

# What is STEM Identity? An Interview with Erik Nisbet

On October 18, 2017, [Martin Storksdieck](#), Director of the Center for Research on Lifelong STEM Learning at Oregon State University, interviewed [Erik Nisbet](#) to understand his thinking and work on the topic of STEM identity. Dr. Nisbet is an Associate Professor in the School of Communication at the Ohio State University. Dr. Storksdieck conducted the interview as a member of the Center for Advancement of Informal Science Education (CAISE) task force on evaluation and measurement and is co-Principal Investigator of CAISE.

A video of Dr. Nisbet's interview, as well as interviews of other researchers, is available at [InformalScience.org/identity](https://InformalScience.org/identity).



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## Tell us about a project you've done that's focused on identity.

Most of my research is focused on the intersection of science and politics. And in that context I've looked at political identity—people who identify either as liberal or conservative or as Democrat or Republican. One project we did was [published in 2015](#) that looked at the process of motivated reasoning as driven by identity when it comes to controversial science topics. Our goal was to show that motivated reasoning basically serves biased processing of scientific information, possibly the rejection of scientific information, and/or what we call source derogation. Basically being exposed to information and distrusting the source, in this sense scientists, for example, and being politically motivated. Distrust of science is not something unique to those who identify as conservatives or Republicans. The goal of the project was to refute what we thought was a misinterpretation of the science-motivated reasoning by people like Chris Mooney who wrote [The Republican Brain](#) or [The Republican War on Science](#). We felt that literature that approached a knowledge deficit argued that Republicans or conservatives have some type of cognitive deficit when it came to science. We disagree with that and especially in the sense that the science, psychological science, the science of motivated reasoning, the science of political science, political psychology, doesn't argue that at all. It argues that both liberals and conservatives have equally the potential to engage in motivated reasoning around topics or issues that they find somehow threatening or antithetical to their

self-identity, their political identity, their values. That was a study where we selected what we felt were three controversial issues from a conservative viewpoint, things like climate change, or evolution. We then selected three issues from a liberal viewpoint we thought might be controversial like nuclear power, for example. And we picked three what we called nonpolitical issues or nonpoliticized issues like astronomy or geology. I think earthquakes was one of them and Pluto no longer being a planet. So you don't see a lot of political debate in congress about Pluto's status.

At this time contextually, if you look at the overall trust in science, trust in the scientific community, conservatives on a survey compared to liberals report a lower trust. Although I will say that if you actually look at trust in the scientific community compared to other institutions overall across liberals and conservatives, it's very high compared to any other institutions except for the military, I think was the only that scores higher. If you look at all the various institutions: news, politics, social, economic in our country. What we did was expose people to these different messages coming from a scientist that we said was a science learning website, we did it online with a national sample. We found that if you expose conservatives to a short passage about the scientific issue presenting a short factual passage, they read it then they expressed lower trust in the scientific community than the control (which was the nonpolitical science). We found the same thing for liberals as well. If you expose them to factual information about something like nuclear power they're going to express lower trust in the scientific community as well. Our argument is that at this time in our history, this political juncture as we've seen more and more issues become politicized, especially issues that somehow go against or are seen at least framed as antithetical to conservatives or Republicans, often for political reasons, then yes, you will see Republicans and conservatives are going to express maybe a lower trust in the scientific community compared to liberals at this particular point in history. It wasn't the case if you look historically going back 30 or 40 years. We would argue that moving forward, if nuclear power became a major issue like climate change was, in terms of the amount of medical attention and public scrutiny and public discourse and political discourse, you might see a flip flop wherein liberals then become distrustful of the scientific community. It would be really interesting for me if I had the time and the resources to go back and look at the polling. If you look at the antinuclear movement in the 1980s, some of the seminal research I'm framing around science came out of [Gamson's](#) research as a sociologist looking at antinuclear power frames in the 1980s, for example. It would be interesting to look at how did liberals versus conservatives feel about science then in that context. So I think this interaction, when we talk about political identity, I don't think the antiscience is hard coded. It's contextual based upon the science issue being discussed and the amount of both political and media attention given to it. And it might be more cyclical.

**So, in other words, the stronger your ideological beliefs in either direction whatever direction it is, the more and more that might trump the factual.**

The more likely you are to engage in biased processing of information. If you look at some of the polls by Pew where they looked at where the public stands on certain science issues versus scientists, there are definitely disagreements between scientists and those who hold

more conservative views, but there are definitely disagreements between scientists and those who hold more liberal views.

People also think, and this is another misperception I think among many scientists, that the more educated you are, the less likely you are to rely on what we call heuristics, which are mental shortcuts, and the less likely you are to engage in biased processing. But research by [Kahan](#), has shown that those who sometimes engage in more cognitive reflection and use more deliberative processing information don't actually have less biased outcomes; you might have more. That's why you find often it's not only the more ideologically coherent your political attitudes are, political identity, whether on the left or the right, you're more likely engaged in biased processing. The more politically sophisticated you are, the more likely you are engaged in biased processing. So you often see more of a divide between educated Republicans and educated Democrats than lower educated Republicans and lower educated Democrats on science issues. So I think there are a lot of misperceptions when it comes to science communication as a role that ideology and political identity play in shaping attitudes. Kahan is actually drawing upon the basic science, but there's a great deal of research in political psychology, psychology in general, that underlies Kahan's application.

