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Embodied learning within embodied communities

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The four chapters in this section take us from sturdy gym mats where our authors learned to perfect strong and stable handstands or honed the aikido ideal of harmonising with an opponent, to deep below the water's surface, where breath holds became successively, achingly longer, and finally into the realm of the seemingly surreal, where artificial neural networks became musical collaborators. The authors shared authoritative and reflective accounts of embodied learning, collaboration, and socially scaffolded cognition. Greg Downey's suggestion that, 'the path to expertise is signposted by the community' (p XXX), struck me as particularly astute, and even poignant given the challenges to sharing and collaborating with one another in an embodied context that have characterised human life for almost everyone on earth since the arrival of COVID-19 in early 2020 (just over a year before the time of writing). In this commentary, I reflect upon some lessons, observations, and insights in light of the pandemic-induced (and hopefully temporary) shift away from physical interaction, learning in close social contexts, and collaborative embodied learning in general. Embracing the spirit of the rich and perceptive ethnographies so generously shared by this section's authors, I also briefly reflect on

a recent experience of my own, my first opportunity for embodied collaborative learning in a pandemic-fatigued world.

Reflections on the experts' accounts

The piece by Kath Bicknell and Kristina Brümmer rotated our worldview by 180 degrees as they cartwheeled us through their experience attending a 'Handstands Foundations' class over a 6-week period, with the aim to train the strength, stamina, balance and overall body awareness to achieve a strict handstand. They share their triumphs and tribulations as they chart a rocky, unpredictable, and far from linear or smooth learning trajectory from novice to slightly more experienced handstanders. They emphasize the vital role played by failure, regression, near-misses, and surprise successes in the learning process (particularly at the early stages), as well as the role(s) played by other participants in the handstand classes (2 teachers and 12 learners). Bicknell and Brümmer describe how both expert and novice observations of their own handstand practice helped educate their attention toward proper body alignment, while physical adjustments of the handstander's body by a fellow student or teacher further helped to embed the kind of embodied knowledge required to sustain a well-aligned handstand.

Clear takeaways for me from this piece included not just the value in examining failures and setbacks during complex new physical skill learning among novices, but also how crucial learning companions are for contextualising and accelerating one's own learning process. If these same classes were offered online during the pandemic, where participants could practice in the comfort of their own

(obstacle-cleared) living rooms, it seems obvious that learning would be far slower, patchier and ultimately poorer without the value added by embodied, physically-present learning companions sharing the same space with each other as well as instructors. That said, the proliferation of online classes that have emerged as a result of studios and training centres closing their doors, for everything from handstands to tumbling and acrobatics, suggests that at least some aspects of these complex skills can be learned or maintained in a digital context. Specifically, online learning appears to amplify some aspects of the ecology of collaborative, embodied learning (such as discussion of how and where to focus attention, and verbal feedback from an instructor or observer), while other aspects are entirely missing during screen-based learning (such as the trust in an instructor or fellow learner to catch you when you fall).

The value of touch and tactile communication during the learning process was further explored by Downey. In this vignette, we were transported onto a sunny Sydney pool deck, where Downey considers the varieties of collaboration that are essential for building extreme breath hold discipline, as required by skilled free divers. These include disrupting habitual breathing patterns, incorporating distraction tasks or instructional nudges into one's practice, leaning on an experienced instructor and/or other learners to scaffold one's own learning, and learning to use the physical infrastructure and dive buddies to minimise risk of blackout or obstacles to resurfacing. As Downey elegantly describes, building these skills from the ground up would not be possible without the wealth of knowledge about the human body provided by the medical community, nor would learning and breath hold development progress as effectively without support from a diving

buddy. Downey draws on the classic developmental psychology work by Lev Vygotsky as well as more contemporary work by social anthropologist Jean Lave when he emphasises that 'learning is most often a social activity, situated interactively in everyday life' (p. XXX).

Similar to the handstand training described by Bicknell and Brümmer, but arguably even more salient due to the life and death nature of the skill being learned, it is difficult to imagine how the type of disciplined breath hold techniques practiced by Downey could be effectively or safely learned *without* other practitioners and/or an expert instructor, all collaboratively learning together. Downey perceptively addresses the seeming paradox of how a skill like freediving, which appears an ideal exemplar of a solo activity, in fact requires deeply collaborative practices to effectively learn. Ultimately, we learn how the skill described in this chapter, which requires individuals to first *unlearn* aspects of the most fundamental motor behaviour of all terrestrial animals, is deeply socially embodied. New learners ignore the value of collaborative learning in this particular context at their peril. Online or screen-based instruction might help build awareness and theoretical knowledge of the skills required and risks encountered in this specific learning context. However, the value added by working with and among others to build this kind of breath holding skill must be incalculable.

