Decentering Humans in the Learning Sciences: The Role of Nonhuman Nature and Place in Learning Ecosystems

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Abstract: What does it mean to do learning sciences research in a more-than-human world? How does considering nonhuman actors as agents for learning impact teaching and learning? We propose shifting our unit of analysis from human interactions to relational processes between humans and nonhuman nature, by which we mean the intra-actions among learners, educators, flora, fauna, land, and waters working together iteratively and reciprocally to support the co-construction of interest and learning. We present two multispecies, micro-ethnographic case studies – moths and arachnids – drawn from a teen summer program in an urban park. These cases exemplify the nuanced ways that humans and nonhuman nature come together through relational processes to support youth environmental interest development.

Introduction

We present two case studies from a teen summer internship program at an urban parks organization where we consider nonhuman nature, including flora, fauna, and landscape features, as key actors in the learning process. This project was part of a research-practice partnership between university-based researchers and urban environmental educators. One of our goals was to dissolve boundaries between human and nonhuman nature in order to help youth come to see themselves entwined with and in relation to the local environment (Bang & Marin, 2015). Working together over six months before the program began, we examined program goals and problems of practice in order to develop our research question: How do relational processes between and among youth, educators, and the landscape they work within support youth environmental interest development?

Given that climate change presents an existential threat to our species and planet, exploring and encouraging relations between humans and nonhumans is more important than ever. Urban landscapes provide critical opportunities to engage youth in local, place-based education that connects to regional and global environmental issues (Ardoin, Clark, & Kelsey, 2013; Greenwood, 2017). Urban centers are unique ecosystems where numerous species of nonhuman nature, from coyotes to non-native plants, have adapted successfully. Cities are also sites of tension between human and nonhuman nature. In cities, we see efforts at human domination over nonhuman nature coexisting alongside growing movements for 'greening' of cities (Duhn, Malone, & Tesar, 2017). These elements make urban settings valuable sites for environmental interest development and learning.

Our focal educational program was a five-week paid summer internship for high school aged youth offered by our practice partner. Activities primarily took place in the Park, but also included field trips to other city parks and partner institutions, e.g., the regional museum of natural history. In addition to activities led by program educators, there were also a number of guest educators, including a restoration ecologist, a horticulturalist, a lepidopterist, a herpetologist, and an ecological data visualization expert. We worked with 11 youth. When asked to describe their racial and/or ethnic backgrounds, youth described themselves as Black (n=2), Chinese American (n=1), Filipino (n=1), Mixed race (n=2), Puerto Rican (n=1), White (n=3), or White/Jewish (n=1). Five self-identified as male and six as female. Youth ranged in age from 14-17 and were rising 9th, 10th, and 11th graders at three different city public schools (n=7), one public charter school (n=1), and a private regional school for deaf and hard of hearing youth (n=3).

Microethnographies that decenter humans

Our observational practice included notation of episodes of interest expressed through interaction between educators, youth, and nonhuman nature. This included human-human interactions (e.g., youth asking questions about environmental phenomena), human-tool interaction (e.g., use of field guides), and human-nonhuman nature interactions (e.g., tasting a wild edible plant). We also noted counter evidence of youth interest, such as disengagement or resistance to structured activities. We audio-taped semi-structured interviews with both youth and educators. In an effort to center the materiality of the Park as a site for learning, and inspired by prior work noting the significance of walking for embodied informal learning (Marin & Bang, 2018), we asked each interviewee to guide us on a walk or select a place to sit in at a location in the park of their choosing. An interpreter was present for interviews with the three youth that were deaf or hard of hearing.

What would happen if we explore case studies that center nonhuman elements of nature instead of focusing primarily on youth? The nonhuman natural elements of the Park would then be our largest analytic frame. Here we present two cases where interactions between and among humans and nonhuman nature were central to youth interest development. These interactions included conversations between guest educators and youth, youth mimicking program educators' modeled interest, youth-to-youth encouragement, and direct human-nonhuman physical contact. This latter type of interaction included touch that was driven by both curiosity and fear.

Case 1: Juniper geometer moth (*Patalene olyzonaria*)

Chuck, a guest educator, joined us during an overnight retreat at the start of the program for a two-day session to explore moths. He is with a conservation organization and conducts inventories of flora and fauna in protected landscapes. He has excellent ecology field skills and a strong personal interest in moths. As the youth roasted hot dogs over a campfire one night, Chuck set up a simple moth trap—a sheet hanging between two trees with a UV light behind. He turned on the light at 10pm and we all gathered near the sheet to see what creatures might be attracted to the light. Chuck provided background information about moths as the creatures joined us. Selah, an educator, was excited. She had developed a strong interest in moths the previous summer when Chuck had done a similar activity. Now, she sat by the trap, letting moths land on her and gently reaching out to scoop individuals into her hand in order to look at them more closely. Most of the youth were now shrieking loudly, excited and nervous about being close to so many insects. Dozens and dozens of moths flocked to the sheet, including charismatic moths such as the 8-spotted forester (*Alypia octomaculata*), Isabella tiger (*Pyrrharctia isabella*), and pale beauty (*Campaea perlata*). Selah enthusiastically displayed interest and, when she asked who else would like to touch a moth, Daisy moved in closer.