**Having grown up politically in the 1980s in Germany, I can tell you that there was a gigantic bias of the political left against science and technology. It was particularly at the intersection of how basic science becomes intertwined with industrial interest that the left had a huge issue. That's where the Green Party was formed.**

You see that also when it comes to GMOs in Europe. Much more there than here. I think some of what you're talking about with Germany is an interesting case where what you see now is a debate of nuclear power. Germany shut down their nuclear power but you actually see that their greenhouse emissions and global warming emissions are actually rising because they have had to rely on fossil fuels because they can't ramp up the renewables quickly enough to take the place of the nuclear power. At least in the short term, they're in an issue with their global warming initiatives. I think that's an issue that if you presented that type of information to those who are liberal, or here in the United States or elsewhere, they would have issues processing that.

**How do we define "identity" in your work?**

I've looked at political identity. Another area of research I've been developing lately is more environmental identity. I think that is an interesting area of research that's undeveloped because there are different measures of our mental attitudes, our environmental values. You have the environmental paradigm, which people are very critical of. You can take a look at some work in social psychology looking at altruistic, biospheric values, as well as narcissism. You also have research that shows that people who identify as environmentalists are less likely to be politically active. People have said if you want to make political change you actually have to engage in politics. I have done some survey work I haven't published, but actually those who score high on the new environmental paradigm measure are actually less

likely to engage in political behavior. What is that tapping? What does it mean to be an environmentalist? And sometimes people will simply ask explicitly “are you an environmentalist or not?” which is a very reductionist way to look at it. You can also look at research on social psychology when it comes to identity. Identity is actually much more complicated. We have multiple identities at any one time. When I do research on identity, you’re not only going to say you’re Republican, but you are also based upon your gender, class, ethnicity, and your race. When it comes to being an environmentalist, are you an environmentalist or not is somewhat dependent by how central environmentalism is to your identity, your core identity, a sense of self compared to other types of competing identities; socially constructed identities. Genders can be socially constructed, race, ethnicity, politics, as well as the salience. The salience of any one identity changes depending on context. How salient your environmental identity is compared to your gender or racial or political identity depends on the social context. But for me I’m interested in communication. It could be the media context. How does media and communication influence the centrality and salience of certain identities? In political science we often simply define it as are you Republican, Democrat, are you liberal or conservative? When I actually look at the literature on identity, it’s much more complicated.

### To what degree do you think identity matters for science communication?

I think it matters greatly across multiple dimensions. I think it matters as we discuss how it influences how we process information about controversial science issues like we already discussed. It influences all types of cognitive process, of selective exposure. What human information we expose ourselves to. If we’re exposed to information, how we comprehend it, do we recall it or not, do we either reject or accept it. So in terms of science communication, science learning is about people being exposed to information and accepting and internalizing information. Then it shapes those processes intrinsically. Another aspect of identity I think is important for us to understand is the role that identities play in shaping motivation and interest. I think especially when it comes to historically marginalized populations when it comes to science, especially gender and minorities. For example, one area of research I’m increasingly interested in is the role of science documentaries from an audience perspective on what cognitive and behavioral impacts science documentaries have. Entertainment film as well. We published something in [Science Communication](#) last year, but moving forward one of the things watching a film like [Hidden Figures](#). The question is what impact does a film like *Hidden Figures* have? For example, there are science documentaries about African American scientists and the history that also promote that perspective, especially on youth or populations that typically don’t see science as relative to their identity as an African American, or as a woman. They might not see science as relevant for a whole host of reasons, as they think that it’s not available to them. It’s not because they’re not only disinterested but historically, institutionally, they might have been because of institutional barriers. African Americans participating in science, they think it’s not relevant to them, for example. A movie like *Hidden Figures* has the opportunity to increase motivation and interest among African Americans. But the question is does it also have an impact on the white majority and their perceptions of African Americans and African Americans’ contribution to science. I think

it's interesting not only in a film like that looking at how it intersects with multiple identities, African American identity, white identity, issues of class, issues of education and background. I think there are multiple intersections there in terms of impacts that I think is interesting. That's why one reason identity is important, and that it goes beyond simply attitudes but it also goes to interest, and motivation, and science as a practice, especially as a way to engage in groups that have socially constructed identities that have been historically marginalized in science. What are the identity components that we need to address on that?

**That's fantastic. It's great because we later ask about intersectionality. We also ask later about whether you have to distinguish between identity and concepts like interest and motivation and attitudes, and I think you addressed that just now.**

Well, identity drives all those, and it's intertwined with those.

