1 Why Bother?

This book is about how to talk with members of the general public about science, particularly in informal, free-choice settings. If you have a strong interest in language and how it works, and if you have a genuine interest in sharing that interest with nonexperts, then this book is for you.

Throughout this book, we're going to argue that the best way to engage the general public about language science (or really, any complex topic) is to have honest-to-goodness conversations with people, one-on-one and in small groups. We'll be giving practical advice for how to have good conversations, and we'll guide your development of what we'll call your DOABLE DEMO. By the end of the book, you should be able to use your doable demo to get such conversations going. But we also have a long-term agenda: We believe that engaging with the public in an accessible way should be a regular part of the job of working scientists.

If you're currently a working language scientist – whether you call yourself a linguist, a psychologist, an audiologist, a computer scientist, a speech pathologist, an anthropologist, an English teacher, or something else – this book is for

you. We appreciate that people are interested in language for lots of different reasons and study it from many different perspectives. We've included examples throughout this book that span a wide range of language topics to illustrate how any part of language science can be used to engage with people. We also suspect that your training up to now didn't include much on how to talk with the public, and we hope you will see this book as a form of continuing education.

If you're still getting your training – whether that means you're a graduate student working toward becoming a full-fledged language scientist, or you're an undergraduate who has only recently discovered how amazing the study of language can be – this book is also for you. Engaging with the public is a skill, and the more you do it, the better you're going to get at it. We (both authors!) have taught many college students the core lessons in this book and we have a healthy respect for their ability to use them well. You don't need to be the world's leading expert on a topic in order to convey a sense of excitement about language. What you need is a willingness to try.

Why Bother?

Most language science classes ask you to learn about how language is structured, how people use it, how children learn it, how it changes, what happens when it breaks down, and so on. Language science has been a very successful field for the last hundred (or more!) years, so there is a lot to know about. If you're passionate about language science, you can easily devote your entire life to learning the field. And traditionally, that's what most experts in the field have in fact done.

So if the science has moved forward so nicely without much engagement with the general public, why should we bother to do it now? One reason is that language is something that impacts our everyday lives in many ways. We believe that understanding how language works is critical for making certain choices, at both the personal and societal levels.

Should parents worry if their child uses a funny past tense form like *runned*? Is it OK to raise your child bilingual? What's the best way for a school system to educate multilingual children? Why is English hard to learn to read? Should we invest government money to encourage people to learn multiple dialects of Arabic? Why do computer assistants like Alexa and Siri regularly misunderstand people who use certain dialects of English? Can people tell what race you are from a telephone call? How can we help children born with hearing loss learn to read? To what extent do face masks make it difficult to understand what someone is saying?

Language scientists know the answers to such questions, and this information can be relevant to social issues such as parenting, immigration,

education, law, national security, and technology development. We would be delighted if the general public came to be more knowledgeable about all of these areas, and your public engagement just might move us toward that goal in a small way.

But the very act of public engagement does something else: It demonstrates that language is studied by scientific experts. There is a wonderful world of language out there, and there are guides who can help you navigate it. When an issue arises that touches on language, the public does have someone they can turn to for expert advice: language scientists.

Of course, if you need a more personal reason to engage with the public, the skills you need to do it well are relevant in many other situations. Knowing how to communicate effectively with a range of people is just plain useful. If your goal is to be an academic, the skills we promote here will come in handy. The average introductory classroom is just a room full of non-experts. The dean of your college is also likely to be a nonexpert in your field, and trust us, it's good to be able to explain to your dean why your work is interesting and worthwhile. Doing interdisciplinary work requires you to be able to talk with people whose backgrounds and goals differ from yours. Even talking with your fellow professors within your own department, you will find that background knowledge differs and it's useful to be able to explain your work in a way that builds bridges to others.

If your goal is not to become an academic, effective communication skills are just as necessary. Outside of the ivory tower, you are likely to interact with a very large range of people coming from very diverse backgrounds. Being able to explain complicated, technical information is highly prized. It is common practice for businesses to foster collaboration among teams of people with different skill sets, so being able to communicate with people who have different perspectives will help you succeed. The principles for being clear and interesting will help you give an excellent professional presentation in any field. Mastering the core lessons in this book will make you a more marketable commodity.

Whether you're motivated by a desire to improve society, your field, or yourself, this book is for you.

