Knowledge Design — Towards an Inclusive, Embodied AI Design Practice

Selwa Sweidan, Christine Meinders
ArtCenter College of Design
selwa@artificialknowing.com, christine@artificialknowing.com

Abstract

Anything trained by a human is going to have the same biases and influences as its human designer/developer, no matter how much they try to remain neutral. It is dangerous to assume that an AI is somehow a neutral distillation of human thought and activity (free from judgment or bias). With the rise of consumer facing systems, AI, has the potential to combat or spread new forms of discrimination and unwanted bias, through fundamental choices in representation, design and development. In this paper we use three research projects to explore inclusive knowledge design.

AI Embodied Codes

Under the umbrella of **"AI Embodied Codes"** we present three research projects addressing culture, civic engagement and human to human and human to machine interactions. We speculate on and experiment with new cultural codes of movement in which intelligent systems will understand variations in embodied languages across cultures. We argue for an embodied collaborative knowledge to inform how we engage in AI design. We share our experimental prototypes and co-creative and embodied research methods, to share our vision of an R&D of AI based on Knowledge Design.

We design and employ AI to enhance human to human connections by actively addressing bias. We move beyond existing AI frameworks examining knowledge presence in AI Systems, as suggested by Alison Adam (Adam 1998). Designing for connected knowledge rather than intelligence leads to more interesting outcomes and broader thinking in the AI design space.

Our research focuses on inclusive approaches to AI design from a collaborative, embodied approach. By collaborative we mean using AI systems/machine learning tools to encourage human to human and human to machine connections. By embodied we mean using our physical bodies to understand and engage in algorithmic creation, develop new training data, and explore the cultural codes of body language in the digital space.

Our research is not one finished product, but rather a collection of prototypes, designed for experiences in the AI design space. These prototypes are tools that help us to imagine how to design for and with intelligent systems, allowing us to move outside of the product driven design space into the inclusive intelligent experience space.

Bias

Anything trained by a human is going to have the same biases and influences as its human designer/developer, no matter how much they try to remain neutral. It is dangerous to assume that an AI is somehow a neutral distillation of human thought and activity (free from judgment or bias). With the rise of consumer facing systems, AI has the potential to combat or spread new forms of discrimination and unwanted bias, through fundamental choices in representation, design and development. This unwanted bias is evidenced in the gendering of Amazon Alexa's voice (Stern 2017), the labeling of dark skinned people as "Gorillas" in photo-tagging software (Barr 2015), and Western-centric approaches to "normalcy" in the mental and physical health industries. What message are we sending to users when we prioritize specific voices, body types, or socio-economic demographics in our designs?

With these concerns, we share our research which foregrounds inclusivity and/or harnesses inclusive design methods.

Our Methods

What is inclusive AI design? How can co-creation and site-specific research methods support our goal of inclusive design? The three projects we present includes the following methods:

- Co-creation and community research: we conducted research in various locations with different communities in LA. We intentionally sought to prototype with audiences that were varied in age, race/ethnicity and technical background. We took special care to target audiences that were not primarily cis male.
- *Performative Prototyping* (Sweidan)*:* our proprietary method which harnesses movement-based research to prototype from an embodied perspective. This method is both divergent and affords a low barrier for participation since basic movement (such as walking) can be harnessed to allow workshop participants to engage in basic system design.
- Wekinator: an open source machine learning tool.
- Site-specific research (we created a movement-based dataset tied to a specific location in Los Angeles).

AI Embodied Codes: Projects

In our experimental, site-specific research and speculative tools - we investigate components of a research theme we are calling **"AI Embodied Codes".**

Within the boundaries of **"AI Embodied Codes"**, this position paper introduces three projects that take form as site-specific research, co-creative prototyping and speculative tools. Our three projects "**Accumulative Collaboration**", "**Intelligent Protest**", and "**Data, Bodies and Architectures**", explore embodied knowledge in AI design. These research projects examine what it means to engage in algorithmic creation with physical movement. These projects use individual and collective movements to create new rulesets and training data to understand our physical relationships with intelligent systems.