**Do you think it makes a difference when you think about science communication now STEM comes in? Does it make a difference when people throw in the term STEM with science for you?**

No, but I think it makes a difference when they're talking about educational approaches versus communication approaches. I have a courtesy appointment in the School of Environment Natural Resources, where among some people who deal with science education, communication is a dirty word because they simply see it as persuasion. I say, yes, there are persuasive elements, but it needs to be a persuasive element of education as well. Sometimes you need to persuade people they need to learn. Or persuade people that they don't know what they don't know. So I think education and persuasion aren't necessarily two separate domains. I think some people who say "I work in STEM" versus "I work in science communication" sometimes might view each other negatively. I think [there are] some misconceptions about how the mind works and the role that communication plays in education and the role that education plays in communication. I don't think of a fine and bright line as some people would make it out to be. When it comes to STEM versus science, for me science is more of an overarching term in a sense especially if you bring in health. For me, who deals with some environmental issues, there's a fuzzy line between health and environment. I often view health as a subset of science. Like science, health is an application of a lot of science communication. Health science communication can learn a lot from each other. They are often split differently from each other, but the basics of health communication is communicated about health science. When we talk about STEM, science, and health, I think often we're talking about the same things. Obviously there's a connection between numeracy, for example, and risky decision making, if you talk about the math part of STEM. Does it make a big difference for me, STEM versus science? Not really, though for me, I like science because I just personally view science as an overarching term that includes both STEM, health and risk, and what I consider specific contextual applications that science serves as the foundation underlying all these different specific communicative or educational contexts.

## How do you currently measure identity in your work?

Well, sometimes simplistically by simply asking, “do you identify as a Republican or Democrat?” I’ve also been developing two other measures. Other than beyond the standard “are you liberal, conservative?,” “how liberal or conservative are you?” or “are you a Republican or a Democrat?” I draw upon the literature in social psychology in identity. The literature looks at the term called “identity centrality.” As I mentioned, how central is identity to your sense of self? This comes out of a range of literature that looks at racial identity, socially constructed identities. The other area of research I’ve been looking at is environmental values as differentiated from ideology. So looking at altruistic values, biospheric values, and narcissism as when it comes to influencing value orientations. What identities are constellations of values? Identity determines what’s relevant to you, what you value, and what you don’t. The relationship between identity and values is complex. Usually identity is simply for me a package set of value propositions. If you want to unpack something like environmental identity, one thing is looking at environmental values underlying that, in terms of biospheric, altruistic, and sometimes narcissistic. Looking at values and then looking at the social psychology literature on the salience and centrality of identity, and sense of self, are the two ways of measuring identity.

## Do you think it’s possible to create tools for measuring identity that practitioners or evaluators could easily use in their work?

I think there is, yes. When it comes to look at the social science literature and identity, there are established scales and survey measures and experimental measures used to measure identity. Whether it’s political identity or racial or social identity or things like science identity. I’ve created and used measures in my work measuring environmental identity based upon the literature in social psychology. The same thing could be dealing around science or other science related identities. I think it’s just applying the social science and tweaking the established social science protocols for measuring identity for practitioners. But there is a readily available instrument to do that where you can use five, six survey measures, for example, that capture the centrality and salience of an identity and that is valid scientifically to use. I mean there is a science of identity to draw upon.

## Do you have more examples of resources or tools for measuring understanding identity that you mentioned?

I would say there are established scales in psychology going back 30 or 40 years that have been used to measure identity across a range of contexts. It’s very easy to find those. Work by [Crocker](#), [Marcus](#), for example, and journals like [Personality and Social Psychology Bulletin](#), [Journal of Personality and Social Psychology](#). There are top basic site journals that are used across many different studies looking at racial identity, ethnic identity, other types of socially constructed identities. Marcus is a political scientist who has done work on identity, group identity, and political cohesion. I think it would be very easy to create a primer on the social science of identity for practitioners based upon some of these established scales. If you’re going to do an evaluation, for example, and you want to measure the audience’s

environmental identity or their identity as a scientist, or political or racial identity, there are established measures of that I think could be easily employed on some type of questionnaire. I would just encourage your group to take a look at that and maybe make some of those scales and research available for your practitioners.

### **Is there anything else about identity and science learning that you would like to share?**

I think that scientists and science communicators and practitioners who work on projects and informal science learning have to think about how their own identities influence their perceptions around science and that of the audience. You need to be self-aware that being a scientist is an identity. Just as we talked about identity is shaping how audiences process information, especially in a biased manner, that our own identities as scientists or science educators, or practitioners, heavily process whether we want to admit it or not, our own understanding of audiences, how we communicate, and what we communicate or teach. We often don't take that into account, and I think the science communicators and scientists and the science communication and science learning communities don't take that into account as well enough. That creates communication gaps, and one of the major challenges in science and science education is not the audience but ourselves in taking into account our own biases driven by our own identities.