EMERGING POSTHUMANIST DRAWING: LANDSCAPE ARCHITECTS DRAW LANDSCAPES AND VETERINARIANS DRAW BINTURONGS

MAGALLANES, FERNANDO
North Carolina State University, f_magallanes@ncsu.edu

STOSKOPF, MICHAEL
North Carolina State University, mkstosko@ncsu.edu

1 ABSTRACT

Two professors, one of landscape architecture and the other of veterinary medicine, discuss their approaches to developing their students' drawing skills and applying drawing and observational practice in their work. Both disciplines teach drawing in order to develop a higher level of perception and rigorous visual attention. Their methods in teaching drawing suggest an alterity to the currently dominated technological bent of our disciplines. The need for drawing resides in its importance for seeing complex relationships and communicating complex ideas to other professionals and scientific collaborators. Perceptions of truths developed from observation and drawing are critical to success in the practice of each discipline and making students capable of confronting the challenges of our era. The authors examine differences and similarities in their approaches for providing beginning students with a useful and revelatory skill set. Posthumanist theory, is assuming an expanding role in opposing Humanist theory which has dominated design, design thinking, and decision making by negatively affecting the balance between the human and nonhuman relationships found in Nature.

1.1 Keywords:

Posthumanism, drawing, perception, cognitive skills, veterinary education

2 INTRODUCTION

Drawing has historically been important to scientific ideas and communication. Not that long ago in the scale of human endeavor, scientists and artists such as da Vinci, were defined as humanists. They used drawing in their scientific work, and they challenged the status of events and topics of their day. They studied the world directly and decided the 'truth' for themselves rather than accept the norms of their day and the dictates of the church or existing scientific dogma. Many other famous scientists, perhaps less well known as artists, have done the same.

Luminaries like Da Vinci were not hemmed in by humanism. Although, the posthumanist way of thinking embraces contemporary theory the humanists shared a fondness for asking questions about the world they inhabited like the posthumanists. Drawbacks to their contributions was their anthropocentric view in controlling the world and relying on religion, science, and politics to guide their conceptions of man (Wolfe, 2010). Other humanist thinkers such as Louis Pasteur, Santiago Ramon y Cajal the Nobel Prize laureate, and the respected botanist Maria Sibylla Merian are great examples (Dubois, 1888; Llinas, 2003; Root-Bernstein, and Root-Bernstein, 2004; Stern, 1982; Valian, 1993). Each of these talented individuals demonstrated the benefit of their drawing ability in communicating scientific research and complex ideas but also showing how it might advance society. Humanism expressed a subjectivity towards the world that favored discrimination against nonhuman animals and the earth. (Wolfe, 2010). However, many of the skills, ideas, and approaches of humanism are being questioned for appropriateness and being updated for this century. Our intent, however, is not to focus on the exceptional individuals who have contributed to the history of art and science, nor the amazing tools developed to speed the processing of images, but rather to assert that it is valuable for scientists, artists, and professionals of all kinds to be able to draw in a posthhumanist era. In modifying and rejecting aspects of humanism today, one needs to create a new system of knowledge and thinking and share it across the disciplines. The authors also assert that it is possible to draw, experience, and observe to provide insights to students in professional disciplines if they are being taught to see objectively. The outcome of teaching landscape architects and veterinarians to draw is giving them a platform for rethinking current values beyond the anthropocentric views of humanism and rediscovering relationships in evolution, technology, and nature.

3 THE MERITS OF DRAWING IN A POSTHUMAN WORLD

There is value in drawing from observation. Drawing demands careful examination of the subject. For those who photograph, a quick snap of the shutter may create what may be an overload of information for the viewer. In contrast, drawings properly executed, can focus the viewer on important nuances. Time spent drawing provides meaningful information, but also a platform for reflection, witnessing, discussion, and reframing. We are self assured that teaching drawing can keep students autonomous from the machines that drive society today and allow them to imagine a world without the responses that have endangered our kinship to nature, other organisms, and our environment in the past. (Haraway, 2004).

In landscape architecture a drawing can help characterize human and nonhuman motion and its relationship with anatomy in traversing landscape space. In veterinary medicine drawing allows the identification of structural defects, injuries, or impairments, and can reveal important habitat preferences. Observing people and mirroring their movement in a park bestows insight into activity habits and interactions between individuals and the environment. The movement of one's body through a space elicits *proprioception*, a neurobiological action that adjusts our body position in space. Our bodies have an automatic and unconscious brain and body system carefully tied to our senses (Root-Bernstein, 1999). Enlisting curiosity during observation promotes thought about structural, natural, and biological patterns to help in evaluation of normal and abnormal situations. Expressing those findings to others in imagery is the usefulness of drawings.