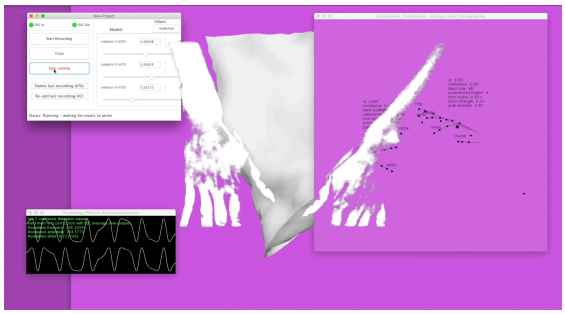
These projects address the following:

- What is site-specific AI research?
- How can we harness embodied knowing to shape AI Design practices?
- How can we conceive of and design AI codes for intelligent architectures and intelligence spaces?
- How do we do so from an inclusive perspective?

Accumulative Collaboration

"**Accumulative Collaboration"** explores "embodied knowing" alongside "machine knowing". Through site-specific training, we explore human to human and human to machine interactions. In "**Accumulative Collaboration"**, we collaborate with an open-source machine learning tool Wekinator (Fiebrink 2009) to facilitate human to human connections, human to machine interactions and embodied knowing.

Using a leap motion, participants improvise gestures with their hands to provide unique movement inputs into the Wekinator model. Hand improvisations become training data for the model, and a duet between machine and human ensues. The model facilitates an accumulative choreography - one participant follows another, building off previously improvised hand gestures. This contagion of choreography brings participants (strangers to each other) into a collaborative relationship facilitated by the AI. This prototyping tool speaks to what it means to locally train data in real time, with users of the space. This approach advocates creating a space for collaborative and individual co-creation in the design of AI systems and is important for inclusive experiences in AI.

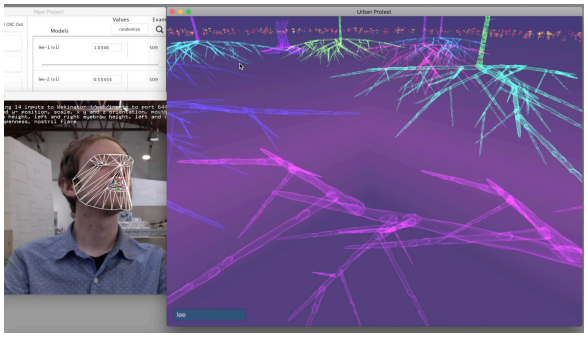


Research for Accumulative Collaboration project. Users engage with Wekinator to create site-specific training examples.

Intelligent Protest

"**Intelligent Protests"** explores new experiences in civic engagement. In this interactive experience, individuals use their bodies to engage in a collaborative protest in virtual and physical spaces. Individuals can login from a home computer and be present in the virtual protest space. A virtual sit-in use case was created by using Rebecca Fiebrink's machine learning tool Wekinator and OpenFrameworks' face tracking software to occupy a virtual sit-in, in response to protesting tree removal in the city of Alhambra, CA (Fiebrink 2009; Kogan 2015). When an individual's tree avatar roots connect with the roots of other trees, they acquire the sound associated with the other tree's roots, so not only can the user be present, but the

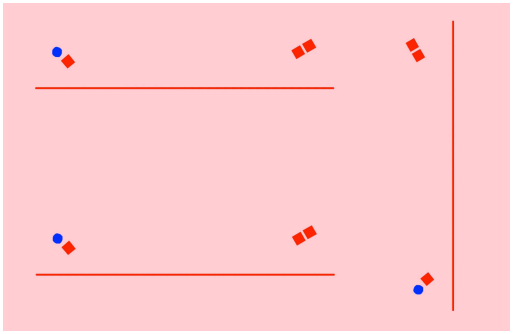
individual is rewarded the longer they are in the space, collecting the sounds of other avatars once the tree roots interconnect. Users' avatars remain be present for 24 hours. The idea of using body information (biometrics, facial recognition) in civic discourse makes it possible for individuals who are working multiple jobs, or caring for children and parents to be present in civic engagement.



