



A Critical Literature Review for Equal Participation in Human-Animal Interactions in Design

Sena Cucumak*

Özge Subaşı*

scucumak21@ku.edu.tr

ozsubasi@ku.edu.tr

Futurewell: CoCreation and Wellbeing Lab, Media and Visual Arts, Koç University
Istanbul, Turkey

ABSTRACT

Animals have been studied in the CSCW, such as in studies about animal welfare, pet-advocacy groups, pet video chat, and multi-species interaction. Animal-Computer Interaction (ACI) is the field where studies with animals and technology are at the centre. However, within the CSCW and the ACI field, the equal participation from the animals' viewpoint remains relatively human-centric, and how humans can collaborate with nonhuman animals remain underexplored. Research beyond human-centrism in other fields puts equal participation of nonhuman animals at the centre with the intention of equal inclusion. Thus, this poster introduces the initial results from a literature review on the previously published work in animal-inclusive and equity-oriented research fields with the purpose of opening a discussion on equity perspectives and equal participation of nonhuman animals in the CSCW work.

CCS CONCEPTS

• **Human-centered computing** → **Computer supported cooperative work.**

KEYWORDS

human-animal interaction, animal-computer interaction, equity, participation, literature review

ACM Reference Format:

Sena Cucumak and Özge Subaşı. 2022. A Critical Literature Review for Equal Participation in Human-Animal Interactions in Design. In *Companion Computer Supported Cooperative Work and Social Computing (CSCW'22 Companion)*, November 8–22, 2022, Virtual Event, Taiwan. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3500868.3559467>

1 INTRODUCTION

CSCW studies the collaborative interactions between humans and technology [24]. As our interactions with animals on the axis of technology increase, CSCW has begun to find its place in various contexts of these interactions. For example, Munch [19] studied to improve the collaborative ecosystem of the animal shelter field

*Both authors contributed equally to this research.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

CSCW'22 Companion, November 8–22, 2022, Virtual Event, Taiwan

© 2022 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-9190-0/22/11.

<https://doi.org/10.1145/3500868.3559467>

with technology and other tools. Neustaedter and Golbeck [20] explored the understanding of when and how families might value a video chat system designed for them to monitor and interact with their pets. White et al. [33] researched how online pet advocates mobilised their ad hoc discretionary activities to more cooperative, organised work to assist numerous displaced pets after Hurricane Sandy. Liu [14] aimed to discover and develop alternative design paradigms and practices for sustaining human-nature collaboration, cohabitation, and co-creation. While the number of studies that involve animals increase, CSCW has not yet questioned how to collaborate with nonhuman animal participants in an equity-oriented way.

Animal-computer interaction (ACI), a branch of human-computer interaction (HCI), emerged to focus on the relationship between animals and technology to enrich animals in different ways [16]. Supporting togetherness through technology makes CSCW the perfect ground for ACI scholars who seek equal inclusion with nonhuman animals. For this reason, ACI with a collaboration and equity perspective highly corresponds to the issues discussed in the CSCW community. Establishing equity and inclusion-related methods and guidelines within CSCW through expanding ACI is a way forward.

The lack of appropriate methodologies for doing studies with animals pertains to many fields. For example, animal geography literature complains that researchers still tend to deploy human-centred methods to examine nonhuman phenomena [12]. The theoretical and analytical approaches discussed in such fields [1, 13, 25, 26, 32] have a potential for extension to include animals as equal components of research and design processes in future CSCW research with nonhuman animals.

The well-being of the nonhuman animals and human stakeholders can be reciprocally enhanced by creating an opportunity to include them as equal participators in the actions [25]. Sharing the same ecosystems affects all involved interactants differently; no one can isolate itself from the chain. Ironically, the anthropocentric circles that humans built may lead to carrying the heaviest burden due to the human's positionality compared to other species. For this reason, including significant others equally, in this case, non-human animals, primarily benefit them and secondarily benefits all [1]. Developing together on an egalitarian basis provides justice-oriented approaches and better circumstances for each interactant [1]. Equal inclusion of nonhuman animals liberates the dualistic and human-centric perspective and contributes to the pluralistic structures [1, 13].

This poster introduces the ongoing results of a literature review on how existing methodologies enable nonhuman animals to have equal participation and collaboration.

2 METHOD

This study adopts a systematic literature review (similar to Xiao and Watson [34]) as an approach to plan, conduct and report concept-centric critical literature review in equity-oriented fields.