Posthumanism continues to evolve as a theory. It has a long history of philosophical and scholarly debate that has created several strands of ideology and several definitions that are forming around the topic. Individual proponents of posthumanism come from disciplines in the sciences and the humanities complicating the framing of one given definition. Due to several definitions and descriptions unfolding around the subject, this paper will apply Gary Wolfe's description found in his book, *What is Posthumanism?*, to help structure this essay's reflections of the drawing courses.

> *"To return, then, to the question of posthumanism, the perspective I attempt to formulate here – far from surpassing or rejecting the human- actually enables us to describe the human and its characteristic modes of communication, interaction, meaning, social significations, and affective investments with greater specificity once we have removed meaning from the ontologically closed domain of consciousness, reason, reflection, and so on. It forces us to rethink our taken-for granted modes of human experience, including the normal perceptual modes and affective states of Homo Sapiens itself, by recontextualizing them in terms of the entire sensorium of other living beings and their own autopoietic ways of 'bringing forth a world' – ways that are, since we ourselves are human animals, part of the evolutionary history and behavioral and psychological repertoire of the human itself. But it also insists that we attend to the specificity of the human-its ways of being in the world, its ways of knowing, observing, and describing- by (paradoxically, for humanism) acknowledging that it is fundamentally a prosthetic creature that has coevolved with various forms of technicity and materiality, forms that are radically 'non-human' and yet have nevertheless made the human what it is.*
> *(Wolfe, 2010).*

Wolfe invites debate and discussion around posthumanism and shifting the boundaries surrounding the philosophical understanding of humans. Wolfe encourages us to reach further into the argument by having us look at how humans epistemologically know the world around them, by questioning the humanist anthropocentric perspective of humans, by inquiring about the use of tools by humans in developing information and knowledge, and ultimately joining in changing the values established by humanism from the Enlightenment to the present.

It is precisely these points he makes that are overlapping the initial strategies for deconstructing humanism and teaching drawing in a posthumanist mode. He believes that it is through thinking or re-thinking existing situations that are needed to meet the challenges we now face having inherited a world developed by humanist efforts and actions. Wolfe considers posthumanism a call to science and the humanities to act by "… decentering of the human in relation to either evolutionary, ecological, or technological coordinates… and how thinking confronts that thematics, what thought has to become in the face of those challenges." (Wolfe, p. xvi). He further extends his argument beyond science and the humanities to even architecture and landscape architecture. He encourages working in an interdisciplinary manner because not one discipline has all of the knowledge required to resolve environmental challenges of today.

3.1 Drawing and Communication

The power of an image in communication is cliché. Consider "a picture is worth a thousand words" or "seeing is believing." The value of an image can often be greater than written or spoken words, which are very culturally based and not always universally comprehended. Messages based on language can be infused with assumptions, prejudices, and political biases (Luntz, 2007). People generally intuitively understand imagery. This makes drawing an excellent way to present information effectively without ambiguity (Rothenberg, 2011; Gompertz, 2015).

3.2 Can Anyone Learn to Draw?

A widely held belief is that "a good drawer" has special talents. The commonly asked question, "Can anyone learn to draw?" enters the poshumanist debate. The question is a binary question that suggests you either can or can't draw. Posthumanist thought entertains a different perspective believing that students are on a longer evolutionary path on their way to 'becoming-with' and becoming intertwined with nature, skill, culture, subjects, objects, or systems. (Haraway, 2016). It gives no single person power or control over drawing more than any other human in the classroom and suggests you should something else you are becoming with as you learn to draw. Embedded within posthumanism is the discussion around defining who and how power is established in society "in a web of relations with human and non-human others." In their evolution of 'becoming-with' landscape architects and veterinarians, drawing can formulate their understanding and skill as an ongoing process of becoming-with during the fast-changing times found in society. Many adult students lament, "I can't draw." When the statement is explored, ordinarily this opinion of self-limitation was solidified at an early age, often before entry into formal schooling. Observing this common lack of self-confidence, several psychologists have rationalized an explanation based on early developmental rigidity of the neurological pathways in the brain. These scientists limit the possibility of good

drawing ability to not only a small subset of talented individuals, but then only to the few that are encouraged to draw at very early ages. The authors of this paper take exception to this prevalent dogma and believe with proper instruction anyone can be taught to draw. All our students have the capacity to learn to draw and demonstrate this by the end of the semester. There is considerable support for revoking this misunderstanding. Advances in neuroscience and neural plasticity tell us that "mature" brains can re-pattern neuronal connectivity and generate new neurons when needed. We do not postulate such adaptations are necessary for adults to learn to draw, but clearly there is no physiological reason why they would not be able to repattern their behavior (Barinaga, 1998; Gage and Temple, 2013; Doetsch and Scharff, 2001; Eagleman, 2011; Ramachandran, 2004; Dweck, 2006; Rose, 2005).