Talking with the Public in Informal Free-Choice Learning Environments

One distinctive thing about this book is that it will focus on talking with the public in INFORMAL FREE-CHOICE LEARNING ENVIRONMENTS. Before we tell you why we chose to focus there, let's be clear about what these environments are.

What we have in mind are places such as festivals, libraries, and museums. These are places where people visit in order to have fun and learn a little something. They are *informal learning* environments because they are not in classrooms with a podium or a screen at the front of the room. That means you don't get the usual tools of a classroom to work with – no quizzes, no reading assignments, no homework, no grades. Also, these environments aren't structured like classrooms, where students are often sitting in specific places and the main talker is typically the teacher. These locations are *free-choice* because visitors come and go freely. You might be in a crowd or in front of a booth or behind a cart, and you will need to capture the interest of people passing by and sustain that interest long enough to inspire new thinking about language. If people don't like what you're doing, they will freely choose to go somewhere else!

What kinds of people go to these locations? All kinds. And lots of them. People spend a lot more of their lives outside of school than inside school, and they do a lot of their lifetime learning in informal free-choice locations. The graph in Figure 1.1 comes from research by scholars of free-choice science learning, John Falk and Lynn Dierking. It shows how much exposure people get to any kind of science education over their lifetime. As you can
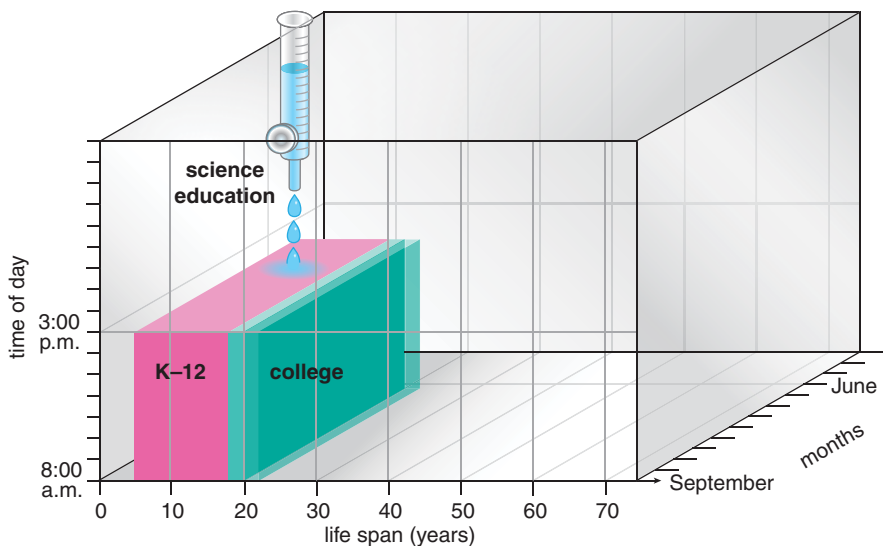

Figure 1.1 Amount of time Americans spend in different learning environments
Note. This elegant figure from Falk and Dierking (2010) shows that Americans may spend on average only about 5 percent of their whole lives in formal classrooms. The amount of time they spend getting formal science education is so small, it can only be shown in droplets. Used with permission.

see, at least for Americans, most of that isn't coming from standard schooltime.

This research also found that the percentage of people from all around the world who had visited an informal learning location was high. From these same researchers, the graph in Figure 1.2 shows that a high percentage of people visit public libraries, zoos/aquariums, natural history museums, and science/technology museums. Language science fits well in at least three of these places (and you might even bring language science into a zoo/aquarium through a connection with animal communication!).