> I think when I just came over there and…I literally asked Chuck, 'Aren't moths just brown?' He's like, 'No. No, they're not.' [laughter] And I was like, 'Okay.' And I'm like, 'Why are moths attracted to this light?' And he was like, 'I'll tell you the story later.' And then Selah said, 'It'll make you cry.' And Selah was being dramatic as always but that intrigued me [laughter]. So, I saw all the little moths and I decided, 'Oh, I just want sit right there,' really close. (From Daisy's interview, 7/11/19)

Daisy's reflections reveal her desire to physically engage with the moths, to sit 'really close' to them. This was a new experience for her, and was mediated by Chuck and Selah's modeling of engagement, by Daisy's desire to learn more about something she had never observed closely, and by the moths themselves that joined our group.

The next morning, Daisy immediately approached Chuck and began asking about why moths have hair. The two of them hypothesized about the relative benefits and challenges of a moth having hair. This kind of exchange became more intense during the day. Chuck had set up a bucket trap for moths the night before— a 5-gallon bucket filled with crumpled paper and topped with a UV light and funnel. Moths drawn to the light fall through the funnel and into the bucket. Chuck had us all gather around a picnic table where he opened the trap and started pulling out the crumpled papers. Earlier that morning, Chuck had placed the bucket filled with moths into the refrigerator and the chilled moths were now listlessly nestled in the crevasses of the paper. This simple technique allowed Chuck to show each of the moths to the youth in a way that did not involve killing the insects.

With the moths moving slowly, many more youths became comfortable holding the moths until they revived themselves and eventually flew away. Daisy positioned herself right next to Chuck and as soon as he began pulling moths out of the trap, Daisy started peppering him with questions. This lasted for over 10 minutes while Chuck effortlessly toggled between this exchange and revealing and naming the many moths that had fallen into the trap. At one point, a small, russet colored moth, a Juniper geometer (*Patalene olyzonaria*), landed in Daisy's hair and the two of them – the girl and the moth – sat in stillness together. The following week when the youth were asked to introduce themselves to the organizational staff and say what they liked best during the retreat, Daisy said that her favorite thing was learning about the moths and having them land on her.

Through this robust episode involving interactions between herself, Chuck, Selah, and the moths themselves, Daisy found a new interest developing that she independently followed to learn more about this often-overlooked taxon. She began seeking out additional information about moths using field guides. On several occasions during quiet moments, Daisy would look through the field guides, marking pages of moths we had seen and making notes in her field journal. She said this about her developing connection with moths.

> I always thought all moths were brown, so when I saw they weren't I got excited. I was surprised…I learned that I really like learning about insects and butterflies and moths, so I think those are really cool…[I thought] 'Oh, moths are just brown and they're boring and they come

> with the light.' But I feel like seeing something that I've never seen before really interested me. And then just finding out that butterflies are moths just blew my mind. And then for insects, I just used to see them as creepy crawly things that deserved to be smacked with a shoe [laughter]. But when people told me, 'Oh, they help with this,' and they all end up working together in a way, I was like, 'Maybe I shouldn't kill these guys.' And then I just wanted to learn more about them...(From Daisy's interview, 7/11/19)

Case 2: Wolf spiders (*Lycosidae sp.*) and daddy long legs (*Opiliones sp.*)

Rashawn, a youth participant in the program, was afraid of spiders. He remembered 'the big spider in the cabin' during the overnight retreat at the start of the program. He talked about how huge and scary it was, and how one of the other youths shooed it out of the cabin, which was not something he thought he could do. During the first week of program activities in the Park, we hiked down a trail that followed one of the small Park streams. Everyone, including youth and educators, was asked to take photos of anything that they were curious about; that give them the chills; or they would like to change. Rashawn's photo of something that gave him the chills was of a large black and white wolf spider (*Lycosidae sp*.) that appeared to be nesting between a downed log and a stand of stinging nettle (*Urtica dioica*). While he described how the spider gave him the 'heebeejeebies', he also correctly identified that this spider was in the wolf spider family, suggesting that he was both afraid of and curious about the creature, repelled by it and wanting to learn more. In his interview, he reflected:

