

UNTANGLING SOME WEBS OF NATURALISM FROM THE SCIENTIFIC METHOD

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As a self-proclaimed naturalist and follower of the scientific method, I sometimes see in myself the lines between naturalistically observed phenomena (things I may only observe once in my life) and empirically verified findings (with huge sample sizes) blurred. I remember as a young undergraduate student at Cal State discussing the content of a conference presentation with a professor who had come from a conference where a master's candidate presented an entire project on an experiment with one animal. "*The audacity of that graduate student (and his supervisor) to do such a thing*", my professor friend complained. "*How did the abstract ever get accepted by the science technical committee*"...., the conversation continued.

Reporting on the response of a behavior or character of one organism obviously does not allow for generalizations about such (although it may refute other generalizations), and limits how much one can extrapolate to other conspecifics. To many, such findings would not be considered science. On the other hand, finding the skeleton of one sasquatch would cause quite a scientific stir, albeit again, a single femur of the sasquatch discovered may not well represent the range of femur morphologies found in other sasquatches...anyway, this has all been spelled out and emphasized by folks far more brilliant than I (*see* Beehler 2010).

As a graduate student, my supervisor taught me over and over again the importance of sample sizes, error and statistical significance. Although I knew this intuitively before my masters project, I learned to eat, breathe and sleep it and it has been a powerful life lesson. So now I view the world empirically, analytically in numbers and *p* values right? Well yes, but no...oh let me explain.

Although I am serious about my research and

strive to live by the dictum of a scientist named Axle I once heard say "*do only excellent science or do none at all*", I am still impressed at seeing the *only* photograph of a planet in another solar system or watching *one* bull caribou in a herd of cows. I marvel at the nerve of a *single* yellow billed loon fishing way out of its range in the Sea of Cortez, and stand in amazement of a *lone* elm along my street recovering from heavy pruning using compensatory growth. In other words, I tend not to discount the magic of an observation because I have only seen it occur once in a single specimen. The significance of the *one* planet we know of with life on it is pretty impressive too. And I can't help but sometimes think that what that one organism is doing must just be the way it is. My dog just had puppies and what I observed one pup do, appeared to be duplicated by all pups in the litter and every other puppy I've seen since. It seems as if I am building a case for the merits of $n = 1$. On the contrary. Again, let me explain.

Early one morning in August of 2008, I was strolling in the R.W. Starrat Wildlife Sanctuary in Valemount, BC with my camera when I noticed heavy dew resting on spider webs strung across the fruiting spikes of cattails that covered the trailside of the path through the marsh. As the sun rose and the dew of the morning began to glisten across the wetland, spider webs appeared atop dozens and dozens of cattails. As I looked around more closely it appeared as if every web was strung only between the cattails – I could find them nowhere else! I knew I couldn't have been the first to observe this, but I might be the first to put some numbers to it; a write-up of it might be fun to submit to *Wildlife Afield*, I thought. I looked around in excitement at all these data upon which I would report. As the sun gently rose across the marsh, I ran back to my bag, grabbed a pen and paper, created a

data form and started logging my observations.

As I collected data, I knew I was onto something... almost 100% of the two dozen webs I found at first were built between cattails (Figure 1). I'd been at this for about an hour. Then I heard "Ahem". I looked around, but was alone. "Ahem!" The scientist in me said. "n = 25? Excuse me, you know better than that", the voice announced. "Ahem", my thesis supervisor said, "Ahem", said Axel.



Figure 1. A spider web very typical of what I found during the first hour of my walk in the wetland near Valemount, BC.

I continued to collect data despite thinking how conclusive my study had been and started thinking up the paper and how fun it would be to share. As I continued down the path through the marsh, the trail rounded a corner where the aspect of the trail changed in relation to the sun and so did the vegetation and the profile of the marsh. The webs started appearing to be constructed in places other than cattails, which were getting harder to find. Soon, I was recording webs in willows, thistles, near the ground, between long blades of grass, just about everywhere.

By the second hour, my preliminary conclusion

(Figure 2; black bars) looked very different than my harder earned and more robust (now $n = 90$) conclusion (Figure 2; gray bars). Although a full week of data collection in and outside of that particular site would surely result in an even different looking finding, findings resulting from more time in the field would be bound to look more like the set of gray bars than the black in Figure 2 - more like data collected by the scientist in me, than the naturalist.

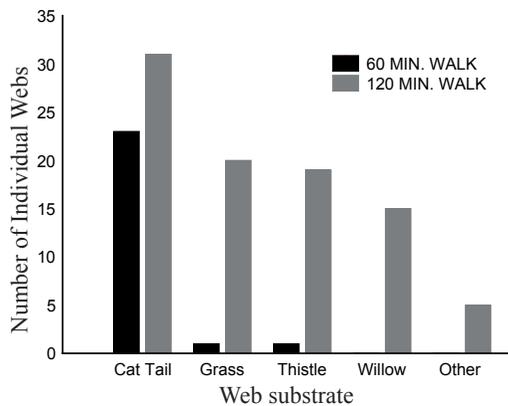


Figure 2. The number of individual webs constructed on different substrates found both during the first and second hour of my walk through the marsh.

In no way do I mean to slight my or other's naturalist tendencies whose observations often lead the way to important scientific discoveries. However, the untangling of those webs in my mind that day in that beautiful marsh (to which I encourage all naturalists and scientists plan a pilgrimage) taught me only to take my naturalist tendencies to the next level - a naturalist squared approach - if you will. I learned that day to push through my initial impressions, put in more time on the ground and not to jump to conclusions until I had walked the full (or at least bigger section of the) trail of the marsh and gamut of possibilities.

Literature Cited

Beehler, B.M. 2010. The forgotten science: a role for natural history in the twenty-first century? *Journal of Field Ornithology* 81:1-4.