It is unfortunate that upbringing can stifle drawing ability. Some of our students' parents have always believed they themselves cannot draw and are often saddled with the same misconception. The availability of early drawing instruction in elementary school, by competent facilitators could do much to counter the damage inflicted by well-meaning parents.

For now, graduate landscape architecture and veterinary drawing courses have begun making positive environments and creating exercises that overturn existing negativity around the ability to draw. For example, an end of semester evaluation comment of the course by an MLAEP student, "[This] drawing class has been a highlight of my MLA[EP] career thus far. He [the landscape architecture instructor] re-sparked my love for drawing and art-making. Somehow, he is able to create a classroom environment that knocks down the ego and fears that sometimes accompany art and design, and instead sets the stage where the willingness to put pencil to paper and pin up your work is a success."

4 DRAWING COURSE BACKGROUNDS

Professor Fernando Magallanes, a landscape architect, and Professor Michael Stoskopf, a veterinarian, became friends around 1999. Since then, they have taught in their respective colleges and collaborated on design projects. They have built a friendship around design, landscape, environment, teaching, and of course drawing. In the past five years there has been more intense collaboration and communication between Stoskopf and Magallanes exchanging ideas and methods for teaching their courses and have yet to teach the drawing courses together. Stoskopf has long been a proponent of biological illustration for his veterinary students. Since his early days at Johns Hopkins University to his arrival at NC State University, he has offered drawing courses to medical and veterinary students. In his drawing courses he allows for observational study and seeing to reveal what anatomical facts learned in the classroom themselves do not reveal to the student. Magallanes has evolved a similar way of thinking about his drawing course. At first, his course was mandated to teach his students to fulfill the department's need for drawing accurate, traditional, and well communicated plans, sections, and perspectives. Over the years, his teaching changed as he discovered new directions in the discipline were requiring students to account for more complex issues found in the landscape and environment. Drawing had to change to maintain its importance and relevance to society and engage new philosophical and scientific debates taking place.

The two drawing courses are taught separately in their respective departments of Landscape Architecture and Veterinary Medicine. The courses attempt to recontextualize the students' thinking through an immersion of all the senses and suggest a stronger awareness of relationships with other living beings and natural systems in the world. The students arrive in class exhibiting 'taken-for-granted" attitudes about humans and knowledge about their environments (Wolfe, 2010) but soon learn to discern patterns in the world questioning what they know with what they see. The marks on paper begin to engage and focus them on a world that they had forgotten or never paid attention. Both courses provide physical immersion into environments that brings about new perceptions through the physical act of being in the environment, culture, and system relationships they are assigned to draw. The dots, the lines, the scribbles, the smudges, and the values begin to expose a surface with an image that is ready for discussion and filled with cognitive insight. Maya Lin, the designer of the Vietnam Memorial has something say about what was missing in her education as an architect. She complains that she was never taught architecture or about sites of other cultures except those of Western Europeans. "The way we are taught is severely lacking." She accounts that she had to travel to China and Denmark to fully immerse herself and learn about a culture. (Lin, 1998). This immersion she mentions is what these courses do. They immerse the students in the regions and locales where they live to make up for the severe lacking that Maya Lin expresses. A good example of posthumanist becoming-with by learning architecture with a culture.

The North Carolina State University (NCSU) Landscape Architecture department offers an elective 16-week drawing class for graduate students, who are typically between 22 and 37 years old and have little experience in drawing, art, or design. This course began as a required course that later became an elective. The course was pushed out of the core curriculum to make room for computer-based courses. This demotion separated students from nature and the environment by causing the students to spend hours in sensorially barren computer labs devoid of contact with the outside world. Over the last decade the drawing course had maintained its focus on drawing in line with the tradition of landscape architectural history. The drawings for students became stereotypical symbols of what was represented in drawings. A drawing of a tree, for example, would be represented as a symbol representing a tree in plan, section, and perspective rather than expressing the true qualities or conditions expressed by a tree in the environment showing its leaf texture, microenvironment, or response to wind movement. The course evolved, as an elective, to emphasize drawing as a tool for exploration at the intersection of human evolution, natural systems, the complexity of culture, and responding to a complex layering of information found in landscapes. The course is designed to give students the basic skills of drawing but also to interrogate and visually question the world they are drawing. It is in the re-thinking of why and what is drawn that creates an opportunity to explore rethinking what is being drawn. The use of various drawing media reinforces the re-examination of landscape representation offering an alterity to previous beliefs about landscape and its application of landscape design proposals. By the end of the semester a student should feel comfortable with various media, with using drawing in design ideations or visualizing proposed landscapes and understanding environments from a sensorial perspective.

