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## Science and Society: A Creative Reflection Centering Perspectives of Emerging Scientists

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**Science and Society:**  
***A Creative Reflection Centering Perspectives of  
Emerging Scientists***

By Kelly Melville

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*Abstract*

In a series of poems, I reflect on what it means to be a scientist in society today, focusing on the fields of environmental science and biology. My project challenges the conception that science functions separately from social processes and societal structures. Reflecting on articles, books, and interviews conducted with Western students, I explore ideas concerning how the sciences could become more democratic or just. The readings were recommended to me by my faculty advisor based on my inquiry interests. The interview subjects were students and recent graduates of Huxley and the Biology department at Western Washington University. I was careful to describe the interview subjects' stories in a way that did not allow for speculation about their identities to ensure they would not feel inhibited in their responses. The goal of the project was to examine my field of study and prospective career from a broader perspective. The following summary statement describes the purpose, process, and outcomes of the project in more detail.

### *Summary Statement*

This project is an effort to try to reconcile some of the different kinds of knowledge I've learned the most from throughout my years as an undergraduate. One large body of knowledge I have become acquainted with is scientific knowledge about how the world works through my Environmental Science degree. This has been an eye-opening process full of astonishment, new insights about my place in the world, and new methods of approaching questions. Another life-changing learning experience has been exposure to new ways of conceptualizing the human social world. I've come to a deeper understanding of political tensions, social institutions, social justice, and responsibility. I find myself now with a deep desire to be a part of changes in the world that promote justice and equity.

This second category of learning happened in a context largely separate from the first: in social science and humanities classes as well as life outside of the classroom. I came into this project with the vague idea that I wanted to explore the connections between these two fields of learning, how science is related to society. In both of these categories of learning much of what I learned emphasized connections: we are ecologically connected with other species, we depend on and change the environment, social positioning affects every aspect of peoples' lives, and social institutions also shape our lives. Yet, because of the separate contexts, the connections between social processes and scientific processes seemed unclear. I had not anticipated the depth and breadth of connection I would find to exist.

I am certainly still a newcomer to the study of science through a social lens, but I hope that my project can inspire others to ask new questions, think of science (and society) in new ways, and start conversations. In particular, questions worth probing include: What does it mean to be a scientist in society today? How does elitism function in the sciences, and what can be done to make our studies and institutions less elitist? How can science become more just, equitable, objective, and in-line with democratic ideals? After diving into research, I came to the conclusion that it is not only necessary to find the connections between science and society,

but also to challenge the idea that they are such separate entities in the first place. I want to show that they are intimately intertwined.

People have a tendency to think of science as a category of processes that is totally separate from social processes. However, realistically, like many (or perhaps all) divisions that are sometimes conceptualized as dichotomies, this isn't true. Social processes influence scientific processes, and scientific processes influence social processes. Dichotomization is not inherently evil; it is a result of the categorization processes the human brain uses to sort information, which are essential to our development and ability to make decisions. However, I argue that dichotomization becomes problematic when it becomes institutionalized. The conceptual separation of science from society is so institutionalized that, for example, the idea of an anthropologist observing a scientific laboratory sounds absurd (Latour & Woolgar, 1979).

Dichotomization is even more problematic when it enables dominance and inequity. The sciences are not only thought of as totally separate from social processes, but more inherently true and believable. Separation from social processes is thought of as essential to the production of scientific truth, even though separation from social processes is simply not possible (Latour & Woolgar, 1979; Harding, 1992; Haraway, 1988). By claiming separation from social processes, scientists assert themselves as "omniscient" observers of truth (Haraway, 1988). This false conception leads to a technocratic society (Fischer, 2000), and it distorts our relationship with the conception of truth (Haraway, 1988; Harding, 1992). In my project, I explore the relationship between science and the social world, challenge the status quo, and explore ideas concerning what changes should be made to move toward a science with an improved relationship to truth, justice, and democracy.

I gathered information from readings, interviews, and reflections on my own experiences. First I read books and articles which addressed the questions I was seeking to explore. Some, especially the book *Citizens, Experts, and the Environment* by Fischer (2000), addressed how science functioned as an institution in society and what could be done to create a better

relationship between experts and the public. In other words, how can science function in a way that fits into our democratic ideals as a society (by "our society" I refer mostly to the U.S.)? Other readings, especially *Laboratory Life* by Latour and Woolgar (1979), explained how social processes function throughout all phases of the scientific process to create an end result (and indeed, science *is* a social process). In many stages, I found myself analyzing our societal relationship with the abstract concepts of truth, fact, and objectivity. Especially influential in this part of the analysis were Harding's *After the Neutrality Ideal: Science, Politics and 'Strong Objectivity'* (1992) and Haraway's *Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective* (1988). Finally, I felt that I needed to leave this project with some concrete ideas for solutions, or at least specific steps in the right direction. Accordingly, I read a few articles focusing on ideas for change and success stories. Please refer to the last page to see a list of readings which inspired my work.