Beyond major institutions that are devoted to informal learning and free-choice settings, there are many event-based opportunities as well. Many organizations host science festivals, and language science makes for a terrific booth. Language science can fit into other kinds of festivals – arts festivals,
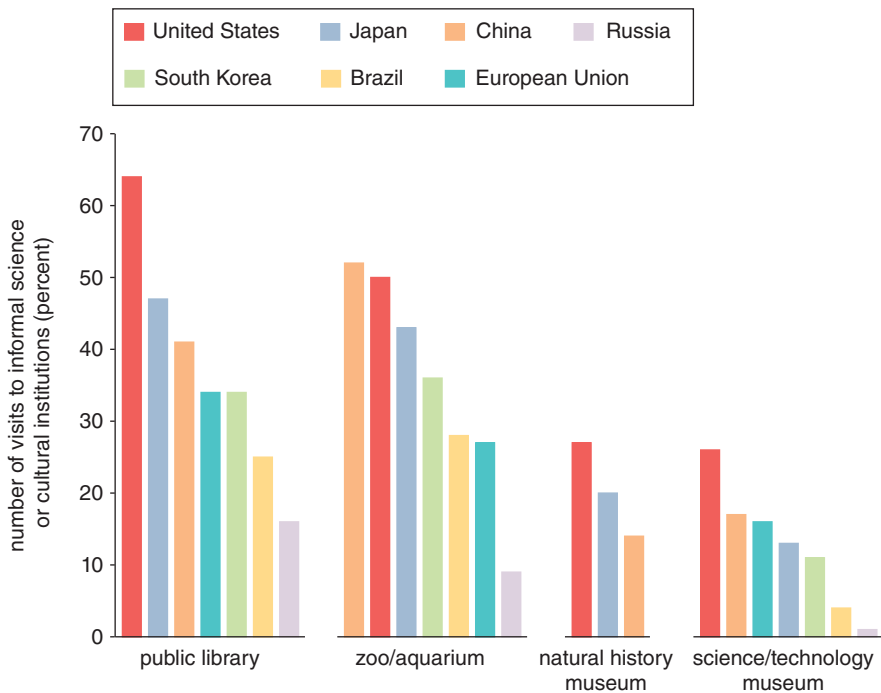
Figure 1.2 Attendance at several types of informal learning venues
Note. This graph from Falk and Dierking (2010) shows that all kinds of informal learning venues are popular around the globe. Moreover, Falk and Dierking suggested that the fact that the US public visits science-oriented institutions at particularly high rates may account for why American adults have similar proficiency in science to other adults worldwide even though American children tend to lag behind: Americans learn science in informal venues all through their lives. Used with permission.

food festivals, children's festivals, and cultural festivals all have room for language connections. Often for these kinds of events it's worth tailoring your focus to fit the event, but with the breadth of topics that language science covers, that's rarely a problem.

What's more, if you are connected to a university or college, it's likely that your home institution has events that would welcome you. The events might target local students (freshman orientation and meet-your-major fairs are great!), or they might be events intended to reach the wider community. Either way, they offer some infrastructure to support engagement with the public. Toward the end of this book (Chapters 18 and 19), we'll offer some more specific suggestions for places you might practice your new public engagement skills, and provide some advice for how to be a good partner with institutions or groups you might want to work with.

Our own public engagement efforts have centered on free-choice learning environments (see the Worked Example Box in this chapter). We like them for many reasons. First, they allow us to reach a lot of people, both in terms of raw numbers (as you saw above, lots of people go to these kinds of locations) and in terms of types of people (not just college students, but families; and in many of the venues, families from diverse backgrounds). Second, they are great places for our students to get training in how to talk with the public. Most of the interactions we have at these locations are relatively short (often fifteen minutes or less), which means our students get many opportunities to practice. They also get feedback from the people they talk with – there is nothing more satisfying than hearing someone walk away saying, "That was so cool!" Finally, we believe the challenge is worth it! To paraphrase a famous song by Kander and Ebb, "If you can make it in a free-choice learning setting, you can make it anywhere!" For most people, talking with the public doesn't come naturally, and mastering the relevant skills takes effort and practice. But your communication abilities and public speaking confidence will improve dramatically.

What You Won't Find in This Book, at Least Not Directly

There are lots of different ways to engage with the public around language science. As we laid out above, this book focuses on something we have a lot of experience with: encouraging informal learning in free-choice

environments. But often when we tell people that we train people to talk with the public, they assume we're doing something different – like helping people talk to politicians, or helping people create a podcast or a social media page. We think reaching various kinds of nonexperts and using different media are worthwhile, and if that's what you're interested in, we encourage you to do it. But it's not what **this** book is about. The core lessons of this book will be useful if you talk to politicians or create online materials, but they aren't targeted toward those goals. And we certainly appreciate – and we hope that you do as well – that there are going to be differences between working with the general public at a festival and talking to your local elected representative.