The drawing course taught to veterinary students at NCSU is relatively novel. It is the only course of its kind in a veterinary curriculum in North America. Also taught for 10 years, the intensive studio class is uniformly fully subscribed. The course is one week-long, and approximately 40 contact hours, including a juried show on the last day, and a field excursion mid-week to draw animals from life.

Students enroll in the elective course through a system that uses assigned lottery numbers and student seniority to choose 12 students from a much broader pool seeking to take the course. Each enrolled student is asked to create four drawings in the early part of the semester, ahead of the start of class. These are 1) any animal in motion, 2) any animal demonstrating emotion, 3) a designated bone on one of the skeletons on display in the college, and 4) a rendered image from a provided animal photograph. These are used to assess the student's abilities entering the course and determine how best to move them forward in their drawing.

Registration has always included at least one student with highly developed drawing skills, including students who have studied design or art as undergraduates before choosing a career in veterinary medicine. More importantly, every year the course has included several individuals with drawing skills limited to crude stick figures and students with skills between the extremes.

5 METHODS FOR TEACHING OBSERVATION

The capacity to see and understand what is seen offers advantages in application for veterinarians and landscape architects. For a landscape architect the ability to see provides a means of capturing the integration of form (shapes, geometries, proportions, textures) and the function (aesthetics, comfort, utility, safety, ornamentation, systems) of a landscape. The benefits to a veterinarian include some similar understandings, but also identification of abnormalities in stance, locomotion, or interaction in groups of animals. For both professions, improved observation through disciplined viewing, provides awareness of issues important in their practice (Tversky, 2019) and questions what accounts as 'human' or posthumanist (Haraway, 2004). Drawing provides a powerful tool for disrupting previous biases, for making better evaluations, and for communicating new observations discovered in about what is being studied.

5.1 Veterinary Drawing Course

The first day of the class involves the introduction of the instructor and veterinary students followed by brief warm up exercises. The instructor helps individual students with concepts and techniques identified as needing improvement from the pre-course artwork skills survey which he sends out two weeks prior to the start of class. The first two days focus on developing graphite pencil skills and most of the drawing time is self-determined.

Students are provided with a thick pad of drawing paper with a challenge to use up the pad in the course. No one has even approached meeting that challenge. The large format paper is purposeful. It

encourages students to grow out of their natural tendency to draw small. Students are also given pencils of varying hardness and are transitioned to softer leads. Other than art experienced students in the class, most are unaware of the different choices for hardness in pencils. The presence of art trained students in each class has been fortuitous. They serve as examples of what to strive for, but more important, served as important peer mentors to the other students. The effect cascades through the skill levels, with students helping students with less developed techniques than their own, magnifying the impact of the one instructor. This interesting and consistent phenomenon emerges on day 2 or 3 of the five-day class.

On the afternoon of day three, the class is introduced to ink and three techniques: hatched line, stipple, and what we call squiggle, a very rapid rendering technique that often resonates well with less experienced students (Figure 1). We work on developing signature styles and signing as a symbolic gesture of completion and acceptance. Students present self-selected images demonstrating at least one example of each technique, taught in the course for display in the show. The show is attended by 50 to 100 visitors and the 4 or 5 jurors provide primarily positive critiques of the displayed works to each student. The finale of the juried exhibition is announcing seven works chosen to be displayed in the college library. A juried team of artists, the CVM librarian, and veterinary faculty help select the work for the library. The works hang in the library so part of the criteria is show examples that read well at a distance, can connect with other veterinarians, and demonstrate a high level of graphic skill using line, value, and sometimes color. The quality of the juried show art is quite amazing, with every student demonstrating remarkable improvement over their pre-class demonstration works.