The purpose of conducting interviews was to complement the perspectives presented through the readings with a variety of personal stories and perspectives from students involved in the biological and environmental sciences. I conducted three interviews total. One interview subject was a senior, one was a recent graduate, and one was a graduate student. The interviews were semi-structured. I brought a list of questions to spark conversation relevant to my study questions, but our conversations developed in a natural manner depending on the kinds of stories and perspectives the interview subjects chose to share. My interview protocol was approved by the Institutional Review Board at Western. Here is my list of basic questions, which were sometimes rephrased in various ways.

- What do you consider to be your first encounter or experience with science?
- How has your conception of science as a field or an institution changed since you first became acquainted with it?
- Do you have any stories relating to bias or elitism in science?
- Is science objective? Should it be?

- What do you think should be the relationship between science and the ideal society?

The emphases of our conversations varied considerably. One focused largely on personal reasons for pursuing science and the interview subject's particular field of study. We discussed how social position and circumstance shaped those choices along with other factors. Another interview centered around a specific experience with extreme elitism in science and the need for better communication between scientists, policy makers, and the public. The final interview subject offered new perspectives on many of the more academic and abstract ideas I have been grappling with. The interview subject described how these ideas played out in the real world and on an international level. There were several thoughts that all of the interview subjects expressed, which I have summarized to the best of my ability below.

- Science should be grounded in what society needs and asks for.
- The hard sciences' obsession with publication as the main way to obtain validity is frustrating and skewed.
- The difficulty of obtaining an education, and the high level of education necessary to become a recognized and respected scientist, is a major obstacle to diversification of science.
- It's frustrating that some fields within the sciences are more highly respected than others, especially because these values don't seem to align with the meaningful impacts of those fields.

These ideas cannot be said to be held in common by anyone other than the three students interviewed, but it was interesting to hear them repeated. These common ideas were generally supported by the readings, especially the first two assertions. The readings support the latter two articulations, but do not necessarily focus on the indicated problems specifically. Thus, in addition to reinforcing ideas that were thoroughly discussed in the readings, the interviews provided examples of specific phenomena related to elitism that were not as thoroughly discussed in the readings I chose.



Finally, I reflected on the information I had gathered by writing poetry. Why poetry and not a thesis paper? Writing a thesis paper felt contradictory with one of the main assertions of my project: that science should be more accessible and less elitist. The culture of writing in a specific kind of way that only specific people with specific training can comprehend opposes the ideal of democratic discussion with the community, and in my opinion, is one of the cornerstones of exclusion in science. Academic papers are not inherently evil, and I don't think we should do away with them completely. However, I believe that one of the main ways that science should change is in the way we communicate, and we should move away from specifically-formatted academic and scientific papers as the default and dominant form of communication. Especially because my project is meant to be more of a beginning of questioning and an exploration of new ideas than an end statement, creative writing is an appropriate format. My hope is that this format of expression will be accessible to a broad audience and reach people in an emotional and personal way. I also hope my project will inspire others in academia to explore new forms of communication.

Out of all forms of creative writing, why poetry specifically? I was drawn to poetry specifically, because poetry has been another context of learning I have grown through over the last four years, although this context has been separate from my academics until now. So in the end, my project involved connecting three subject areas I have learned the most from over the last four years: the "hard" sciences, sociological theory, and poetry. Writing poetry about a new subject matter offered a daunting but exciting challenge, as did writing about academic ideas in a new format. I am very glad I decided to take on this challenge, and I am excited to present my first collection of academic poetry about a subject that I believe is imperative to the future of humanity.

Although all of the poems inevitably incorporated information gathered from many of my sources, most had one or two main sources of inspiration. I have noted these sources below each poem, and the complete list of academic inspiration can be found at the end of the document. These are the same sources which are referred to throughout the summary statement.

## *Science: A Complicated Love Affair*

It started out with

Questions

The mystery of the ocean, space, the human brain

I liked systems, mechanisms, and

Trying to make sense of it all

There's so much unknown about the ocean

When I got bigger

They called it science and math

My brain, it works in a certain way

I was good at something

So I kept going

I found my first questions in long walks through the jungle

And holes dug on the beach

I found myself

Falling in love with something bigger

I started reading, learning

That trillions of piles of trash accumulate

Into something called the Great Pacific Garbage Patch

That was the saddest thing I'd ever heard

And I decided to do something about it

Science

Then came the scientific method

The way truth is cut and dry

Between facts and things that aren't true

Next I learned

Science isn't cut and dry

The deeper in I go  
Being a scientist means  
Accepting uncertainty

Now I wonder  
How am I supposed to explain my job  
To someone who only learned the cut and dry?