LINGUISTIC ACTIVISM is another sort of public engagement that has a strong presence in the language sciences. Many researchers, especially those whose work depends on linguistic data from distinctive speech communities, have a tradition of giving back to those communities. Sometimes these efforts involve creating educational materials to help preserve a local language or dialect; sometimes they involve combating prejudice against the community; sometimes they involve celebrating the history and culture of the community. We have the greatest respect for these activist efforts, but that's not what this book is about either.

Our emphasis is much more general than most linguistic activism. We believe that just about every dimension of language science is worth sharing broadly, from highly theoretical topics in syntax and phonology to experimental results in language processing and acquisition to the sociolinguistics of identity. We will recommend that you tailor your messages to the needs and interests of your audience, and that can mean being sensitive to the cultural background of the people you're talking with. But we're not expecting that your activities will be embedded within a specific community or that your language science topics will necessarily be connected to classic issues of social justice or combating prejudice.

We do, however, think that the kind of engagement we're promoting in this book can be seen within the activist tradition. Ultimately, the goals of this engagement are to encourage a field that is committed to communicating with broad audiences, and to creating a public that is more informed about language science. But we see these as very long-term goals. What you will be doing with each conversation with a nonexpert is contributing in a small, incremental way to these long-term goals.

It's Language Science All the Way Down

The science content that we know best is language science, and the examples in this book emphasize language and how it works. But language science is not only important as our core content; it has also created some of the most important insights for how to effectively communicate with others. As you'll see in the upcoming chapters, our advice draws heavily on two foundational results from language science: Grice's principles of COOPERATIVE CONVERSATION and the information processing principle of GIVEN BEFORE NEW.

We're not trying to suggest that you need a degree in linguistics to prepare to talk with the public. If you've taken an introductory course on linguistics, you've likely run across both of our core ideas. If you've taken a course on informal science learning, you will likely have met these ideas there too. But communication is a part of language science, and it shouldn't be a big surprise that our field has helped uncover how communication works, and what can make it work better (or worse). We take our science seriously and encourage you to put some trust in the results of the very field you are interested in. We consider it a privilege that it is **our** science that we draw on to guide our efforts.

How to Use This Book

We think of this book as a guidebook for communication, and it can be used in a few different ways. We've organized ideas into bite-sized chunks, so if you're looking for ideas about how to avoid using jargon, or about how to make your work relevant to others, or want advice on where to go to do public engagement, you can jump to the chapters that emphasize those topics. If you read the book straight through, you'll get the full story, from theory all the way to very practical advice. If you want a slightly deeper dive into details – including pointers for more to read – you can check out the further reading section at the end of each chapter. Each chapter ends with a worksheet designed to help you make a demo that should be doable by the end of the book. Collectively, these worksheets will help you develop an activity on language science that you can use with the public in a free-choice learning environment.

CRITICAL TAKE-HOME MESSAGE

Informal learning venues are good places to reach a lot of people. This book will help you engage people with language science at these locations.

WORKED EXAMPLE BOX

Who are we? Why do we bother?

Laura Wagner

I'm a professor in the Department of Psychology at the Ohio State University. My PhD is in linguistics, and I have spent my career doing interdisciplinary research, mostly involving children's language development. My bread-and-butter research is on children's understanding of aspect, and I have also worked on children's developing understanding of indexical information such as social register and regional dialect.

A number of years ago I helped start the Language Sciences Research Lab (https://u.osu.edu/thebln/language-pod/). The lab is embedded inside of my local science museum, the Center of Science and Industry (COSI) in Columbus, OH. I collect my regular research data at the lab (alongside several other language scientists), and the visitors to the museum are my participant pool. Museum visitors can just watch, or ask questions about what we're doing, or participate in live research. At the lab, we think of our research as a form of public engagement: One of our missions is to demystify science for the public by showing them what the actual practice looks like, from the inside (Wagner et al., 2015).

Because of the special location, the lab is also a permanent museum exhibit that attracts hundreds of thousands of people every year. And that's more people than even our team of scientists can work with! So we also use the lab as a platform to engage with the public using just the kind of activities featured in this book. Another one of the lab's missions is to show people the range of things that language science has discovered and help people to experience the wonder and joy of language.