2.1 Keywords and Databases

To understand the standpoints of related fields that include animals with an equity perspective (e.g., critical animal studies, animal geography, human-animal interaction, animal-computer interaction) and their relation to design, we conducted searches in both ACM Digital Library and Scopus databases in March 2022 without date restriction. The former database has been selected to reach more computer-supported results (i.e., animal-computer interaction). On the other hand, the latter has been selected to access animal-related social sciences literature (e.g., critical animal studies). We mainly combined keywords to narrow the results to the design- and animal-based studies. In conclusion, 11 keywords have been identified (e.g., “animal-computer interaction”, “more-than-human” AND design, “animal geography”).

2.2 Selection Criteria

We focused on peer-reviewed full-text articles. We eliminated nonfull-text articles such as notes, editorials, posters, and tutorials. 1700 results appeared in the first cycle search, with 11 keywords identified across the databases mentioned earlier. After applying the first inclusion and exclusion criteria, eliminating duplications, non-full text, and non-English articles, this number decreased to 1005. Reading titles, abstracts and keywords of 1005 unique entries and eliminating irrelevant ones, this number was reduced to 23. Here, we paid attention to selecting the papers that include animals towards the decentralisation of the human factors by applying a method in the design and design research processes. The following structure is used for the elimination process: (1) Does the paper include animals in the research and/or design process? If yes, move on next question. (2) Does the aim of the paper only or mainly concern human stakeholders? If no, move on next question. (3) Does the paper analyse the research and/or design process of the methodology discussed? If yes, accept the paper.

2.3 Analysis

We analysed the selected papers by using thematic analysis [4]. Starting with descriptive codes applied to each paper (includes aims, interaction types, animal species involved, methods, and involvement level) both authors independently coded and categorised articles on a Miroboard (inductive). After that, authors compared, and evaluated the emerging categories in relation to each other, and to previous work [11]. The overarching question was: How do existing methodologies enable nonhuman animals to have equal participation and collaboration in the research and design processes?

3 FINDINGS

The coding and negotiations resulted in twenty-one open codes. Of these, five are about motivation and aims (supporting animals, involving animals, interspecies interactions, methodological innovations, future scenarios); three are on the researcher’s stance (human-centred motivations-classical, changing positionality in research-political, exploring new interactions-speculative); seven on possible strengths of such methodologies (improving researcher’s understanding, room for novelty, rethinking methods, raising awareness, empathy with animals, motivating animals intrinsically, tangible assessment); three intermediaries for interaction (bodies, objects, shared experiences); and three limitations (human domination, limited interpretation, access to data). Once positioned with our research question, ‘How do existing methodologies enable nonhuman animals to have equal participation and collaboration?’. Three work-in-progress categories emerged in which the human-centric ‘prioritisations’ in the research practice play a role in empowering or disempowering the participation of nonhuman animals. These are:

- prioritising human needs and interactions over animals’ in the study setup,
- recording and interpreting the measurable human output,
- lack of animal-centric methodologies and design structures.

3.1 Prioritising human needs and interactions over animals’ in the study setup

Human and designer authority within the analysed 23 study setups is a frequently encountered attitude in various ways, such as dominating decision-making, research and design processes; controlling animals with limited knowledge (e.g. training); and anthropomorphising the relationships. A part of the selected papers in this review explicitly put the human subject at the centre, although animals were involved in the studies, examples: [1, 3, 6, 10, 27–29]. Those studies examined human-centrism through the cause itself, who is humankind, without involving nonhuman animals’ active presence. Discussing the displacement of humans in between humans through human-based communication and research techniques prioritised human concerns in the first place.

Training and controlling animal participants in study setups demonstrated human privilege by forcing animals with extrinsic motivators/rewards to participate [21, 22]. The imbalance between the position of human and animal participants put human decisions forward.

In order to make sense of the interactions with other species, anthropomorphism can be embedded in some contexts [2]. Most anthropomorphic item is hard to understand and get in touch with for nonhuman animals. Humans tend to give a human voice to establish a meaningful relationship with animals. For instance, Tomitsch et al. quote that there are documented limitations of their personas, such as uncertainties about their validity, the risk of them being biased by the human’s mindset and used to justify decisions after the fact [26]. Researchers implemented one exceptional example: training is essentially participatory as a relational, reciprocal practice directed by each party’s semiotic, volitional and choice-full engagement [17].