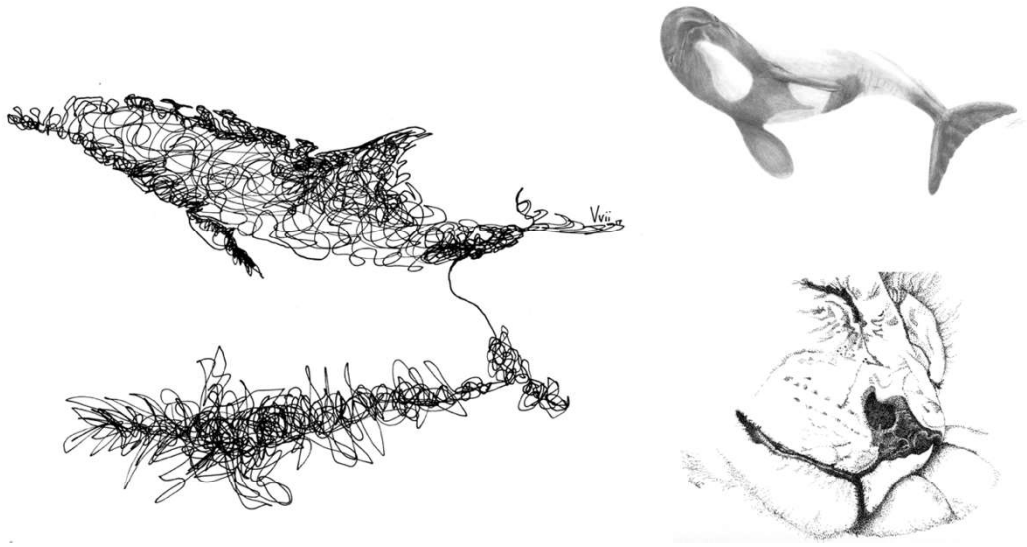

Figure 1. Three techniques taught in veterinary illustration. Rapid continuous line squiggle by V. Su. Pencil drawing by J. Griffioen. Ink stipple, by V. Isler. Photos by M. Stoskopf.

5.2 Landscape Architecture Drawing Course

The landscape architecture course begins with a focus on using a variety of media, basic drawing principles, and seeing relational elements in the landscape (shapes, patterns, textures, colors, proportions, other humans, animals, and plants). In most cases, landscape architecture students assume they know landscapes because they traverse them daily, but the class assignments serve to challenge this assumption. Students are required to walk in various landscape types (parks, campus, urban settings, trails, historic sites) throughout the semester. They are required to draw scenes they select on their walks. Stopping to draw creates decision-making moments in selecting what to draw on their walks. This encourages rigorous seeing and questioning of the landscape in all manner of detail leading to another level of consciousness in the student (Figure 2). What is the play of sunlight on the landscape? What environmental issues conflict with the human issues? What is visible and what is not visible? Is there a visible history or *herstory* to the landscape? Who and what inhabits our shared environment? One student from the 2020 spring semester drawing elective commented, “the walking aspect was very beneficial and important to improving observation skills and enforcing drawing concepts learned in class.” (Class

Evaluation 5/2020). The once a week, three-hour class is divided into three parts: discussion of the previous week's drawings, a brief lecture introducing a drawing technique, and an instructor directed demonstration inviting students to practice drawing from slide images that exhibit similar qualities to those found in the field. Group field trips are interspersed throughout the semester. The classes are moderated with discussions to allow students to present their drawings and discuss what was discovered by drawing a particular place. In discussions students often surprise you by making a comment that their drawing captured physical forces in opposition to a healthy human and nature relationship. These kinds of ideas do not surface when we take a simple walk to class. The discussions reveal the students' thinking along with struggles with the mastery of the media. Reviewing and discussing the works introduces the student to valuing their drawing for what it can reveal through the act of drawing. A former student commented in a class evaluation from the 2020 spring semester drawing elective, "he fostered a safe space for us to freely talk about our drawings and give each other feedback." (Class Evaluation 5/2020).

Figure 2. Student drawings of public walks. Fate Malek (2020) 21.59cm x 27.94cm ink and markers. Sarah Dunsford (2018) 21.59cm x 27.94cm. Markers. Cartridge paper. Raleigh, NC, USA. Photo by Fernando Magallanes.

6 KEY STUMBLING BLOCKS TO TEACHING POSTHUMANIST SENSIBILITY

The teaching situation is not different in the veterinary and landscape architecture course, where many of the students either believed they could not draw or struggled because they had little or no instruction prior to the course. Being highly intelligent and hyper-motivated in every aspect of their education, graduate landscape architecture and veterinary students hold themselves to unreasonably high expectations. However, many of the students need rudimentary help with basic concepts such as proportions and perspective. It is particularly important to convey to them the concept of starting over and making many attempts to achieve a desired product. In veterinary medicine this runs counter to the false but prevalent tenet of perfection in every effort and in landscape architecture those with science backgrounds respond in the same manner.

Two insights have surfaced after teaching the landscape architecture and veterinary drawing courses. Firstly, is reinforcing the concept of 'rigorous practice' and 'varied challenges' in accommodating successful learning (Duckworth, 2016). Students must learn to draw daily with time allocated to undertake the practice of their new skills they are being taught. Educational psychologists have also discovered the basis for learning something new is focused attention on a subject but also studying it from various points of view (Brown, Roediger, & McDaniel, 2014). Making the practice experience a daily event and varying the challenges each day offers the students' brain the ability to build new neurons. For example, varied

challenges for students might be to draw a tree with a pencil one day and ink or watercolor the next. Use of different media in assignments formulates cognitive knowledge by engaging the use of different drawing materials in practice. Using various drawing media in drawing promotes thinking and exploration in one media and allows new ideas when using a different media (Haraway, 2004). Purposely designed exercises challenge the student to develop more long-term use of cognitive skills rather than short term motor skill learning.

