Benjamin Huang, University of Virginia, Chemical Engineering, 3MT competition
"A New Approach to Cooling Hypersonic Vehicles"
https://www.youtube.com/watch?time_continue=4&v=FtwKMKVgUHE

"Imagine if America could strike back at its enemies, such as Isis, or Al Qaeda no matter where they are in under an hour, all without putting our troops at risk. It sounds impossible, right? Here's how we do it: By using hypersonic vehicles traveling at over five times the speed of sound we can deliver explosive payloads to time sensitive targets anywhere on the planet in under an hour. Most importantly, unlike drones or conventional cruise missiles, these hypersonic vehicles can be launched within the safe shores of the United States minimizing the need to put our troops in danger.

Now, there are many challenges to overcome before hypersonic vehicles can work. One of these challenges is that traveling at such high speeds generates an enormous amounts of heat due to air friction. Think of it this way: if you've ever seen fiction movie like "Gravity" where the spaceship reenters the Earth's atmosphere at really high speed it starts glowing red-hot from all the heat, and everyone's worried that it's going to explode—that the same effect that we had to deal with here, but for an even longer period of time. And that's where I come in.

The purpose of my research is to investigate a new cooling method that can handle those enormous heat loads at hypersonic speeds. The idea here is to run the fuel lines directly underneath the hot surface of the vehicle and use the fuel itself to absorb some of that enormous amount of heat. As the fuel absorbs enough heat, it begins to break apart into smaller fuel molecules. Breaking apart the fuel is very important because this process consumes a significant amount of heat and cools down the vehicle. Now, one of the challenges in this method, is shown in the figure above. Using heat alone to break apart the fuel results in a mixture of different types of fuel molecules. Some of these smaller fuel molecules have very undesirable properties and so the key to making this technology work is to develop a material—or in my field, [what's] know as *a catalyst*—that can use the heat to selectively break apart the fuel. I like to think of the catalyst as a tool, perhaps a pair of scissors that we can use to cut apart the fuel to whatever type of molecule that we desire. As you can see in the bottom half of the figure, the ideal catalyst here would use heat to break apart the fuel into all the desired fuel molecules. So, what I've done is test different combinations of jet fuel and catalysts in order to understand how they interact.

 I have made significant strides toward this. I've even identified a promising catalyst-fuel pairing. Ultimately, the catalyst fuel pairing that I've identified could be used to cool a real hypersonic vehicle. And if that works, the new can have the technology to strike back at our enemies no matter where they are—all without putting our troops at risk.
~ 506

Commented [EAF1]: This is both a "hook" and a broader application

Commented [EAF2]: These kinds of rhetorical questions are helpful in the 3MT presentation, as they help to connect the speaker and the audience

Commented [EAF3]: Notice that the speaker highlights one research problem that he is addressing.

Commented [EAF4]: A contemporary reference that at least some audience members will recognize. Even if some members of the audience have not seen "Gravity", the presenter offers a clear and simple description of a key moment within the film that is easy to grasp.

Commented [EAF5]: It is common to use possessives in 3MT presentations

Commented [EAF6]: A potential solution to the problem

Commented [EAF7]: The speaker references his slide; interacting with the slide is important, especially if it depicts a data set, method, or other key findings.

Commented [EAF8]: The speaker cites an important challenge that other researchers have confronted. Notice that this reference is very brief but still effective. You do not typically need to limn the extant scholarship in the field—a simple statement will indicate what is important about this question within the discipline.

Commented [EAF9]: Although the term "catalyst" is very familiar to those in scientific fields (and possibly to those outside these fields) the speaker uses an analogy to support the audience's understanding.

Commented [EAF10]: Another good reference to the slide to help guide the audience

Commented [EAF11]: Key findings

Commented [EAF12]: Reminder to the audience of one application—the speaker comes full circle through this statement

Sean Andrist, University of Wisconsin-Madison, Computer Science
"Social Gazing with Robots"
https://www.youtube.com/watch?v=kDivUiIrfJ4

"You've probably heard an expression that the eyes are the windows to the soul. And that's because we don't just use our eyes to see. We use our eyes to communicate with each other, both consciously and unconsciously. So, we look at the things and people that we like. We look away from each other when we're feeling uncomfortable. It turns out that we also look away when we're about to start speaking. And we look toward the next person that we expect to speak next. And so we're constantly reading these signals from each other. And, they make our conversation go much more smoothly. But what about for robots? If we give robots eyes and enable them to use those eyes like people do, can that make conversations with robots go more smoothly? That's what my Ph.D. research is about.