3.2 Recording and interpreting the measurable human output

Several papers involved humans speaking for animals, making interpretations and representing animals through adopted methodologies. Studies [2, 8, 9, 15, 18, 25, 31] that involve human-driven interactions such as human guidance during the interaction with device or interfaces, speaking on behalf of animal participants, interpreting the meanings of behaviours of animals, representing animals rather than their own expression. Interpretation of behaviours, interactions, decisions, personalities and speaking on behalf of other species influenced the interaction between participants in an unbalanced way. Representing animals by giving voice and anthropomorphising them in various contexts as human beings are classified as another kind of human-driven act.

Using human-based research techniques such as noticing, abjection, narrative inquiry, design fiction, and multispecies worlding lead to maintaining one-sided participation for humans [1, 3, 6, 10, 17, 27, 29]. Passive participation of nonhuman animals through human language and methodologies with words are examined as abstract because of not include animals actively and mutually.

3.3 Lack of nonhuman-inclusive methodologies and design structures

Due to the lack of methodological guidelines and structures to include nonhuman animals in research domains equally, non-inclusive and human-centric methodologies and design structures are widely used in studies. Human communication uses a combination of symbols, icons, and indices, but the first two are seldom used or accessed by nonhuman species due to abstract and convention-based language [18]. Anthropology-based ethnographic research and data collection methods (e.g., interviews and observations) used in many studies worked with animals are regarded as highly abstract and human-centred to be understood by animals [3, 5, 7–9, 18, 21, 22, 25, 26].

More tangible and direct phases like designing, prototyping, and testing are more inclusive of animal perception. This situation could be related to Peirce's representational system, as explained by Mancini et al. [18]. The methods and tools used in these phases allow communication that enables a direct and physically grounded of all signs.

Speaking for animals was primarily observed in methodologies such as observation, going along, kinesthetic empathy, species inclusive interview, game, and content analysis. Although the papers adopt participative methods, the research process still included human-based approaches. Even though adopting human-centric methodologies and structures intends decentring humans, the existing approaches erase the nonhuman animal voice from the equation.

4 DISCUSSION AND CONCLUSION

We reviewed the research and design approaches from various disciplines regarding the equal participation of nonhuman animals in design. Three categories are extracted that hinder equal participation of nonhuman animals in research: 1) Prioritising human needs and interactions over animals' in the study setup, 2) recording and interpreting the measurable human output, 3) lack of nonhuman-inclusive methodologies and design structures.

For future CSCW studies that equally integrate nonhuman animals, our initial findings indicate the need for (1) Nonhuman-based communication techniques, (2) Motivating stakeholders intrinsically, and (3) Using tools that let more direct signs.

4.1 Nonhuman-based communication techniques:

The anthropocentrism of interpretation and representation of animals by humans can partially be overcome by adopting communication techniques that address everyone. In order to include participants from all species, the repertoire of meaningful communication needs to be extended beyond words [23]. It must include verbal and non-verbal exchanges (e.g., sounds, body language) [7, 13, 25]. The importance of embracing nonhuman-based communication techniques is implicitly emphasised in Neustaedter and Golbeck [20] study by discussing how a video-mediated communication system to monitor pets can affect pets negatively as a consequence of human-centred needs and communication techniques by creating disembodiment for pets.

4.2 Motivating stakeholders intrinsically:

Like in any collaboration, it is essential to recognise the equity for nonhuman animals. Providing choice and control, allowing active participation through inherited motivations such as joining to play by free will rather than extrinsic motivations like food rewards provide nonhuman animals inclusion by their own existence [7, 17]. Neustaedter and Golbeck [20] also mentioned that providing pets having control and choice of whether to participate is only possible with training and scaffolding to use human-based communication tools, in other words, without intrinsic motivation.

4.3 Using tools that let more direct signs:

Using tools such as prototypes [32] and play [30, 32] involved nonhuman animals more equally than more abstract and indirect tools like multispecies worlding [29], and design fiction [10]. Not using direct signs such as voice-based interaction without imagery [20] could be confusing for pets, as Neustaedter and Golbeck. Therefore disembodiment of computer-supported interactions can create limited participation for animals. Using physical mediators such as bodily activity [25], prototypes [32], or toys [7] creates a mutual understanding for all stakeholders without imposing the human perspective through mediators.