Secondly, students must learn to accept failure to succeed. Most students entering the class have difficulty learning because they possess the *Hazard of Perfectionism Syndrome,* a phrase coined by Stoskopf, the instructor of the Veterinary drawing course. This syndrome prevents many students from advancing because they assess all work during the learning phase against a standard of perfection. To overcome this, students are encouraged to understand the value of failure as a means of learning (Lehrer, 2012; Syed, 2010; Duckworth, 2016). Once the class is under way and many drawings are experienced, the students become more comfortable as they see their drawings improve. One former student commented, "[The instructor] really wanted us to improve and it was okay with us making mistakes and slowly improving our skills…I wasn't afraid to make mistakes and ask questions and I think that is a huge reason why I am better at drawing and sketching than before I took this course." (Class Evaluation 5/2020).

7 VALUABLE TEACHING TECHNIQUES

7.1 Veterinarians

In the veterinary illustration course, speed drawing development has been particularly valuable. The technique evolved over the first several years of the course to overcome student inability to draw from life. Even the "experienced" students were unable to generate recognizable sketches of animals from life before the advent of the teaching technique. The biggest challenges for the students were movement of the animals' poses and perfectionism stifling attempts at gesture drawing.

Projected still images of unique species of animals in relatively simple postures are displayed for 5 minutes for students to draw. Students are given repeat chances to draw the same image, but as the session continues, the time is reduced. The exact patterns of repeats and timing varies with the class response until only 2 minutes is allowed for a drawing. The students are exhausted at session end, but most seem to enjoy the chaos (Figure 3). They are amazed to discover they like the drawings executed in shorter times better than the drawings where they had longer time.

The second day of the course, another session drawing from still images starts with two minutes per drawing. Then under loud student protest, a one-minute limit is imposed. Their ability to do this startles them. After a short rest, the exercise shifts to drawing animals viewing one-minute videos. For the first attempt they are shown only the animal they are drawing. The second attempt adds a synchronized insert of the instructor's hands drawing the same animal in an upper corner. The inset captures an unedited first attempt by the instructor showing hesitations, explorations and obvious imperfections in the renderings as normally occurs. After each one-minute attempt, the class briefly discusses what worked and how it could have gone better. The sessions desensitize the students to motion and teach them to wait for the return to position of moving parts, or to meld body parts from different postures into a coherent sketch.

Figure 3: Veterinary students participating in class mirth during the exercise, live sketching of wolves, and rapid drawing from video exercise drawing by V. Isler. Photos by M. Stoskopf.

The morning of the third day the class is treated to a field trip to an animal sanctuary. They are allowed to sit in field chairs and observe and draw lions, tigers, wolves, small felids (a wild cat) and binturongs going about their daily routines. Student work is not directed or timed. The instructor moves among them while also sketching. The impact of the exercises from the previous days greatly improves the quality of the sketches. Even the least confident students are drawing as well as the best students in the class. The binturong also serves an important purpose with its unique anatomy as a largely vegetarian viverrid (mammal in the civet family). It requires the students to draw what they see without including what they know or expect (Figure 4).

Figure 4. Binturongs provide novel models for veterinary students. Close-up of a binturong, photo by Sidk-Kurniawan. Learning life drawing. Photo by M. Stinner.

7.2 Landscape Architects

Early in the course students need to understand how drawing with traditional drawing media (markers, pencils, pens) hampers growth and development of skills and ideas. One valuable technique in the landscape architecture course is one that involves reshaping the students' thinking. Drawing with twigs of various lengths and widths collected from trees is used in the introduction of the course to sever traditional ways of drawing and a posthumanist 'reframing' through the transgressions of traditional methods used in our programs. Each student is handed several twigs along with a small cup of black India ink **(Figure 5).** Asking them to use twigs as drawing tools helps break down pre-conceived assumptions about how to hold a manufactured drawing tool and brings attention to many new possibilities for making marks, lines, and informing the body and mind about what is being drawn.

Students are encouraged to explore as many different marks as the twig can make. The twig offers varied types of marks on the page by pushing, pulling, dotting, dragging, and rolling the twig. Holding a writing instrument to write is very distinctive from holding a drawing instrument and requires a different kind of precision and movement. Drawing with a twig allows loosely holding it and transfers the physical pressure and holding position to drawing with a pen, marker, charcoal, or watercolor brush. They also discover that it requires not only just hand movement to guide the drawing instrument on paper, but also their body. They realize they have access to the power from the wrist, the arm, the shoulder, or the entire force of their body in laying down marks. The newly experienced types of pressure and movement of the hand has them thinking about many factors open to them in drawing. Throughout the semester the use of twigs and similar activities are repeated to reinforce this new way of thinking. When they return to drawing with a traditional pen, pencil, or marker, they are more cognizant of how they hold and use their drawing instrument to yield a variety of ink marks when applied to paper and their drawings.