I think there are lots of societally important reasons to do this kind of work (and we laid those out in the chapter), but I think that what really keeps me doing it is how much fun it is. I love to think about language and science, and people regularly say things that are surprising and make me think about both of them in new ways. For example:

One of our demo activities uses an iPad app that lets you record someone speaking and then play it back for them (the app is called Singing Fingers and is produced by the MIT Media Lab). It's great fun to use with little kids because they get permission to shout on the museum floor and hear their own voices. One of this app's features lets you play the recorded sounds backward as well as forward, and that leads to some fun discussions about coarticulation effects and how we can only produce sound in the forward direction. I once watched a student doing this activity, and she started with a thought-provoking question to a young child. The child had just recorded her name, and the student asked,

(cont.)

"Do you think your name will sound the same backward as it did forward?" The child said her name, then turned around so her back faced the student and said it again. She triumphantly returned to the student and confidently announced that her name did in fact sound the same when she said it backward.

I cracked up laughing, as did the student. But truly, the child was a natural experimentalist and taught me something about space-time metaphors in the process. You don't need to be an expert in order to have insight or to come up with the perfect example. Every time I go out on our museum floor is another chance for me to learn something cool (and often to get to laugh while I do it!).

Figure 1.3 The authors on the job
Note. Cecile (left) and Laura (right) at the Family Science Days festival of the American Association for the Advancement of Science (AAAS), 2016.

(cont.)

Cecile McKee

I'm a professor in the Department of Linguistics at the University of Arizona, but I'm also affiliated with units such as the Department of Psychology. Before my university-based career, I was a K-12 teacher. I was also Director of the Linguistics Program at the National Science Foundation (NSF) 2001–2003. This latter experience is what crystallized for me the importance of public engagement. This particular agency is a sophisticated pipeline for distributing public monies to research on and education about what's called STEM (science, technology, engineering, and mathematics) here in the United States, including both formal and informal settings. I came to realize while working on that pipeline that many of us who generate new STEM knowledge share it through relatively narrow channels. The points we just discussed regarding the popularity of informal learning venues suggest that scientists who are so inclined should get out more. I myself was so inclined, and fortunately, so are many of our colleagues (McKee et al., 2015).

While I've emphasized working at events like festivals more than anything else, I've dipped my toes into some other streams as well. For example, I took a workshop on public discourse a few years ago, which led to publications and presentations for audiences outside of academia. I volunteer at an agricultural heritage museum featuring edible plants of Arizona, California, and Mexico (called Mission Garden); and I've worked bits of linguistics into interactions with the public that I have through that work. I've also collaborated with Children's Museum Tucson for both teaching and research activities. I do this for all the reasons we touched on above. Because my research concerns language and literacy development, my favorite interactions with members of the public include ones like the following:

I was in a museum playing one of the games that my students and I designed to engage children in science practices and to study their practices. The game started with a demo of how mouth shapes relate to vowels. Players produce the vowels [i], [u], and [ɔ] and then come up with words having those vowels (like *see*, *sue*, and *saw*). Our conversations with caretakers after children played this game emphasized that changing something and noticing effects of the change was a science practice that very young children could enjoy and that adults could encourage. A Latina mother whose child had just finished a bilingual version of our game stayed to talk about her family. Sharing that she and her husband

(cont.)

were native speakers of Spanish, she expressed concern that they disagreed on whether to use Spanish at home. She called him over for a spontaneous conversation on multilingual development, a topic that experts across language sciences have studied extensively and that is critically relevant where I live in Arizona and also more broadly.

This anecdote highlights one benefit of the free-choice setting, namely that we can take more time with people who want to keep a conversation going or who want to take it in their own direction. For me, then, it's not so much the chance to teach someone about vowels or young children's science practices. It is instead that such one-on-one conversations give me the chance to show that science is flexible and relevant and even fun, that scientists care about the applications of their expertise, and that science engagement can happen anywhere.

CLOSING WORKSHEET

Making a doable demo

The goal of this book is to inspire you to engage with the public, and to provide some practical advice about creating an activity that you can use for such engagement. We'll be calling these kinds of activities *demos*, which is our shorthand for *demonstration activities*. The Closing Worksheets at the end of each chapter offer specific suggestions to help you apply the lessons from that chapter to the demo you yourself make for public engagement.

So let's begin!

First, brainstorm topics that you might turn into a doable demo. Try to think broadly at this stage and consider a wide range of possibilities. Don't worry about coming up with a specific activity at this point – that's what the rest of the book is about. For now, try to think big. Write down three topics.

Now, for each of your three ideas, think about the following three things:

- How knowledgeable are you about the topic area?
- How societally relevant is your topic area?
- How much fun would your topic area be to work with?