Equal involvement of animals does not only depend on participative approaches but also on adopting methodologies that enable a shared experience through communication, motivations and mediators. Westerlaken and Gualeni also expressed that during the design phase, it is up to the designer to balance the human experience and the perception of the animal experience to design meaningful interactions for both [30]. Therefore, as mentioned earlier, three key points to include nonhuman animals in research and design processes equally can guide researchers and practitioners who study with animals regardless of specific methodologies. Our future research will involve a deeper analysis of the currently reviewed methods, frameworks, and tools to show methodological guidelines for equal participation in computer-supported human-animal interactions. For this reason, we believe that opening a space for

the equity for animals perspective in the CSCW community notably influences the inclusion and equity-oriented studies in CSCW afterwards the whole ecosystem.

Lastly, expanding the meaning and conditions of the particular activity or term can automatically invite nonhuman animals to the equity. As Krauth said, by choosing worlding and placemaking through the body as keystones for dog/human interactions, both dog and human parties could be involved in the writing process on their own terms [13]. The collaboration links at least two parts. Using the nonhuman animals' voices instead of solely humans might be a way to encourage collaborative creative processes.

ACKNOWLEDGMENTS

We thank Pinar and Zeynep Şölen for their precious suggestions.

REFERENCES

- [1] Yoko Akama, Ann Light, and Takahito Kamihira. 2020. Expanding Participation to Design with More-Than-Human Concerns. In *Proceedings of the 16th Participatory Design Conference 2020 - Participation(s) Otherwise - Volume 1* (Manizales, Colombia) (PDC '20). Association for Computing Machinery, New York, NY, USA, 1–11. <https://doi.org/10.1145/3385010.3385016>
- [2] Fredrik Aspling, Oskar Juhlin, and Heli Väättäjä. 2018. Understanding Animals: A Critical Challenge in HCI. In *Proceedings of the 10th Nordic Conference on Human-Computer Interaction* (Oslo, Norway) (NordCHI '18). Association for Computing Machinery, New York, NY, USA, 148–160. <https://doi.org/10.1145/3240167.3240226>
- [3] Heidi R. Biggs, Jeffrey Bardzell, and Shaowen Bardzell. 2021. Watching Myself Watching Birds: Abjection, Ecological Thinking, and Posthuman Design. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 619, 16 pages. <https://doi.org/10.1145/3411764.3445329>
- [4] Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3, 2 (2006), 77–101. <https://doi.org/10.1191/1478088706qp0630a> arXiv:<https://www.tandfonline.com/doi/pdf/10.1191/1478088706qp0630a>
- [5] Jessica Katherine Frawley and Laurel Evelyn Dyson. 2014. Animal Personas: Acknowledging Non-Human Stakeholders in Designing for Sustainable Food Systems. In *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures: The Future of Design* (Sydney, New South Wales, Australia) (OzCHI '14). Association for Computing Machinery, New York, NY, USA, 21–30. <https://doi.org/10.1145/2686612.2686617>
- [6] Fiona French, Ilyena Hirskyj-Douglas, Heli Väättäjä, Patricia Pons, Sabrina Karl, Yoram Chisik, Eleonora Nannoni, Anna Zamansky, Mandep Mangat, Patrizia Paci, Haruka Kasuga, and Dana Vilker. 2021. Ethics and Power Dynamics in Playful Technology for Animals: Using Speculative Design to Provolve Reflection. In *Academic Mindtrek 2021* (Tampere/Virtual, Finland) (Mindtrek 2021). Association for Computing Machinery, New York, NY, USA, 91–101. <https://doi.org/10.1145/3464327.3464366>
- [7] Fiona French, Clara Mancini, and Helen Sharp. 2018. High tech cognitive and acoustic enrichment for captive elephants. *Journal of Neuroscience Methods* 300 (2018), 173–183. <https://doi.org/10.1016/j.jneumeth.2017.09.009> Measuring Behaviour 2016.
- [8] Stuart Gray, Fay Clark, Katy Burgess, Tom Metcalfe, Anja Kadijevic, Kirsten Cater, and Peter Bennett. 2018. Gorilla Game Lab: Exploring Modularity, Tangibility and Playful Engagement in Cognitive Enrichment Design. In *Proceedings of the Fifth International Conference on Animal-Computer Interaction* (Atlanta, Georgia, USA) (ACI '18). Association for Computing Machinery, New York, NY, USA, Article 6, 13 pages. <https://doi.org/10.1145/3295598.3295604>
- [9] Sabrina Hauser, Ron Wakkary, and Carman Neustaedter. 2014. Understanding Guide Dog Team Interactions: Design Opportunities to Support Work and Play. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (Vancouver, BC, Canada) (DIS '14). Association for Computing Machinery, New York, NY, USA, 295–304. <https://doi.org/10.1145/2598510.2598531>
- [10] Ilyena Hirskyj-Douglas and Andrés Lucero. 2019. On the Internet, Nobody Knows You're a Dog... Unless You're Another Dog. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland UK) (CHI '19). Association for Computing Machinery, New York, NY, USA, 1–12. <https://doi.org/10.1145/3290605.3300347>
- [11] Ilyena Hirskyj-Douglas, Janet Read, and Brendan Cassidy. 2015. Doggy Ladder of Participation (DLOP).