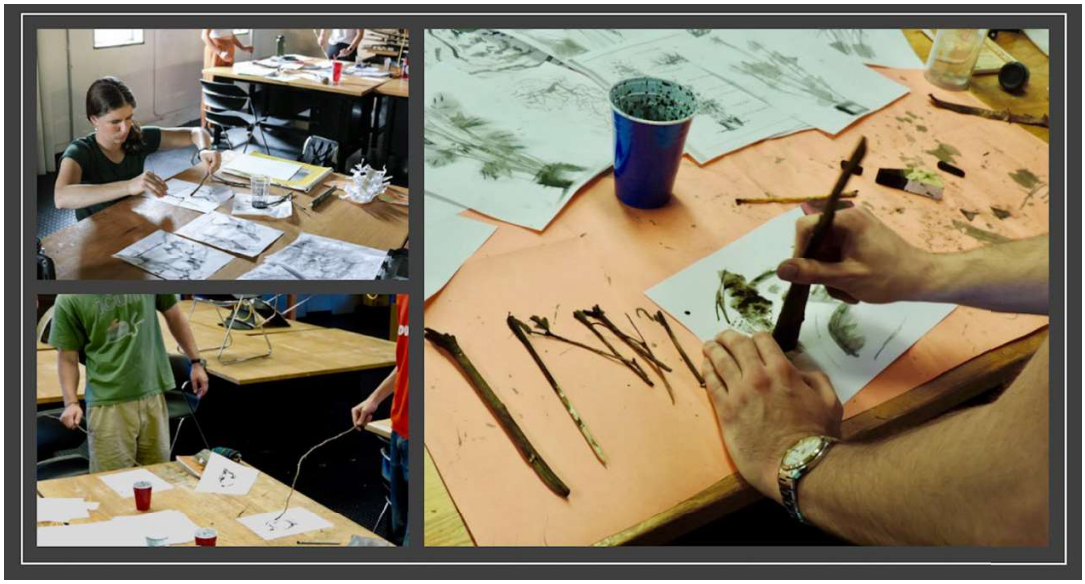

Figure 5: Students drawing with twigs and working in studio. Exploring mark making, hand-tool relationships, hand movement, marks, and using wet medium. (2018). Twigs, India ink, cartridge paper. Raleigh, NC, USA. Photos by F. Magallanes.

8 CONCLUSION

To draw and observe landscapes and binturongs means engaging firsthand with cognitive functions to counter existing humanist patterns of behavior and thinking. By unifying drawing with observational exercises delivered in the drawing courses, it reconnects veterinarians and landscape architects to humans, non-humans, and nature in a way the traditional anthropocentric humanist does not. The drawing approaches found in these courses have given the students an ability to reconstitute and disrupt humanist views and values that are questionable practices of humanism (Haraway, 2004). A former student recalls the valuable lesson in observation, "[the landscape architecture instructor] instilled in me

that observation is a critical component of a designer's process. I can't recall [another] professor who taught how to see in order to understand and store designer's observations…". (Documented letter 11/22/2019).

Students in these drawing courses have provided written feedback describing the benefits of learning to draw through direct observation. These individuals voiced an awakened consciousness about the environments they traversed and drew. John Griffeon, who is now a Doctor of Veterinary Medicine (DVM) at the Indianapolis Zoo, acknowledges values gained by taking both Stoskopf's drawing class for veterinarians and a design studio experience with Magallanes where he was required to draw. Griffeon explains, "I now approach aspects of my job, including the management of endangered and threatened species, with a more holistic approach… I find myself analyzing the structure of zoo exhibits and design of holding facilities, searching for ways to improve the function, appearance, and ultimately well-being for the spaces' inhabitants." (Documented letter, 11/19/2019).

Alignment of drawing course with posthumanism happens in four main areas:

- Information from other disciplines influences the formation of exercises and the way students are taught to sensitively approach their drawing subjects. Anthropology, Biology, Art, Anatomy, Horticulture, and History are examples of disciplinary influences prompting curiosity and questions.
- Seeking the visible and the relationships made visible. Account for a range of relationships ranging from invisible to visible.
- Observation amplifies one's perceptions. One sees more events / consequences / affects that permits better communication between disciplines and groups of humans.
- Posthumanism strongly advocates learning about the natural world for humans to recognize the place of humans and nonhumans within it.

The authors believe this paper pleads for making drawing available to professional disciplines like landscape architecture and veterinary medicine. Drawing introduces a different framework for teaching posthumanist theory. In the overly prescribing of professional landscape architecture knowledge and veterinary anatomical knowledge of landscape and animal subjects, exposing students to drawing and direct observation becomes a new and healthier approach to seeing the world. By de-emphasizing the professional norms and instead teaching inquiry through drawing, reconnects the eye, the mind, and the hand with a more earthbound consciousness in experiencing and looking at our world. The hope of the two drawing courses are to move students from being anthropocentric individuals to being posthumanist beings who assess earthbound environments for humans and nonhumans and observe and capture the complexity of our world with a greater ability.