In the penultimate piece, we return to dry land and the feeling of thick gym mats beneath our feet as Susanne Ravn examines the complex antagonistic interactions, where the aim is to win the fight without harming the attacker, that typify aikido. She describes how she becomes part of the aikido ecology – dressing

the part, moving the part, and socially embodying the part. Her focus on the bodily sensations of being enveloped with stiff cotton fabric, hugged by a fabric belt, feeling an attacker's energy and intentions through a gripped wrist underscore the role of corporeal and physical awareness, first of oneself and one's own body, and then extending to the opponent. She eloquently describes the process of dynamic attunement, where each opponent's attention and sensory awareness is synchronised with the other, and shaped by each individual's skills and abilities (Mingon & Sutton 2021). Ravn's nod to Merleau-Ponty was equally enlightening, in terms of how thinking about how others' bodies helps us to more fully comprehend and engage with the world within one's own body. As Ravn writes, '[t]he body of the other person presents a miraculous prolongation of my intention already on the level of operative intentionality. I sense the intentions of others immediately in their actions, and act in coordinated ways along with the movements initiated' (p. XXX). This way of thinking provides a distinct and thoughtful counterpoint to the focus of experimental psychological literature on joint action (e.g., Sebanz, Bekkering & Knoblich 2006; Sebanz & Knoblich 2021), where much of the focus is on the psychological mechanisms that enable effective action collaboration, such as the analysis and prediction of the specific action parameters of a co-actor's movements. While Ravn touches upon similar themes to those studied by joint action researchers, she is more philosophical and poetic in her consideration of the embodied collaboration, competition and learning that takes place during Aikido, suggesting that 'sense-making reaches beyond the here and extends before the now of the two [individuals] practicing together' (p. XXX).

As with learning handstands and breath holding, Ravn's aikido practice further reinforces, and perhaps even amplifies, how this kind of learning and expertise building centres on the physically embodied practice where bodily knowledge is transmitted, and energy is read and interpreted, through tactile engagement with another practitioner. Far from being based solely on physical aspects of the martial art, the ecology of aikido is further developed via the codes of conduct, techniques, values, and rituals of this practice. Gaining a foothold into this practice, and cultivating expertise, will require intentional *and embodied* engagement, and thus close physical contact with another. It is difficult to imagine how the basic building blocks of this practice could be established or consolidated via disembodied, screen-based means.

The final piece, by Roberts and Krueger, takes an exciting and unexpected detour from these grounded, embodied, here-and-now physical skill learning scenarios. Here, the authors consider the status (and legitimacy) of AI systems as creative collaborators in art-making processes. Specifically, they focus on AI's potential for creative agency in music making contexts, shining a spotlight on musician Holly Herndon's collaboration with artificial neural network Spawn during creation of her full-length album, *Proto*. Roberts and Krueger highlight three qualities of musical agency that could feasibly be used to argue against assigning Spawn a role as a fully-fledged collaborator: embodiment, emotional expression, and autonomy. Across all counts, Spawn and her AI brethren fare poorly (at least at present – although technological advances mean that artificial versions of all three qualities are becoming increasingly sophisticated; see Hortensius, Hekele & Cross 2018). However, Roberts and Krueger argue that it is perhaps more useful to change the narrative about

the status or legitimacy of AI's musical agency *per se* to instead consider a *fictionalist* approach to artist-AI collaborations. According to this idea, 'it can be advantageous for an artist or listener to engage in the fictional pretence that there is AI musical agency - ranging from performance and interpretation to full creative composition - even if we accept that this is not literally true' (p. XXX).

Roberts and Krueger's fictionalist proposal does not directly ask what listeners actually think about the origins of an AI in a collaborative artistic role. However, this question fascinates me, as research by my own team and others, suggests that people's beliefs about the autonomy or agency of an AI-imbued agent, or the humanness of an artist, can profoundly shape perceptions and enjoyment of an artwork (or any other stimulus for that matter; e.g., Chamberlain et al., 2018; Cross et al., 2016). Further provocative questions arise when one considers the role played by the human programmer behind an AI algorithm, and their role in establishing the parameters for the AI learn from, as well as overseeing and fine-tuning the machine learning and training processes. Digging a little deeper into the role of Spawn in Hendon's album, I came across this dazzling quote on her website (emphasis my own):

> You can hear traces of Spawn throughout the album, developed in partnership with long-time collaborator Mathew Dryhurst and ensemble developer Jules LaPlace, and *even eavesdrop on the live training ceremonies conducted in Berlin, in which hundreds of people were gathered to teach Spawn how to identify and reinterpret unfamiliar sounds in group call-and-response singing*

sessions; a contemporary update on the religious gathering Holly was raised amongst in her upbringing in East Tennessee (http://www.hollyherndon.com/proto).