We recommend that you keep a file (or a notebook, or a set of index cards, or a website – whatever works for you) where you save your

responses to these Closing Worksheets. These sheets will build on each other as you go through the book, and the later worksheets will be a lot easier to do if you have a record of what you did for earlier ones. If you do all the worksheets, at the end of this book you will have what you need to do your very own (language) science demo!

Further Reading

1 What does public engagement mean to you?

Public engagement is our first technical term. We think that most readers will start with a sense of what the term means, in part because they're reading this book. We'll be using this term in the context of science education that occurs outside the formal classroom. But it can also refer to decision-making processes that various governing entities might use, as you can see in this guide published by the city of Fort Collins, CO (USA): www.fcgov.com/excellence/files/publicengagementguide.pdf.

Researchers whose work has implications for public health often use public engagement to share their results, not only to inform the public of the research conclusions but also to inform the researchers of the concerns and questions of the public. To get a sense of the breadth in each element of this term, see Duncan et al. (2017): www.publicengagement.ac.uk/sites/default/files/publication/reviewing_pe_in_ref_2014_final.pdf.

2 If you're currently a language scientist

People study language in all kinds of fields and from all kinds of perspectives! This blog post from computational sociolinguist Rachael Tatman gives a nice rundown: https://makingnoiseandhearingthings.com/2021/05/11/who-all-studies-language-%f0%9f%a4%94-a-brief-disciplinary-tour/.

3 There is a lot to know about

If you're interested in getting some general background in language science, we have some recommendations! *An Introduction to Language*, by Vicki Fromkin, Robert Rodman, and Nina Hyams (Fromkin et al., 2018), is a terrific introductory textbook of a traditional sort, and The Ohio State Linguistics Department's *Language Files* (Dawson & Phelan, 2016) is full of bite-sized introductions to language topics. If you'd rather read something aimed at a more popular audience, David Crystal's *How Language Works* (Crystal, 2007) is a good choice. And if you'd rather learn via video, the *Crash Course – Linguistics* YouTube channel or Moti Lieberman's *The Lingspace* YouTube channel are both entertaining and informative. And if you just want more, we recommend checking out Gretchen McCulloch's *All Things Linguistic* website (https://allthingslinguistic.com), which curates a list of podcasts, blogs, and other resources to scratch your language itch.

4 *Engagement with the general public*

Many people refer to what we're talking about here as *outreach* rather than *engagement*. In fact, we ourselves have on occasion used the term *outreach* (e.g., reaching out from the university to another institution). However, throughout this book, we're going to use the term *engagement*.

We think it's a better choice for several reasons. First, *engagement* is an everyday kind of word, while *outreach* may sound more technical. As people who value plain speaking, we are in favor of using an everyday word for what we do. Second, we like the way that the word *engagement* suggests participation from multiple people. Engagement is something that you do **with** other people, while outreach is more likely to be something you do **to** them. As you'll see (for example, in Chapter 4), we believe that it is important to respect the funds of knowledge that your conversational partner brings to the table. *Engagement* captures that cooperation and reciprocity better. A final reason to go with *engagement* is that it is the genuinely modern term for what we're doing. As we know from historical linguistics, the popularity of words changes over time, and right now, the popular word for our kind of work is *engagement*. Google's Ngram Viewer can show this! We used it to chart the frequency of use of the words *engagement* and *outreach* for a couple of hundred years, as represented in texts Google has access to (see Figure 1.4).
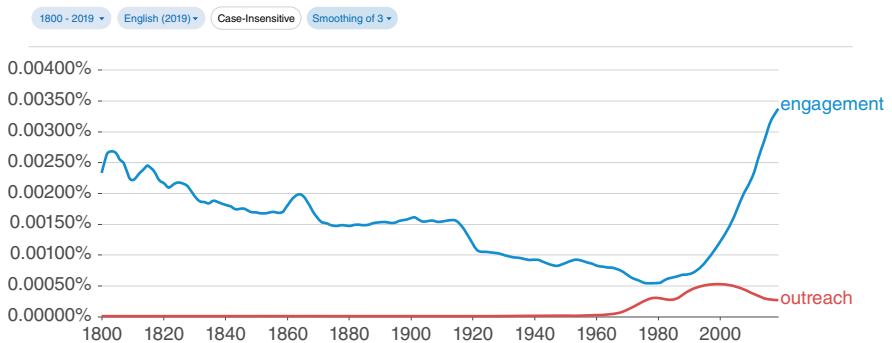
Figure 1.4 A Google Ngram graph comparing usage of *engagement* and *outreach*
Note. This graph was created with Google Books Ngram Viewer. See https://books.google.com/ngrams/info.
Source: Michel et al. (2010).

