimodal Technologies and Interaction* 2, 2 (2018), 30.
- [21] Olivia Johnston-Wilder, Clara Mancini, Brendan Aengenheister, Joe Mills, Rob Harris, and Claire Guest. 2015. Sensing the shape of canine responses to cancer. In *Proceedings of the 12th International Conference on Advances in Computer Entertainment Technology*. 1–4.
- [22] Cassie Kresnye, Sam Rasmussen, Mia Gallardo, and Patrick Shih. 2021. Payload Drones and ACI: Drone Navigation System Prototype. In *Eight International Conference on Animal-Computer Interaction*. 1–8.
- [23] Anne Lansink. 2019. Technological Innovation and Animal Law: Does Dignity Do the Trick? *European Journal of Risk Regulation* 10, 1 (2019), 80–93.
- [24] Shaun Lawson, Ben Kirman, and Conor Linehan. 2016. Power, participation, and the dog internet. *Interactions* 23, 4 (2016), 37–41.
- [25] Clara Mancini. 2011. Animal-computer interaction: a manifesto. *interactions* 18, 4 (2011), 69–73.
- [26] Clara Mancini. 2017. Towards an animal-centred ethics for Animal–Computer Interaction. *International Journal of Human-Computer Studies* 98 (2017), 221–233.
- [27] Clara Mancini, Rob Harris, Brendan Aengenheister, and Claire Guest. 2015. Re-centering multispecies practices: a canine interface for cancer detection dogs. In *Proceedings of the 33rd annual ACM conference on human factors in computing systems*. 2673–2682.
- [28] Clara Mancini, Shaun Lawson, and Oskar Juhlin. 2017. Animal-Computer Interaction: The emergence of a discipline. 129–134 pages.
- [29] Clara Mancini and Eleonora Nannoni. 2022. Relevance, impartiality, welfare and consent: principles of an animal-centered research ethics. *Frontiers in Animal Science* 3 (2022).
- [30] Rachel Monaghan. 2013. Not quite terrorism: Animal rights extremism in the United Kingdom. *Studies in Conflict & Terrorism* 36, 11 (2013), 933–951.
- [31] Susana Monsó, Judith Benz-Schwarzburg, and Annika Bremhorst. 2018. Animal morality: What it means and why it matters. *The Journal of Ethics* 22, 3 (2018), 283–310.
- [32] Patrizia Paci, Clara Mancini, and Blaine A Price. 2019. Wearer-centered design for animal biotelemetry: implementation and wearability test of a prototype. In *Proceedings of the 23rd International Symposium on Wearable Computers*. 177–185.
- [33] Kirsten Person, Bernice Simone Elger, and David Martin Shaw. 2017. The Indignity of Relative Concepts of Animal Dignity: A Qualitative Study of People Working with Nonhuman Animals. *anthrozoös* 30, 2 (2017), 237–247.
- [34] MB Rodriguez Ferrere. 2022. Animal Welfare Underenforcement as a Rule of Law Problem. *Animals* 12, 11 (2022), 1411.
- [35] William B Rouse. 2007. *People and organizations: Explorations of human-centered design*. John Wiley & Sons.
- [36] Luisa Ruge and Clara Mancini. 2019. A method for evaluating animal usability (meau). In *Proceedings of the Sixth International Conference on Animal-Computer Interaction*. 1–12.

- [37] Luisa Ruge and Clara Mancini. 2022. An Ethics Toolkit to Support Animal-Centered Research and Design. *Frontiers in Veterinary Science* (2022), 546.
- [38] Peter Schabert. 2014. *Dignity only for humans? On the dignity and inherent value of non-human beings*. Cambridge University Press, 546–550. <https://doi.org/10.1017/CBO9780511979033.070>
- [39] Dirk van der Linden. 2021. Interspecies information systems. *Requirements Engineering* 26, 4 (2021), 535–556.
- [40] Dirk van der Linden, Brittany I Davidson, Orit Hirsch-Matsioulas, and Anna Zamansky. 2022. On the role of technology in human-dog relationships: a future filled with dreams or nightmares? *arXiv preprint arXiv:2202.02030* (2022).
- [41] Dirk Van Der Linden and Anna Zamansky. 2017. Agile with animals: Towards a development method. In *2017 IEEE 25th international requirements engineering conference workshops (REW)*. IEEE, 423–426.
- [42] Rebecca Walton. 2016. Supporting human dignity and human rights: A call to adopt the first principle of human-centered design. *Journal of Technical Writing and Communication* 46, 4 (2016), 402–426.
- [43] Sarah Webber, Marcus Carter, Sally Sherwen, Wally Smith, Zaher Joukhadar, and Frank Vetere. 2017. Kinecting with orangutans: Zoo visitors' empathetic responses to animals' use of interactive technology. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 6075–6088.
- [44] Sarah Webber, Mia L Cobb, and Jon Coe. 2022. Welfare Through Competence: A Framework for Animal-Centric Technology Design. *Frontiers in veterinary science* (2022), 741.
- [45] Michelle Westerlaken and Stefano Gualeni. 2014. Felino: the philosophical practice of making an interspecies video game. (2014).
- [46] Hanna Wirman et al. 2014. Games for/with strangers-Captive orangutan (pongo pygmaeus) touch screen play. (2014).
- [47] Mark Zachry and Jan H Spyridakis. 2016. Human-centered design and the field of technical communication. *Journal of Technical Writing and Communication* 46, 4 (2016), 392–401.
- [48] Anna Zamansky, Dirk Van Der Linden, and Sofya Baskin. 2017. Pushing boundaries of RE: Requirement elicitation for non-human users. In *2017 IEEE 25th International Requirements Engineering Conference (REW)*. IEEE, 406–411.