How utterly fascinating that large groups of people were required to physically come together, to use their voices and bodies to provide the vital human input to train Spawn's algorithms so that this artificial neural network was a suitably creative collaborator. While listeners might willingly (and happily!) engage a fictionalist mindset when considering AI-driven programmes as legitimate creative collaborators, at their core (or at least at Spawn's core) is the rich input of a vast human chorus, with individuals collaborating with each other and the AI to build something akin to musical agency. The questions raised by Roberts and Krueger in their chapter about the legitimacy and status of artificial artistic collaborators are timely and important, as algorithms take on increasingly complex and central decision-making roles in our lives. A clearer understanding and more nuanced appreciation of the human creators who set the wheels in motion for these autonomous artificially intelligent systems to participate in the creative process should spark further spirited debate on the role for digital algorithms in art creation.

Returning to a world of embodied collaborative learning

The physical learning and expertise-building experiences reported by Bicknell and Brümmer, Downey and Ravn, and the AI-training sessions with hundreds of members of the public that were required to breathe life into the artificial musical collaborator profiled by Roberts and Krueger, occurred well before the arrival of a

worldwide pandemic that shut most people into their homes for weeks or months on end. While we will undoubtedly see a surge of original research published over the coming months and years documenting learning changes due to a sudden and prolonged shift to disembodied, screen-based learning (where learners can only mix and mingle with other learners and expert instructors from the confines of their square of the Zoom screen), the deeper, more enduring and philosophical implications of pausing embodied collaborative learning and replacing it with proxies will be equally important to understand. Each piece across this section underscores the importance of others' bodies for learning, for improving, for understanding and for creating.

Drawing on my own experience as a practitioner and teacher of contemporary dance, if I wish to teach you how to perform a new dance sequence in an online learning context, I might be able to see that you are holding your shoulders too high even if you appear as a small figure on my laptop screen, or that your timing is slightly off. However, by standing beside you, sharing the same physical space with you, I will have a much better chance of learning that the tension comes from your neck or the base of your spine, just as you might pick up a subtle weight shift that makes timing easier that simply is not discernible in the small digital rendering of an instructor. These sentiments echo observations made by Ravn in her aikido learning journey. Her subtle duet with the elderly Taka-sensei, where his decades of embodied expertise subtly and resolutely undermined her own movements, simply could not happen with anywhere near the same level of corporeal knowing or awareness (if at all), if the practitioners engaged solely via screens.

These insights have been reinforced by recent first-hand experience, when I returned to the dance studio with a group of other dancers, after nearly a full year's absence, to take a breaking course with leading Australian breakdancer bgirl Raygun. After leading us through an athletic warm up and extensive wrist stretching, bgirl Raygun began putting us through our paces by coaxing our bodies through the breakdancing basics, including leg hooks, top rocks, sixstep combinations, and baby freezes. The 20 or so other workshop participants ranged from complete novices in dance (and breaking) to those with some breaking experience all the way through to professional hip-hop and contemporary dancers and teachers (but for whom breaking was new). As I contorted my body to try to balance all my weight on one ear while resting my ribs on one elbow in order to move into the baby freeze position, my progress was aided by watching other dancers also attempt to negotiate this tricky position, as well as by receiving physical feedback and adjustments from other dancers and bgirl Raygun herself. Sure, one can hold a dance class, an orchestra practice, or choral auditions online, but the value and richness of the learning experience, and quality of information transmitted and received simply does not (yet) compare.

The practicing of giving and taking control with other practitioners in dance, acrobatics, martial arts, and music improvisation, of having conversations with our bodies (not just our heads and upper torsos, floating on a screen, against backgrounds of our chaotic homes and makeshift offices, or perhaps an anodyne workplace template) and physically engaging with other learners has been vital for human learning, creating and thriving for millennia. The beating heart of embodied, contextualised learning is diminished (or at least very much changed) when we are

sat behind screens or when pandemic-mandated extreme caution around other living, breathing human beings requires avoidance of physical proximity (let alone contact) with others' bodies. While I am certainly not suggesting we neglect public health advice for the sake of having richer, collaborative embodied learning experiences, I am very much looking forward to a time people, the world over, can safely engage with the kinds of skilful learning activities explored in this section. The countless online dance, music, sport, and other digital learning tools that have emerged during this unusual time will undoubtedly reveal those aspects of skill learning that can be learned or refined just as well (or even better) in screen-based compared to in-person contexts. We will also undoubtedly continue to be surprised, disappointed, and delighted by technological innovations aimed to emulate or replace human instructors, co-learners and collaborators. However, reflecting on the role of embodiment, and being deeply, physically, and completely embedded within a context where learning happens, the chapters in this section, and indeed, across the whole book, reinforce the fact that we were never meant to be isolated, visual creatures, taking in our rich, complex social world with a pair of eyeballs through a phone or computer screen. Returning to Downey's quote about the path to expertise being signposted by the community, my hope is that this unusual time will bring a fuller appreciation that learning can happen with the support of multiple manifestations of community (online and in-person, expert and novice, local and distant), but let us never underestimate what embodied, in-person, and social cooperation brings to complex skill learning and collaboration.

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