> **Commented [EAF13]:** Very nice hook that is immediately relatable

> **Commented [EAF14]:** He introduces his research question.

I develop models of social gaze behavior for humanoid robots like this to make them better communicators. So, imagine a robot—a personal robot—that could help motivate you to exercise more or to build that Ikea furniture that you just bought. Or imagine a robot that can help you when you get old to take your medication, stay active and just retain your independence.

> **Commented [EAF15]:** Here he introduces broader applications of the research

So, in my research, I follow a three step methodology to design useful gaze behaviors for these types of robots. So, first I want to understand a particular human gaze behavior by studying real people. Then, I computationalize that understanding, meaning I turn it into an algorithm that I can implement on a robot platform. Then, I evaluate the robot's use of that gaze behavior to see if it actually improves interactions with real people.

> **Commented [EAF16]:** Breaking the method into three simple parts is extremely effective

So, I've carried out several projects using this methodology. In one of them, I was interested in "when do people look away from each other in conversation?" So, we don't just stare at each other all the time, right? Our gaze is constantly darting around. And we actually have to remind ourselves to make more eye contact when we do things like job interviews. For robots, eye contact is not an issue. They will stare you in the eyes all day, no problem. But that's not good, because looking away every once in a while is actually very important. So, I brought pairs of people into our lab. And I just had them have a conversation with each other. And I measured very precisely when and how they were looking away from each other during that conversation. I then implemented what I observed on one of our robots. And I invited new people to come in and have conversations with that robot. And so what I observed is that these conversations were much more fluid when the robot looked away correctly. So, they interrupted each other less, and people actually just enjoyed talking with that robot more.

> **Commented [EAF17]:** Once again, he references a situation that the audience will know that helps inform his research question and method

> **Commented [EAF18]:** Notice how simple this description of method is; the speaker does mention above the computational work that he is doing, but he doesn't get into the details of that work here, as it is less likely to be meaningful to a broader audience

In other projects, I've shown that robots can use their gaze to help people learn better, to express a personality, and to better motivate people in rehabilitation. So, even though robots may not have souls, I believe that their eyes can be the windows to move effective interactions.

> **Commented [EAF19]:** Key findings

> **Commented [EAF20]:** Other findings (and also other applications)

> **Commented [EAF21]:** Nice ending—coming full circle

~526

Alexis Schusterman, UC Berkeley, Chemistry—UC Carbon Slam—
"BEACO$_2$N: High Resolution Carbon Monitoring"
http://www.ucsd.tv/search-details.aspx?showID=31052 33:13-36:13

Global warming is a global problem, but with 70% of CO_2 emissions coming from a small handful of cities, global warming's origins are necessarily local in nature. Unfortunately, the current approach to carbon monitoring involves a small number of expensive instruments that, while providing a highly accurate integrated signal over a given area, cannot hope to resolve the heterogeneous landscape of contributions to an urban total. But, in order to regulate CO_2 more effectively, lawmakers will require more specific information about which of their policies are working and which resources need to be reallocated.

So, along with my advisor, Ron Cohen, we have constructed a novel CO_2 sensing approach that seeks to address this mismatch in scale between science and policy. BEACO$_2$N, or the Berkeley Atmospheric CO_2 Observation Network is a web of 28 CO_2 sensors stationed at 2 kilometer intervals across the Oakland metropolitan area. Each BEACON sensor is therefore much more sensitive to its unique local environment, allowing us to drill down into the integrated urban total and further differentiate between CO_2 coming from cars, trucks, ships, buildings, etc.

In order to afford this high volume of sensors, we rely on low-cost off-the-shelf technologies previously believed to provide only moderate quality measurements. Over the course of our three year pilot period, we have developed *in situ* corrections for the influence of meteorology as well as temporal drift after applying these corrections. We demonstrate performance on par with instruments 100 times more expensive. Now we are generating the highest resolution maps of CO_2 concentrations ever made. From there, we can feed these observations into inverse atmospheric models that follow the CO_2 molecules backwards in time and space to their point of emission. Comparing these emission maps with our prior estimates reveals where our assumptions about CO_2 sources might be wrong. So, for example, when the Easy span of the Bay Bridge was closed to traffic, BEACON was able to correctly diagnose that there were reduced CO_2 emissions coming from the bridge on that day relative to what we could expect and not only that, but BEACON was also able to show us where people were probably driving instead.