I spent two years reading journals  
Before my week-long experiment  
The experiment was  
Not enough supplies  
One jar got more air than the other  
And then everything died  
At the conference they said  
“Yeah, that makes sense”  
“And mistakes, that’s just fine”

Now I think uncertainty means  
You need more time to develop  
Culminating becomes preliminary  
Learn to build settlement plates differently  
Design a tighter lid

It’s not always good to have definitive results  
If it leads to a definitive plan  
Science is useful like a telescope  
But there are people around you on the ground  
You shouldn’t ignore  
And it’s not always good to say it straight  
We’re not always straight

We are full of maybes but  
That doesn't mean our telescopes don't mean anything  
Now I want to focus on  
What do I produce?  
How do I impact society?

There's pressure to choose something established  
And you've got to work your way up  
Start out cleaning tanks  
But why I came here is  
My professor was studying these creatures  
And I like them too  
And they're important to our survival  
And there's so much unknown about the ocean

It started out with questions  
And then, things got complicated  
Complications are what you get when you ask questions

Complications like  
Large research universities think  
The only valid career path is  
PhD then big research institution  
While only about 8% of PhD students find research jobs  
Complications like  
Universities intentionally not hiring women because  
They're going to start families in a couple years  
And then that will be their whole lives

And if you're not cut out  
To work 60 hours a week  
Have your parents send you groceries when you don't have time  
Not speak back  
And not put your name on work you've done before your PhD

If you don't have specific qualifications like these  
You shouldn't be a scientist

There's a certain process to becoming a scientist  
It's called weeding out

I know I could make it  
Get a PhD, study what I want  
Become someone as respected  
As the asshole I interned for

I know I could break through  
The glass of the upper class  
Of scientists who don't think  
Anyone else is worth talking to  
But I'm so disenchanted with the whole system

It started out with questions  
And then things got complicated

But why I came here is  
There's so much unknown about the ocean

Inspiration/References: This poem was inspired mostly by one interview in particular, but it incorporates aspects of two different interviews to embody a combination of these two interview subjects' experiences and perspectives.

## *Technocrat*

Google: "Technocrat: A member of a technically skilled elite"

Google: "Elite: A select part of a group that is superior to the rest in terms of abilities or qualities"

We know elites aren't really better than anyone else

Or do we?

Google: "Superior:

1. Higher in rank, status, or quality
2. Further above or out; higher in position"

So according to google, Elites are Higher but not always Better

I googled Better for spite

But

I already know what it's like to

Get lost in a stream of

Terminology I don't want to admit I googled.

These are words

We have heard all our lives

But we're not always grounded

In meaning when we utter

People ask: What do you mean by "elitism in science"?

I don't want to admit that I googled:

"Elitism:

1. The advocacy or existence of an elite as a dominating element in a system or society
2. The attitude or existence of a person or group who regard themselves as belonging to an elite"

I've been thinking lately

Of the strands connecting definitions 1 through infinity,

I think that's what I mean when they ask

Those strands are not just the fractions between.  
I would like to draw their slivers  
The connection between our attitudes, our existence  
And the "advocacy"  
Of the system  
Our existence and  
Existence of elite as dominant

Of course  
The word Elite can't exist without Dominant  
It is one of those linguistic circles  
That becomes invisible  
With the moving fingers  
Of those addicted to Google

I know  
Scientists don't think of themselves as elites  
Or if they do  
It's elite as in wealthy  
Or white or man or abled or straight,  
These elites in science are  
Important but not the whole picture  
I'm talking about elite as in technocrat

Let's go back to the start  
Google: "Technocracy: The government or control of society or  
industry by an elite of technical experts"  
The question: Is this democracy?  
Isn't so often uttered from our throats  
As are statistical certainties and measures of diversity

Can elitism be part of democracy?

It depends what you mean

Google: "Democracy: A system of government by the whole population or all the eligible members of a state, typically through elected representatives"

Or also "control of an organization or group by the majority of its members"

I don't think the majority

Is always right or just but

Democracy is a good place to start

Especially at its roots

"Rule by the People".

The antithesis of "the people"

is "only some people"

More than Democracy I'm for equity

Voice is one of the goods to be shared

In science, is voice something that's shared?

How can it be when we need experts

To tell us the risks in our own lives?

To tell us if our water is safe to drink

How much sea level will rise

What food is safe to eat

If our planet will survive

It's hard to hear meaning

Through all the expert noise

How do you know who to believe?

You need a special education to do that

You need to go to school

Take expert classes and become one of them

Then you will know who to believe



See what I mean?  
Honestly, that's why I'm here  
But I don't have a Master's Degree  
So what do I know

Listen,  
It isn't wrong to be an expert  
To devote your life with intensity  
To a focused knowledge  
Is admirable and  
Maybe what we need,  
But it's time to ask  
What knowledge do we value?

We have to recognize  
There isn't just one kind  
The world isn't all formulas and values of P  
Not all rules of ecosystem function and biodiversity indices.