9 REFERENCES

Barinaga, Marcia (1998). *New Leads to Brain Neuron Regeneration.* Science Vol 282 (Issue 5391) 1018-1019. DOI: 10.1126/science.282.5391.1018b

Brown, P.C., Roediger III, H.L, McDaniel, M.A. (2014). *Make it Stick: The Science of Successful Learning.* Cambridge, MA: Belknap Press of Harvard University Press.

Doetsch F, Scharff C: (2001). *Challenges for Brain Repair: Insights from Adult Neurogenesis in Birds and Mammals.* Brain Behav Evol 58:306-322. doi: 10.1159/000057572

Dubois, Paul. (1888). *Louis Pasteur.* M H S. The Magazine of art. Jan: 88-90/

Duckworth, A. (2016). *GRIT: The Power of Passion and Perseverance.* New York, NY: Scribner.

Dweck, C.S. (2006). *Mindset: The New Psychology of Success.* New York, NY: Ballantine Books.

Eagleman, D. (2011). *Incognito: The Secret lives of the Brain.* New York, NY: Vintage Books.

Gage, Fred, H. and Sally Temple (2013). Neural Stem Cells: Generating and Regenerating the Brain. Neuron. Vol 80 issue 3: 588-601. DOI 10.1016/j.neuron.2013.10.037

Gomez-Luque, M., & Jafari, G. (2017). *Posthuman.* In *New Geographies 09 Posthuman* (09: Posthuman ed., Vol. 09). New Geographies Lab Harvard University Graduate School of Design.

Gompertz, W. (2015). *Think like an Artist and lead a more creative and productive life.* New York, NY: Abrams Image.

Haraway, D.J. (2004). *The Haraway Reader.* New York, NY: Routledge.

Haraway, D.J. (2016). *Staying With the Trouble: Making Kin in the Chthulucene.* Durham, NC: Duke University Press.

Lehrer, J. (2012). *Imagine: How Creativity Works.* Boston, MA: Houghton Mifflin Harcourt.

Llinás, Rudolfo R. (2003). The contribution of Santiago Ramon y Cajal to functional neuroscience. *Nat Rev Neurosci* **4:** 77–80. https://doi.org/10.1038/nrn1011

Lin, M. (1998). Round Table Discussion. *In Beauty is Nowhere: Ethical Issues in Art and Design.* R. Roth and S.K. Roth, eds. (1998). Amsterdam: G+B Arts, International.

Luntz, F. (2007). *Words that Work: It's not what you say, it's what other people hear.* New York, NY: Hyperion Books.

Osborne, Roger. (2006). *Civilization: A new History of the Western World.* New York: Pegasus Books.

Ramachandran, V.S. (2004). *A Brief Tour of Human Consciousness: From Impostor Poodles to Purple numbers.* New York, NY: PI Press Book.

Root-Bernstein, R., & Root-Bernstein, M. (2004). *Artistic Scientists and Scientific Artists: The Link Between Polymathy and Creativity.* In R. J. Sternberg, E. L. Grigorenko, & J. L. Singer (Eds.), Creativity: From potential to realization (p. 127–151). American Psychological Association. https://doi.org/10.1037/10692-00

Root-Bernstein, R., & Root-Bernstein, M. (2004). (1999). *Sparks of Genius. New York, NY: Mariner Books.*

Rose, S. (2005). *The 21st - Century Brain: Explaining, Mending and Manipulating the Mind.* London: Vintage Books.

Rothenberg, D. (2011). *Survival of the Beautiful: Art, Science, and Evolution.* New York, NY Bloomsbury Press.

Stern, William T. (1982). *Maria Sibylla Merian (1647-1717) as a Botanical Artist.* Taxon Vol. 31, No. 3 (Aug.,1982), pp. 529-534.

Syed, M. (2010). *Bounce: Mozart, Federer, Picasso, Beckham, and the Science of Success.* New York, NY: HarperCollins Publications.

Sullivan, C. (1997). *Drawing the Landscape.* 2nd edition. New York: John Wiley & Sons, Inc.

Tversky, B. (2019). *Mind in Motion: How Action Shapes Thought.* New York, NY: Basic Books.

Valian, Sharon (1993). *Maria Sibylla Merian: Recovering an Eighteenth-Century Legend.* Eighteenth-Century Studies, Spring, 1993, Vol. 26, No. 3 pp. 467-479.

Wolfe, C. (2010). *What is Posthumanism?* Minneapolis: University of Minnesota Press.