This proof-of-concept could be easily extended to subtler, more policy-relevant phenomena such as the increasing fraction of electric vehicles. More recently, we have supplemented our CO_2 instruments with sensors for toxic gases as well as particulate matter and already the ratios between these trace species and CO_2 are helping us to differentiate between different CO_2 sources such as heavy-duty diesel tricks v. gasoline-powered passenger vehicles.

In the future we look forward to informing more efficient policy at home while also providing a validated framework for low-cost CO_2 monitoring abroad, where emission are on the rise, but resources are often scarce. Global warming may be a global problem, but BEACON can help us characterize and combat it more effectively one neighborhood at a time.
[483 words]

Commented [EAF22]: She intrigues the audience by juxtaposing the "global" problem with the "local" origins of that problem.

Commented [EAF23]: The problem, brief context, and the inadequacy of previous solutions to that problem.

Commented [EAF24]: The method she uses to respond to the problem.

Commented [EAF25]: Her solution is not only more accurate than other solutions—it's less expensive as well.

Commented [EAF26]: Method

Commented [EAF27]: Findings—note that she gives just one meaningful example.

Commented [EAF28]: The most current expansion/extension of the research (note that this paragraph serves the same function as a conclusion might within a journal article—the specifics of what has already transpired give way to the next phase of the research.)

Commented [EAF29]: Conclusion and reiteration of the hook that begins the pitch.

Nicole Bauer, History, University of North Carolina, Chapel Hill, 3MT competition

"In the Kingdom of Shadows: Secrecy and Transparency in Eighteenth-Century France"

https://vimeo.com/145926278

How much are your secrets worth to you? How important is it to protect them? If you're really thinking about this question, I'll bet that you're looking into to your own past, your own memories. But if we were in France in the 18th century, you probably wouldn't just be looking at yourselves, but at the group you belong to, like your family, and how their actions affect your honor, your reputation.

> **Commented [EAF30]:** HOOK—she relates to the audience in terms that are likely to be meaningful to them.

In my dissertation, I look at cultural shifts that took place in the 18th c. I look at something in particular called lettres de cachet which were secret orders for arrest that you could solicit from the government to put away someone, like a black sheep of your family, whose behavior you wanted to keep quiet and which was damaging your reputation.

And so the government aided in the preservation of your secrets and you didn't pry into the governments secrets. But mid-century, something changed. People became less concerned about their own secrets and more worried about what secrets the government was keeping and whether or not it had a right to do so.

> **Commented [EAF31]:** CONTEXT FOR THE RESEARCH QUESTION

Why this change? It wasn't just that they began to see the practice of the lettre de cachet as unjust. It was more than that, and I argue that it was because of these three main factors:

> **Commented [EAF32]:** RESEARCH QUESTION. In this pitch, the speaker does not position her research question in the critical landscape, but that might have been a good addition.

1) Nationalism. There was this new idea of an imagined community that was bigger and more important that your family or your social class, and this was the nation. On top of that was the idea that a true patriot served his country first and foremost, and had nothing to hide.

> **Commented [EAF33]:** Implicit reference to a theoretical concept introduced by Benedict Anderson; here, the speaker gestures towards one aspect of her approach or method.

2) Religion. There were several religious movements that erupted in the 18th century and they emphasized a biblical language of light and darkness. Truth and goodness happened in the light, and evil in the shadows.

3) The Role of Women. Women actually exercised a lot of power and influence at this time. But it was an informal power—it was behind the scenes. More and more writers and thinkers though began to say though that this was an illegal form of power, that women were secretly pulling the strings. Instead, they wanted an open forum where there was public discussion. But this was a masculine sphere, and so by the time of the French Revolution transparency had become the new paradigm.