There's also, for example,  
The kind of knowledge that  
You feel your heart rooted to, knowing  
The exact smell of fall in your town  
How your grandma will respond to the news  
How it feels to be you at a particular time

All that isn't the point.  
The point is,  
If science is to become untangled  
From the treetops of technocracy  
We need a root system  
Normal life roots to remind us  
We're all only specialized citizens

To remind us how  
Our heart strings are related to our beakers  
Because right now  
We're too often connected by dollars bills  
And not by the blood pumping from our people

That's how we built the atom bomb  
A system connected by dollar bills  
Cut off from the lines of scared children  
We cannot pretend we aren't of the political  
While brushing bombshell dust off our lab coats

I need Google for linguistics but  
Pretending to be above social processes  
Seems to me  
Synonymous with elitism

I want to wash that from the depth  
Of my throat before  
Ever calling myself a scientist.

Inspiration/References: This one is inspired mostly by Part One of Fischer's book, and it also describes many of the thoughts and feelings I confronted while starting my project. The definitions were retrieved from Google Dictionary.

*Wynne vs. Beck*

Have citizens ever trusted experts?  
Or is distrust inert?

Ambivalence may be expressed  
But what of suppressed  
Lack of dissent  
Doesn't equal consent  
Doesn't equal trust  
Nor even nonplussed  
Dependency often leaves  
One who disbelieves  
Silent

Experts act as though  
God directs the flow  
Of advancement of knowledge  
Our allegiance we pledge  
They say this isn't a decision  
But omniscient vision

But this is constructed  
And as we're instructed  
Citizen risk calculation  
Is of multiplication  
Chemicals in our lives  
Times risk of expert lies  
Plus social risk of opinion  
Makes a difficult decision

Inspiration/References: This poem is based off of a section in Part 1 of Fischer's book which describes the two opposing analyses of the relationship between citizens and experts. The poem attempts to embody Brian Wynne's objections to the analysis presented by the German sociologist Ulrich Beck.

*Environmental Science and Scalpels*

When I say Environmental Science  
People think  
You're saving us or  
You're trying to join the political mess  
Without saying so.  
Neither is true

But I want to go back  
And remember  
Environmental and Science  
Weren't always friends  
Still don't see eye-to-eye always

The early environmental movement preached against  
Science and technology, creators of problems  
Does science now spend the same energy studying its creations?

It isn't that simple  
But it's important to remember  
Where we come from, remember  
Both Science and Environmental Movement  
Have been called exclusive, destructive

Anyway,  
In the 80s, the EPA started depending on  
Risk-Benefit, Cost-Benefit analysis  
This required a few more experts in offices  
And there were fewer people demanding in the streets  
But the ones who did  
Pointed at the experts holding the same scalpel  
As the one that carved the damage

The experts said "It's not the same"  
But the edges looked familiar  
And it came from the same factory

This scalpel will find the answers  
The real answers  
Out-yell special interests  
Out-yell the yellers in the streets

Out-yell, meaning  
To talk very quietly behind closed doors  
To publish papers soaked in specialized vocabulary  
Engineered to resist the yelling  
Resist social feelings  
Resist the politics they drag along

Politics make everything fuzzy  
Shape analysis less sharp  
Like a dull scalpel,  
Less power to the hand holding it

And the people say  
Thank God we have scalpels  
To save us

Inspiration/References: This poem is inspired chiefly by Part  
Two of Fischer's book.

## *Political Science*

How did we get here?  
Global warming conspiring  
Debates on the news  
Websites “debunking” the myth  
Scientific counterevidence  
*March for Science*,  
I believe in science  
One of the most political statements

I believe in science  
But I have often wondered  
How it became so... political

And when did the becoming begin?  
Does a becoming exist or just an “always been”?  
Always been but different now...

Once upon a time  
Policy people turned to science  
To de-politicize their processes

The thing is  
To scientists  
Science is laden with maybe  
Uncertainty is every day  
There exists at least enough humility  
To say we’re not yet sure,  
De-bunked hypotheses are exciting, meaning  
There’s so much more to learn.

But science is also perhaps  
Another creature  
Found in textbooks filled to brim  
With “Hard Facts”  
Theories with capital T that  
Make test-taking students anxious

Performance is different than résumé,  
Science didn’t make policy less political

Ever-expanding uncertainty  
Isn’t so exciting when  
Asked to make decisions

Power fractures uncertainty  
Into multi-dimensional realities like  
Partisan politics.

Uncertainty does not look good in power  
Looks like Red and Blue  
But more evidence needed versus it’s enough

Now people whisper in their sleep  
Science isn’t good enough for us

The whispering isn’t new  
But different now  
More like red and blue

I want to say that science is good enough  
But I know, it’s not all we need  
It’s a beautiful questioning  
But it’s not the answer  
And maybe the problem is

We want it to be the answer  
Too badly  
Now here we are in war  
Questions and answers  
Shoot through high-tech rocket launchers and antique canons  
And the question is  
Where do we go from here?