As you can see, around the year 2000, the word *outreach* peaked in popularity; since then, *engagement* has really taken off. We like to think that this rise is because of the two reasons we started with above, but regardless of the reasons, it does appear to be the word that everybody is using. Including us.

5 *Informal learning environments*

Informal learning can be thought of as being the learning that people do outside of a formal classroom situation. However, it's a bit more useful to think of it as consisting of a set of positive features. Callanan et al. (2011) identifies five distinctive

dimensions to informal learning: It is less didactic, it is socially collaborative, it is embedded in a meaningful context, it is initiated by the learner's choice, and it has no consequential assessment (like a grade). These are all features that are common in the venues we are focusing on here, but they are found in other kinds of places as well. For example, Rogoff et al. (2016) takes an ethnographic perspective and discuss how many cultures depend on informal learning practices in the home and community, and how they are even present "on the side" in many formal learning contexts as well. Critically, informal learning is something that happens a lot. Thinking about learning as something that only happens in what Rogoff et al. calls the "factory model of instruction" is missing an enormous part of how we all develop knowledge and skills.

6   *Science education over their lifetime*

Falk and Dierking (2010) emphasizes the disconnect between where or how most Americans get most of their science knowledge and the policies or funding sources that typically support primary and secondary schooling in the United States – what the authors call a "school-first" paradigm. Interestingly, science education in American high schools and colleges is generally good, but these experiences aren't available to everyone. If public engagement like what we advocate here contributes to the public's science literacy, there is considerable democratizing potential in such activities.

7   *Linguistic activism*

There are many linguists who engage in linguistic activism. We can't mention them all, but a few to consider include Ofelia Zepeda (University of Arizona), Rebecca Wheeler (Christopher Newport University), and Walt Wolfram (North Carolina State University). We also think it's worth mentioning some of the linguists who collaborate with the K-12 school system, like Maya Honda (Wheelock College), Kristin Denham (Western Washington University), and Wayne O'Neil (MIT). Denham and Lobeck (2010) describes a number of these collaborations.

8   *Cecile McKee [Worked Example Box]*

See Cecile McKee and her team in action: www.youtube.com/watch?v=6kXK6W8s0II

9   *STEM*

While NSF originally emphasized education in mathematics and the physical sciences, it has long taken a much broader approach. The 1945 report to the US president that motivated NSF's establishment showed visionary attention to science education (Bush, 1945). (This pdf has the original report, as well as NSF's current context: www.nsf.gov/about/history/EndlessFrontier_w.pdf.) NSF added social sciences to its portfolio in 1957. It now uses the term STEM (standing for Science, Technology, Engineering, and Mathematics) to include the many fields where it funds basic research. Interestingly, though, Charles E. Vela coined this term in the early 1990s as a way of referring to an integrative approach to education in these broad areas (Raupp, 2020). Vela developed this emphasis on integrative education at the

Center for the Advancement of Hispanics in Science and Engineering Education. In 2001, when Judith Ramaley became head of NSF's education arm, NSF was referring to its portfolio as SMET. Fortunately, Ramaley took up Vela's term (Chute, 2009). And now, the term is used everywhere English is spoken and beyond. Though sometimes conveying a relatively narrow view (e.g., excluding the social sciences), we ourselves follow Vela and Ramaley in using the term STEM more inclusively. If you want to read more of this history, see www.nsf.gov/about/history/nsf50/science_policy.jsp.

10   *Making a doable demo*

The Closing Worksheets in each chapter will guide you through making your own demo. Throughout the book, we'll be talking about a variety of demos that we've used in the past that cover a wide range of topics. In the index, we refer to these demos using names that we hope are clear for readers. You'll find each demo in the index at least twice – once under the general header "Demos" and again under the linguistics topic area that they exemplify. We also note that our own actual day-to-day references to these are often different and somewhat more fun. For example, we actually call the lexical stress demo the "taco demo"; we actually call the word learning demo "mystery words."