> **Commented [EAF34]:** KEY FINDINGS

Yes, it was an integral part of modernity but its development was not inevitable. It was the result of the convergence of these factors and during the revolution they said, "Okay. The government is transparent? So is the citizen." And they justified searching people's homes and reading their letters all for reasons of secrecy and to uncover false patriots. It think that today this logic is not entirely alien to us. And then when the fever of revolution died down, they began to wonder if maybe there was some safety in secrets after all.

> **Commented [EAF35]:** BRIEF DISCUSSION.

And so I believe that studying this trajectory informs our own understanding of transparency and maybe also, our fear and attachment to secrets.

> **Commented [EAF36]:** BROADER IMPLICATIONS to issues of government/citizen transparency that are likely to be familiar to a contemporary audience (i.e. the Patriot Act).

~512 words

Chi-Ling Joanna Sinn, Aging, Health, and Wellness, University of Waterloo
"Individual Flexibility, Population Equity in Home Care Service Planning."
https://www.youtube.com/watch?v=Y8xD_hU_p48

Over 90% of seniors in Canada live at home and want to stay home for as long as possible. Living at home means being able to get out of bed, use the toilet, get dressed, prepare meals--daily activities that all of us do, but can become more difficult as we age. To continue living at home, help may come in the form of family, friends, and home care. Home care, quite simply, is care that is delivered in the home rather than in a facility. In Ontario, publicly-funded home care is organized through 14 home care agencies. Any individual can contact their local agency, then a care coordinator completes the assessment, and plans the right mix of services to meet the individual's needs. The services are provided, and every six months a reassessment is done to ensure the service plan is current and appropriate.

> **Commented [EAF37]:** Hook/context/definition

> **Commented [EAF38]:** This is the status quo that she is seeking to improve upon (note that this talk doesn't really include a review of the literature)

In 2013, nearly 700,000 Ontarians received some 38 million hours of publicly funded home care. Nearly three quarters of it was for help with personal support and homemaking. In other words, for activities such as getting dressed and making meals. Clearly, having access to help with these daily activities is essential to the well-being of many seniors. However, access to personal support may vary, because each agency has their own guidelines for service planning. We can see how receiving too little support may negatively affect the caregiver and the individual, but the same can be said if someone receives more than enough support, because that leaves other individuals to share a smaller pool of the remaining resources.

> **Commented [EAF39]:** Significance of the problem/question she is asking

> **Commented [EAF40]:** Statement of the goal

The goal of my research is to work with stakeholders and create a standard guideline for deciding if and how much personal support to provide. The result is a personal support algorithm. The algorithm uses items from the clinical assessment to score an individual's need for personal support. In practice, the care coordinator will also consider the individual's circumstances, like whether they have a family member available to provide help and adjust the hours accordingly. Thus, use of the algorithm promotes individual flexibility because personal support services will very closely match the level of need. The algorithm can also be used at the population level. Once all agencies adopt a standard definition of need, it will be possible to check if every Ontarian has the same access to personal support, regardless of where they live.

> **Commented [EAF41]:** Her proposed solution and a brief treatment of her methods

> **Commented [EAF42]:** Broader implications--Her work could contribute to policy changes

With more research, I also hope to examine whether the amount of service concerns provided by agencies is actually enough to keep seniors at home. This research will have a very real impact on the health of Ontarians. Each individual will get the personal support help that they need and every individual will benefit from a sustainable system that makes the best use of homecare resources.

> **Commented [EAF43]:** Opening up in the conclusion to future areas of research

> **Commented [EAF44]:** Conclusion

~463

Additional Samples:

Amy Marquardt, University of Maryland, Materials Science and Engineering, 3MT competition
[untitled--Preserving cultural artifacts through Atomic Layer Deposition]
https://www.youtube.com/watch?v=qVTmNcUOjl8

Diane Nelson, Carnegie Mellon, Biomedical Engineering, 3MT competition
"Drug Delivery to the Lungs Using Perfluorocarbon Emulsions."
https://www.youtube.com/watch?v=KKxXUuZlklk&index=9&list=PLbkhiRA2P3qIoW0X2yQ_d8b9T-kpuElKV

Daniel Hieber, University of California, Santa Barbara, Linguistics, UC Grad Slam competition
"Renaissance on the Bayou: Reviving the Chitimacha Language"
https://www.youtube.com/watch?time_continue=2822&v=QrNOHKjA2q4