Inspiration/References: This poem is inspired chiefly by Part Two of Fischer's book.



*The Mysterious Creation of Facts*

Sometimes definitions are more complicated than they seem  
 Trying to boil an idea down to a short phrase  
 Is no easy task

Fact: A thing that is indisputably the case  
 Indisputable: Unable to be challenged or denied  
 I have always imagined that facts exist to be discovered  
 But maybe the search is what creates them  
 The search: the process of boiling something down to a meaning

The boiling process cannot be separated from what we consider  
 social  
 Words like reputation and validity can't be scoffed at  
 Did you observe a tree falling in the forest?  
 Or did you just think you did?  
 You hadn't slept in a week  
 So how are we to know the truth?

But gravity, you can feel it,  
 We all can  
 Since Isaac Newton discovered it  
 Was it a fact before or after?  
 Now we have The Theory of Gravity  
 More than a fact now  
 And before it was less, a hypothesis  
 Before that, nothing?

It's not a fact that there's life on other planets  
 But it might be true  
 I think it is

"True: in accordance with fact or reality"  
 But that can't be right  
 Truth, I think is at the root of everything  
 But not as tangible as our words  
 And reality is more than a list of indisputable truths

Fact is what we do with truth  
Or what we think it is  
We hope we're right when we think we understand  
Eventually, hope metamorphoses into believe  
And facts are constructed by human minds

If a fact is something indisputable  
Unable to be challenged or denied  
Then facts don't exist  
Anything can be denied  
Just maybe not with validity  
But what is validity?  
If it's popularity  
Climate change might not be real  
Not a fact anyways

If you were to go back 5000 years  
This land would be here  
But America wouldn't exist  
Didn't exist before it was "discovered"

Maybe if you were  
Donald Trump  
Climate change wouldn't exist  
But you'd still be expected to clean up the mess from the  
hurricanes  
Apples still fell before gravity

My climate change professor told me someone else told him  
"All models are wrong, but some are useful."  
I'm pretty sure I think about that more than anything else from  
that class

Whenever I wonder why we continue to categorize our lives into  
boxes  
Like it's our job, or human nature

I know that our boxes are models  
And some models are useful  
But all are wrong  
And when they're not useful anymore  
They're just wrong

But I think climate change models could be put to good use.

Have you ever thought about how much of your life you spend  
trying to create order?  
There's nothing wrong with that

When I tell you the story of my life  
It's only a model of what really happened  
Because what really happened is too  
Huge and messy and I don't even remember  
To be worth listening to  
I often say I'm a disorganized person  
But my messy room still stresses me out sometimes  
And my thoughts  
They are sorted meticulously

Science is a creative process  
It's not about discovery  
It's about creating something useful  
Something that makes sense out of the mess

Inspiration/References: This poem is inspired chiefly by  
*Laboratory Life*. I also used definitions from Google  
Dictionary.

## *Value-Neutral Science*

Politics *on* science shapes  
What type of research  
How it's interpreted  
It is sometimes called  
Politicizing Science  
Done by outside special interest groups

But politics of science can also be  
Politics *through* science  
Through our institutions  
Through the things we think about in our sleep  
Our priorities based on  
The way our hearts are shaped

I mean, the hearts in our brains  
We think through our heads  
But every scientist knows  
What I mean by "our hearts"  
They're in there too  
Our background prunes the pathways  
Where our priorities, language, and mannerisms grow

I used to want to be a neuroscientist  
What I learned was  
It's messy  
We cannot pretend anything  
That happens in our heads is  
A clear process  
I mean, we cannot pretend  
It's disconnected  
From anything else

Say, when the Nazis searched for medical explanations  
For what makes an outcast an outcast  
What makes poor, criminal, different  
Did they politicize or depoliticize the sciences?

Did you know tuberculosis  
Is caused by a bacteria  
And also poverty?

Do you think they knew they were monsters?  
The Nazis I mean  
I mean know they would  
Go down in history like that

Did you learn this in history class?  
In sociology or psychology?  
Do you feel like you escape when  
You go to BIO 243 and learn about cells?

What I am learning is  
You can never escape  
We cannot do science without  
Racism, classism, imperialism  
Our history books breathing down our necks  
They are always there  
Just more invisible sometimes

You know, social Darwinism  
Existed before Darwin's theory  
But when Darwin read the former he said  
It makes sense.  
Was the mirror there before  
Or after he wrote the theory?

Of course, evolution exists,  
But do you think if  
The theory was written by  
A socialist  
We would still learn about  
Competition  
Before mutualism?

Institutional politics  
Is the kind that is just there  
Like the building we work in  
The building is called value-neutral  
It is called Our History Books  
Images of white men  
On every page

This is normalcy  
We must have standards to adhere  
To normalcy  
So our science doesn't become  
Skewed  
Or political

Does losing value-neutral mean losing  
any reminiscence of structure?  
Will objectivity disappear?  
And then truth?