- [12] Timothy Hodgetts and Jamie Lorimer. 2015. Methodologies for animals' geographies: cultures, communication and genomics. *cultural geographies* 22, 2 (2015), 285–295. <https://doi.org/10.1177/1474474014525114> arXiv:<https://doi.org/10.1177/1474474014525114>
- [13] Alinta Krauth. 2020. Making-with: Nonhuman Animal Inclusivity in an Electronic Literature Practice. In *Proceedings of the Seventh International Conference on Animal-Computer Interaction* (Milton Keynes, United Kingdom) (ACI'2020). Association for Computing Machinery, New York, NY, USA, Article 18, 5 pages. <https://doi.org/10.1145/3446002.3446051>
- [14] Szu-Yu (Cyn) Liu. 2019. Designing for Multispecies Collaboration and Co-habitation. In *Conference Companion Publication of the 2019 on Computer Supported Cooperative Work and Social Computing* (Austin, TX, USA) (CSCW '19). Association for Computing Machinery, New York, NY, USA, 72–75. <https://doi.org/10.1145/3311957.3361861>
- [15] Szu-Yu (Cyn) Liu, Jeffrey Bardzell, and Shaowen Bardzell. 2018. Photography as a Design Research Tool into Natureculture. In *Proceedings of the 2018 Designing Interactive Systems Conference* (Hong Kong, China) (DIS '18). Association for Computing Machinery, New York, NY, USA, 777–789. <https://doi.org/10.1145/3196709.3196819>
- [16] Clara Mancini. 2011. Animal-computer interaction: A manifesto. *Interactions* 18 (07 2011), 69–73. <https://doi.org/10.1145/1978822.1978836>
- [17] Clara Mancini and Jussi Lehtonen. 2018. The Emerging Nature of Participation in Multispecies Interaction Design. In *Proceedings of the 2018 Designing Interactive Systems Conference* (Hong Kong, China) (DIS '18). Association for Computing Machinery, New York, NY, USA, 907–918. <https://doi.org/10.1145/3196709.3196785>
- [18] Clara Mancini, Janet van der Linden, Jon Bryan, and Andrew Stuart. 2012. Exploring Interspecies Sensemaking: Dog Tracking Semiotics and Multispecies Ethnography. In *Proceedings of the 2012 ACM Conference on Ubiquitous Computing* (Pittsburgh, Pennsylvania) (UbiComp '12). Association for Computing Machinery, New York, NY, USA, 143–152. <https://doi.org/10.1145/2370216.2370239>
- [19] Mikako Munch. 2019. A Day's Work on Facebook and Other Collaborative Trends in Animal Welfare. In *Conference Companion Publication of the 2019 on Computer Supported Cooperative Work and Social Computing* (Austin, TX, USA) (CSCW '19). Association for Computing Machinery, New York, NY, USA, 314–318. <https://doi.org/10.1145/3311957.3359451>
- [20] Carman Neustaedter and Jennifer Golbeck. 2013. Exploring Pet Video Chat: The Remote Awareness and Interaction Needs of Families with Dogs and Cats. In *Proceedings of the 2013 Conference on Computer Supported Cooperative Work* (San Antonio, Texas, USA) (CSCW '13). Association for Computing Machinery, New York, NY, USA, 1549–1554. <https://doi.org/10.1145/2441776.2441953>
- [21] Charlotte Robinson, Clara Mancini, Janet van der Linden, Claire Guest, Lydia Swanson, Helen Marsden, Jose Valencia, and Brendan Aengenheister. 2015. Designing an Emergency Communication System for Human and Assistance Dog Partnerships. In *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing* (Osaka, Japan) (UbiComp '15). Association for Computing Machinery, New York, NY, USA, 337–347. <https://doi.org/10.1145/2750858.2805849>
- [22] Charlotte L. Robinson, Clara Mancini, Janet van der Linden, Claire Guest, and Robert Harris. 2014. Canine-Centered Interface Design: Supporting the Work of Diabetes Alert Dogs. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Ontario, Canada) (CHI '14). Association for Computing Machinery, New York, NY, USA, 3757–3766. <https://doi.org/10.1145/2556288.2557396>
- [23] Diego Rosello. 2022. The animal condition in the human condition: Rethinking Arendt's political action beyond the human species. *Contemporary Political Theory* 21, 2 (June 2022), 219–239. <https://doi.org/10.1057/s41296-021-00495-9>
- [24] Kjeld Schmidt and Liam Bannon. 2013. Constructing CSCW: The First Quarter Century. *Comput. Supported Coop. Work* 22, 4–6 (aug 2013), 345–372. <https://doi.org/10.1007/s10606-013-9193-7>
- [25] Zoei Sutton. 2020. Researching towards a critically posthumanist future: on the political "doing" of critical research for companion animal liberation. *International Journal of Sociology and Social Policy* ahead-of-print (03 2020). <https://doi.org/10.1108/IJSSP-01-2020-0015>
- [26] Martin Tomitsch, Joel Fredericks, Dan Vo, Jessica Frawley, and Marcus Foth. 2021. Non-human Personas: Including Nature in the Participatory Design of Smart Cities. *Interaction Design and Architecture(s)* 50 (2021), 102–130. <https://doi.org/10.55612/s-5002-050-006>
- [27] Jane Turner and Ann Morrison. 2021. Designing Slow Cities for More Than Human Enrichment: Dog Tales—Using Narrative Methods to Understand Co-Performative Place-Making. *Multimodal Technologies and Interaction* 5, 1 (2021). <https://doi.org/10.3390/mti5010001>
- [28] Harry Wels. 2015. "Animals like us": revisiting organizational ethnography and research. *Journal of Organizational Ethnography* 4 (10 2015), 242–259. <https://doi.org/10.1108/JOE-12-2014-0039>
- [29] Michelle Westerlaken. 2021. It matters what designs design designs: speculations on multispecies worlding. *Global Discourse* 11, 1–2 (2021), 137 – 155. <https://doi.org/10.1332/204378920X16032019312511>