> Because I never actually took the time to go outside and go in the woods and actually see insects. And I like seeing new things. And when I see new things, it makes me a little excited because I never seen it before. And I like to learn about new things I've never seen before and types of species. (From Rashawn's interview, 7/8/19)

Towards the end of the photography hike, several youths began to cluster together on the trail. Selah had a daddy long legs (*Opiliones sp.*) in her hands and began to encourage Rashawn to let it crawl on him. Daisy and another youth immediately gathered around them, letting the daddy long legs crawl on them and saying that it didn't feel like anything. The other youths who had been farther down the trail began to join the group, but Rashawn and Selah remain at the center of the knot. Voices became elevated as more and more people began pushing Rashawn to let the daddy long legs crawl on him with a teasing but encouraging tone. In false starts, Rashawn would put his hand close to the daddy long legs and then pull it back. Rashawn said "Nah – I can't do this" at the same time that he smiled an exhilarated, broad smile and continued to put his hand forward – once, twice, three times, more. At one point he broke away from the knot and walked around it, but then came back to his original position at the center. At last Rashawn put out his hand and the daddy long legs began to crawl on him. His smile became even bigger and reflected a radiant joy. The entire group erupted into loud cheers and Selah said several times "I am so proud of you, I am so proud of you". The group was ecstatic.

Spurred on with confidence, Rashawn then told us about the large wolf spider that he had photographed earlier. He took the lead as we hiked, guiding us onto a small, single track trail and excitedly narrating our walk, saying that it wasn't much farther. As we came around a large bend in the trail, Rashawn pointed out the stand of stinging nettle and the enormous wolf spider sitting on one of the leaves. From this point forward in the summer, Rashawn regularly pointed out spiders, especially wolf spiders, to the group. By the end of the summer, there was a moment when he saw a spider on a small tree trunk and didn't even flinch.

We are still human

This paper explores how educators, youth, and nonhuman nature come together through relational processes to support environmental interest development in diverse learner populations. We interrogate how we might approach methods for data collection and analysis when we accept that nonhuman elements also have agency in the systems in which we work (Kawagley, 2006). But as educational researchers, can we effectively balance our humanistic thinking with a post-humanist lens (Pacini-Ketchabaw, Taylor, & Blaise, 2016)? In practice, it was difficult throughout this project for us to not center humans. Our tendency to focus on human-human interactions, especially through language, was ubiquitous and challenging, as recorded in this fieldnote: "I'm trying today to do more looking and less writing. I find I am just recording dialogue, which is not what I want to do." (Fieldnotes, 7/2/19)

By attending to nonhuman nature during data collection and analysis, we worked to focus on the interactions between elements and to consider the impacts on environmental interest development. Certainly, we could measure youth interest through program surveys or other tools, but we are hopeful that our approach moved beyond a measurement of interest in order to explore the dynamics that support it. Yes, the youth learned about

scientific concepts through this program, but they also learned about themselves – what they care about, what they can overcome. And they learned this through direct interactions with the Park and its inhabitants. The Park was strengthened through interaction as well:

> We're helping the whole environment, now that I think about it … You don't see trash around. It's clean. And people who like to walk through the trails – so when people walk through the trails, they don't got to watch out for big sticks or nothing because we'll handle that. We'll get it out the way. And we'll make paths easier for the bikers. And we'll help stop the erosions. So that's when dirty water gets into clean water, messing up the habitat for what…like fish or tadpoles may live in. So, we could make their stream better and get new insects. (From Rashawn's interview, 7/8/19)

Using ecological thinking that draws on indigenous (Kawagley, 2006), post-humanist (Haraway, 2016) and new materialist philosophies (Barad, 2007), we aimed to shift our gaze from individual youth experiences and towards relational processes. We have described youth, educators, and nonhuman nature working together iteratively and reciprocally to support the co-construction of interest development. To attend to nonhuman, place-based elements of the learning ecosystem, we blended qualitative case studies with post-qualitative approaches that move beyond anthropocentric data and analysis to create multispecies microethnographies revealing the practices of and intra-actions between human and nonhuman actors (Pacini-Ketchabaw et al., 2016; Ruck & Mannion, 2019; Tuck & McKenzie, 2015). However, we recognize that our gaze remains primarily on humans and continue to explore how we might better reflect the agency of the moths and spiders in these processes. Although we have explored this in a study of environmental education for youth, we believe the learning sciences more broadly would benefit from using relational processes as a unit of analysis; and attending to the material elements of learning ecosystems including the built environment and elements of the nonhuman natural world (Hecht & Crowley, 2020).

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