Some questioning is scary but  
Often we are not losing as much as we feel  
What of  
Fairness, honesty, perhaps "detachment"  
They mustn't fall with neutrality

What of  
Seeing another perspective  
Common sense  
Discarding wishful thinking  
Un-neutral is not un-critical nor non-objective

Perhaps neutral is less critical  
It doesn't critique normalcy  
Which it names "the obvious"  
Un-neutral says  
Agreement doesn't equal truth  
And lack of questioning doesn't mean  
There's nothing to question.

If common sense is the new standard  
We must ensure it is not simply  
Feelings of agreement within "the community"  
Who wrote the books,  
This agreement is another shade of neutral

Yes, methods for objectivity exist  
But methods are just one section  
Of every research paper.  
The problem with peer review  
Is the "peer" part  
Because sometimes the peers are all the same  
The ones who wrote the books  
Or read them over and over  
With little else to see

You see, I'm not just talking about diversity  
I'm talking about the normalizing routine  
That teaches what not to question

Social location, priorities, the root of the questions  
And the assumptions not detected  
Are the most powerful

We can't assimilate news  
That doesn't arrive  
And we can't look from anyone else's shoes  
If we don't see them as shoes  
Don't even know they exist

Neutrality has fallen but  
We are still living in its shadow  
We are pacing back and forth  
Between this is the only way and what's the point anyway.  
This is not an either/or check box  
We are not forced to relativism by rejecting absolutism

Is it so hard to believe  
We can have truth from bottom up  
Or sideways,  
That we find truth in our buildings  
But also in the fall

Inspiration/References: This poem was inspired largely by Haraway's *After the Neutrality Ideal: Science, Politics, and "Strong Objectivity"*. It also draws heavily from anecdotes my advisor, Dr. Mark Neff, shared with me in a casual setting over the course of the quarter.



*Colors from my Younger Self*

When I was little  
I came up with a theory  
That colors look different to everyone  
Though we were using the same names,  
That my red is different than yours

I remember my friend told me  
The same thing like a fact  
And I said  
I thought *I* told you that  
She said, no *I* told you  
Anyway, we all agreed it must be true  
It's not a novel idea to children  
That there could be more than one reality

When I was a little older  
I wrote another theory and  
I never really told anyone  
Except maybe my mom

It said, how could there only be one right perspective  
When there are more than a billion to choose from?  
Wouldn't God give us better odds at finding truth?  
So all perspectives must be right in their own way  
I just have to choose what feels right on my feet

Years later, I heard the same idea  
Echoed in a college classroom attached to the name *relativism*  
By then, I had already discarded the idea because  
I decided being a good person and finding truth  
Couldn't mean whatever you feel like.  
I knew truth was complicated, but  
I could feel there was such a thing as reality.

But I still believe  
People see colors differently  
Including not at all  
And, the answer to a lot of questions is  
It depends.

So what constitutes truth?  
Are all knowledge claims power moves?  
How do we commit to the pursuit of real truth  
While acknowledging colors  
Are different for everyone

What if I told you  
Some contradictions are necessary  
The foundations of the universe are paradoxical  
And sometimes our models don't make sense  
So we need another metaphor

Some battles aren't worth their bullets  
Like Truth with a capital T versus no truth at all  
When 12 year old me wrote my own theory of relativism  
I wasn't looking for knowledge  
What I was looking for was something like  
the ground

Do you ever feel out of your own body?  
Sometimes when I'm calculating statistics  
And I get the answer right  
I feel like it's been dropped down  
From somewhere bigger like  
The heavens  
But I know the answers are constructed by my own hands and  
Though the methods come from a bigger field  
Statistics is just  
A bigger body of humans than me

Statistics come from some  
Place, some body  
Or some *bodies*  
like mine but different

We don't use the word *I* in scientific papers  
And usually not *team*  
Have you ever thought about why  
We use the passive voice here  
And not anywhere else?  
Microsoft Word corrects me

Microsoft Word isn't always my friend  
But sometimes it's got a point  
And it's asking me  
Who did it?  
Who collected the data,  
Determined the statistical parameters,  
Determined what it means?  
I say *It doesn't matter*  
*Science does it okay?*

But science doesn't do science  
People do science  
And colors look different  
To different people  
Grounded in different bodies  
And type of vision ability

And shadows look at you differently  
Depending where you stand  
And the stars can seem to rearrange  
After a long plane ride  
Instead of saying *it doesn't matter*  
Let's learn to read maps

Say *this* is where I am  
This photo of the truth  
Is from a here not everyone can be

Understanding can't be felt outside a body  
At least while we're alive  
Even our scientific methods  
Are not Gods

Satellites float above us  
Like haze  
And robot cameras spy  
But they were built by hands  
Made of flesh and bone

Knowledge is always situated  
In a brain somewhere  
Created, not discovered  
And knowledge and truth  
Are different words for a reason

I'm 22 years old now  
And I'm saying  
It still doesn't make sense  
To search for the one right answer  
There's such a thing as wrong but  
Truth's more like a rainbow  
Or a beautiful sunset  
We can only ever photograph

Inspiration/References: This poem was inspired chiefly by Haraway's *Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective*. Clearly, it also draws heavily from my own life experiences.