- [30] Michelle Westerlaken and Stefano Gualeni. 2013. Digitally Complemented Zoomorphism: A Theoretical Foundation for Human-Animal Interaction Design. In *Proceedings of the 6th International Conference on Designing Pleasurable Products and Interfaces* (Newcastle upon Tyne, United Kingdom) (*DPPI '13*). Association for Computing Machinery, New York, NY, USA, 193–200. <https://doi.org/10.1145/2513506.2513527>
- [31] Michelle Westerlaken and Stefano Gualeni. 2014. Grounded Zoomorphism: An Evaluation Methodology for ACI Design. In *Proceedings of the 2014 Workshops on Advances in Computer Entertainment Conference* (Funchal, Portugal) (*ACE '14 Workshops*). Association for Computing Machinery, New York, NY, USA, Article 5, 6 pages. <https://doi.org/10.1145/2693787.2693796>
- [32] Michelle Westerlaken and Stefano Gualeni. 2016. Becoming with: Towards the Inclusion of Animals as Participants in Design Processes. In *Proceedings of the Third International Conference on Animal-Computer Interaction* (Milton Keynes, United Kingdom) (*ACI '16*). Association for Computing Machinery, New York, NY, USA, Article 1, 10 pages. <https://doi.org/10.1145/2995257.2995392>
- [33] Joanne I. White, Leysia Palen, and Kenneth M. Anderson. 2014. Digital Mobilization in Disaster Response: The Work & Self-Organization of on-Line Pet Advocates in Response to Hurricane Sandy. In *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing* (Baltimore, Maryland, USA) (*CSCW '14*). Association for Computing Machinery, New York, NY, USA, 866–876. <https://doi.org/10.1145/2531602.2531633>
- [34] Yu Xiao and Maria Watson. 2019. Guidance on Conducting a Systematic Literature Review. *Journal of Planning Education and Research* 39, 1 (2019), 93–112. <https://doi.org/10.1177/0739456X17723971> arXiv:<https://doi.org/10.1177/0739456X17723971>

PREPRINT