Research for Intelligent Protest project. Users engage with Wekinator to connect with be present with other protesters engaging in an avatar sit-in.

Bodies, Data & Architectures

"**Bodies, Data and Architectures"** focuses on both individual and group design uses rulesets to unlock or create specific cultural experiences within a location, and imagines what it means to port that algorithm across environments.



Research for Bodies, Data and Architectures project. Users engage with Wekinator to create site specific-training examples.

Many of the participants' movement rulesets incorporated sociocultural considerations. This research resulted in a variety of physical responses which often challenged or addressed existing sociocultural behaviors. For example, one participant's ruleset pointed towards a desire to express frustration and individuality in a space, whereas another group created a ruleset, which had one specific language for an in-group, and another language for an out-group. From these individual codes of frustration to communicating within an in-group, this research addresses larger ideas about what it means to engage in both real and cultural code-switching in a digital space.

While explorative in nature, this mixing and matching of algorithms produces new cultural mashups and unique design experiences rooted in the individual's embodied being. Physicalizing these codes also points to challenges across various cultures including that of corporate spaces. One workshop group linked their physical algorithmic sketches to the observation that multiples bodies are required for sexual harassment to be acknowledged and addressed seriously. What does it mean to physically deliver an electronic complaint with multiple bodies? How might the physicalization of the current sexual harassment filing system make transparent unspoken cultural codes in the workplace? How can we physically play out such codes to create systemic change?

Under the umbrella of **"AI Embodied Codes"** and through these three research projects, we have provided three specific examples of experience designs that address culture, civic engagement and human to human and human to machine interactions. We speculate on and experiment around new cultural codes of movements in which intelligent systems will understand variations in embodied languages across cultures. We argue for an embodied collaborative knowledge to inform how we engage in AI design. We share our experimental prototypes and co-creative and embodied research methods, to share our vision of an R&D of AI based on Knowledge Design.

Bios

Christine Meinders is an AI designer/researcher who uses collaborative and inclusive design approaches to co-author social AI projects and AI design tools. As a researcher and designer, Christine holds an MFA in Media Design Practices from ArtCenter College of Design and an MA in Clinical Psychology from Pepperdine University. Her research focuses on the design and utilization of emotion analysis in intelligent agents, inclusive design in AI, and collaborative design for embodiment in hybrid spaces. Christine is co-founder of Artificial Knowing.

Selwa Sweidan is an artist and researcher who conducts movement and systems-based investigations. She prototypes emerging technologies, ranging from the designing of our senses to speculative AI systems. She holds a Bachelor's degree from Smith College and a Master's of Fine Art from ArtCenter College of Design. Selwa teaches at Santa Monica College in the Design and Technology Department's pilot Bachelor's Interaction Design program.

She has been a Design Fellow at Fabric, a Fellow at George Greenstein Institute, an Artist-in-Residence at UC Irvine and a postgraduate Fellow at ArtCenter College of Design. Selwa is co-founder of Artificial Knowing.

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Sweidan, S. *Performative Prototyping* is a research method which harnesses movement in support of embodied and/or speculative technology R&D. It is a form of critical prototyping as defined by Matt Ratto. *Performative Prototyping* involves directing dancers trained in somatic and/or improvisational movement to "sketch" and perform embodied investigations. The method was coined and developed by Selwa Sweidan under the guidance of Professor Phil Van Allen and Department Chair Anne Burdick, while a graduate student at ArtCenter and further supported with input by colleagues Jay Hong and Christine Meinders.