*Robot the Asshole Scientist*

I know this guy  
He's kind of like a robot  
He short circuits sometimes  
He's brilliant, obviously  
But the biggest asshole I've ever met

Robots are very particular  
About the kinds of people they'll let do specific things  
To write your name on a paper  
You have to have a PhD  
PhD is the only programmed code for ambition  
No, even if you spent ten years  
Doing everything in the lab  
Coming in on the weekends  
Working more than you were paid for  
You won't meet the requirements  
Without those three letters

It requires a certain kind of education  
To be respected by a robot  
And it requires a certain kind of person  
To be given the time of day

Forget going into the robot business  
If you talk back to authority  
If you're shy  
If you don't know how to stoke an ego  
If you can't show your intellect just enough  
To be valuable  
But not so much to be rude

There's something in the manual  
About having an advantage  
If you're a tall blonde female  
At least you've got a higher chance  
To meet this robot in the first place  
Perhaps be called a favorite  
Although, when it comes to making decisions  
Man is code for agency

This robot guy  
When I met him I found out  
I have the qualifications  
But the robot business is not for me

I got tired  
He didn't comprehend what I said  
I guess robots don't know how to listen  
Only categorize

Robots are high maintenance  
Require twelve hour days  
And all you get is numbers to announce  
Calculated away from sight

You don't learn anything from staring at a robot  
You get tired of being told you're wrong  
With no explanation  
I know, he's not the only robot  
He's kind of an extreme case  
So I shouldn't judge them all equally  
And some scientists are less robotic than others

But when I came back some professors told me  
That's totally normal  
I don't understand the problem  
If you don't like that robot  
You're not cut out for the business

Most robots seem to be particular  
About access codes like PhD  
Following user guides word for word  
And they won't say anything useful  
For the sake of being useful

Robots are not grounded in anything human

There are other things to pursue in life  
Besides pleasing robots

Inspiration/References: This poem was inspired by an interview. The first-person narrative is meant to embody the interview subject's experiences with elitism in science, and with one character in particular, in a humorous manner.

Scientific Humility

**H**uman uncertainty is inevitable  
**U**ntie your stubbornness to yes or no  
**M**ake new frames with ethics  
**I**lluminating when limitations are reached  
**L**ight needn't only come from analysis  
**I**f you know how to  
**T**reat the disease  
**Y**ou can accomplish a lot in the darkness

Inspiration/References: Inspired by Jasanoff's *Technologies of Humility*.



## *Practical Alternatives*

Some days we need toxic chemicals to exist

But the problem is the need

Not the chemicals' existence

Why do we need to know

The exact toxicity

When we can find an alternative?

I would never use a car

If I could go so fast on my bike

Or apparate

I'll probably never apparate

But non-toxic replacements

Decreased trichloroethylene by 90%

Inspiration/References: This was inspired chiefly by Sarewitz's *World view: A tale of two sciences*.

*Thoughts on Tangible Solutions*

I don't know how to write poetry about solutions.  
My poetry is abstract  
And I want to be part of the solutions  
Specific, local, tangible solutions  
But I only know how to write poetry.

But solutions exist  
Are formulating, being spun constantly  
Maps are drawn, redrawn again and again  
Just because you don't see them  
Doesn't mean they don't exist  
Just because I can't describe them beautifully  
Doesn't mean I can't imagine them.

For example  
Sir Albert Howard derived many of his ideas about agroecology  
From peasant farmers in India  
Whom he referred to as professors,  
And now consensus conferences allow normal people  
To deliberate on issues in the scientific fields  
At least give recommendations,  
And non-toxic replacements  
Decreased trichloroethylene by 90%,  
And community-based participatory research  
Allows all kinds of people without a title  
To be part of science  
And incorporates reflection and relevant action.

These systems are not perfect but  
They're something  
And something's a whole lot more than  
Business as usual  
Change is something.

I have a dream that someday my poetry will grow legs or hands  
Will become something tangible in many ways

I don't know the path to make it there  
But Andean potato farmers might know what to plant better  
Than agriculture scientists  
And indigenous trackers in South Africa  
Can track better than trained specialists  
Without the radios, helicopters, and computers  
And some are finally allowed to and paid  
They should be in the first place  
But some things change and  
Intuition can go a long ways

Our map doesn't need to be perfectly drawn  
To start building something

There are people doing things  
There are maps for change  
And my poetry is dark but  
Isn't that beautiful?  
Isn't that something to hold like hope?

Does it make your feet want to move,  
Your hands want to grasp at change,  
Your mouth speak brave,  
Or your fingers type messages?  
Does your body want to shuffle into action?  
I hope so.

Inspiration/References: This poem was inspired by multiple different sources, with specific examples taken from Fischer and Sarewitz. Jasanoff and Guston's articles also played an important role in the inspiration of this poem.

## *Telephone*

Have you ever tried to count  
Everything you never think about?  
Yeah, that's a rhetorical question  
But I wonder if the length of that list  
Would equal carefree-ness or privilege  
I wonder if there's limited space  
Or if the list keeps getting longer  
With isolation like  
Staying in our home towns  
Or a specific scientific community

Some things you never think about  
Are pillars other people have to work their thoughts around  
Their lives around  
Like I never think about  
How much more likely I am to be published in English  
Or how much scientific-ness depends on  
Being published internationally  
Or the U.S. stamp of approval

When I first read about community-based participatory research  
I didn't think too much about where it came from  
Or how many rounds of the game "telephone"  
Its Brazilian founders might have felt like they had to play  
Before finally hearing it uttered aloud  
How different it felt from  
What came from their mouths in the first place  
First but not allowed to be as loud

Some things always get lost in translation  
Like how did "community" come to mean industry  
Or how did emancipatory tradition for liberation and consciousness-rising  
Become so well-fitted into capitalism

How did the questions  
“Who is our knowledge serving?”  
“And why are we studying that?”  
Become erased?

Replaced with  
Unintentional exploration and curiosity  
And the skipping record of  
Unbiased, unbiased, unbiased

Some things I used to never think about  
I spend a lot of time lost in now  
Maybe that’s some kind of hope  
I don’t want anyone’s truths to be invisible  
And maybe my lost means  
We can find a switch

I know I’ll never see everything  
Or everyone  
But when there are walls separating us so  
The pillars to the lives of millions of people  
Never enter the minds of another million  
I think that’s part of the heart  
Of everything wrong with our world

Especially considering  
There’s only one in who knows how many  
At the end of any game of telephone  
At that last line, the loud one  
Feels like everything

Have you ever thought about  
How much your thoughts are controlled by the setting  
Or how you feel like they should be?  
Social justice is for student movement meetings  
Cell mechanics is for biology class

Writing poetry is for free time  
They always taught us to look for parallels  
But we're afraid to write them down  
Because rational scientific legitimate  
We learn mean something very specific

But I can't count how many times  
I've thought about my love life or lunch or social justice  
During biology class  
And I bet you've done it too  
So here I am writing poetry about  
Social justice for biologists

After the March for Science  
People wondered how scientists somehow failed  
To bring in more people from outside  
Of academia  
They thought maybe that's something new to discover  
Maybe something they'd never thought about before  
But some people had written thousands of words about that  
Saying you can't just convince people science is amazing  
When you're not hearing back what they want

All telephone lines should go both ways

In the light of alternative facts  
We reflex to halt any kind of deconstruction  
To cut off the lines questioning our institutions  
And inciting chaos  
But the distrust, the bad connection  
Is exactly the problem in the first place

We've got to learn to be citizens  
And not only scientists  
And even a two-way telephone line isn't good enough  
If it's only at the end of the day

When the decisions have already been made  
We have to listen all day long  
And discussion about logistics isn't enough  
It's time to discuss values

It's funny how easy it is  
To stop thinking about something  
Especially without  
Well-functioning telephone lines

Like where the equation came from  
Like how did we get here in the first place?  
And what values are guiding my work?  
How does this serve society?  
And is it really what society wants?  
What might we not be thinking about?

I don't like being lost  
And some things aren't pleasant to think about  
But some things I used to never think about  
I spend a lot of time lost in now

But maybe that's some kind of hope  
That here we are in the chaos  
Crossing things off the list  
Of things we never think about

Inspiration/References: This poem was inspired by an interview. Unlike in the other poems based off interviews, the first person "I"-statements embody my own perspective and reaction to the interview.

*Academic Sources of Inspiration*

- Fischer, F. (2000). *Citizens, experts, and the environment: the politics of local knowledge*. Durham, NC: Duke University Press.
- Guston, D. H. (2004). Forget Politicizing Science. Let's Democratize Science! *Issues in Science and Technology*, 21(1), 25–28.
- Harding, Sandra. (1992). After the Neutrality Ideal: Science, Politics, and “Strong Objectivity”. *Social Research*. 59 (3).
- Haraway, Donna. *Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective*. *Feminist Studies* 14, no. 3 (1988): 575.
- Jasanoff, S. (2007). Technologies of humility. *Nature*, 450(7166), 33.
- Latour, Bruno & Woolgar, Steve. (1986). *Laboratory life : the construction of scientific facts*. Princeton, N.J. :Princeton University Press.
- Sarewitz, D. (2009). World view: A tale of two sciences. *Nature*, 462(7273), 566.



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