Communicating Cognitive Science:
Improving Awareness and Understanding Among People Who are Not Ourselves

Organizers

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Introduction

As cognitive scientists, we invest enormous amounts of time in our graduate educations and careers learning to communicate our findings to others in the form of highly specialized research papers. Indeed, it is hard to imagine how the nuance and distinctions required to advance our science, or any science, could be communicated if such were not the case. However, our work is a public enterprise that is largely sustained by institutions that promise some return to the public good. In other fields, this return may be primarily in terms of ideas and insight into the human condition, as might be the case for archaeology and history. The return may be in new fundamental discoveries regarding our physical world, such as recent progress in nanomaterials that promise eventual translation into new forms of energy, transportation, and communication. Or it may be focused on the Pasteur's Quadrant (Stokes, 1997) of research addressing an immediate practical need, such as an Ebola vaccine.

We argue that Cognitive Science is a field where the return to the public good can take any and all of these three forms. Similar to archaeology or history we can promise increased insights into the human condition in terms of the nature of the mind, memory, and thought. In common with Physics, our fundamental research on the nature of cognitive control and the integration of perception, cognition, and action promises a long-term translation into applications and products for reducing cognitive workload and increasing human effectiveness. Likewise, in common with use-inspired medical researchers, we have a long tradition of applying and testing our ideas about learning and decision making by incorporating our research into tutoring systems, guidelines for teachers, and real-time decision aids.

Although we strive to do the right things for the right motivations, many of us would have to admit, if pressed, that our public profile is slim to non-existent, both as individual cognitive scientists and as a global scientific discipline. It is unusual to find a person outside of academia who has any idea what cognitive science is.

Most of us struggle to convey our objectives and results and relevance in a manner that is understandable by people without PhDs in the same specialty as our own. By contrast, some of us seem very successful at getting the word of our good works out. Some of our members author popular books or textbooks (an extremely important way of inspiring people to become members of the next generation of cognitive researchers!), participate in radio interviews, occasionally appear on TV, and write successful blogs. How do they do it? Can their methods be duplicated by others across the world so as to better communicate our aspirations, discoveries, and inventions to the world public?

For this symposium, we brought together a group of people with a history of successfully getting the word out about their own and others' cognitive science research. Following an introductory presentation by the organizers, this group of distinguished speakers will tell what they do, why they do it, evaluate its utility, and offer suggestions for the rest of us for communicating cognitive science in ways that improve awareness and understanding among people who are not ourselves.

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One of higher education's current challenges is providing effective instruction to a diverse population of learners. Research in both cognitive science and learning science offers a rich body of theory, results, and methods to help generate and refine strategies to address this challenge. Why is this research on learning not having more of an impact on educational practice? Beyond the constraints of time, resources, and institutional infrastructure, there is an inherent difficulty in appropriately translating research results – derived from either lab or field studies – to specific classroom contexts. Learning is a complex process where multiple factors interact and context matters. Finding a balance between acknowledging this complexity while identifying fundamental principles, features, and

mechanisms, is the key to progress. Several research-to-practice books and related approaches are discussed in terms of how they achieve this balance.

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It should not be hard for cognitive scientists to reach out to a broader community to enlighten them about the work we do, because of its relevance to most people's lives. So, why aren't more cognitive scientists engaged in outreach? There are three significant factors that limit outreach activities. First, the community is not well-trained either in the style of writing and speaking that engages broad audiences or in the techniques for promotion of outreach that maximize its effectiveness. Second, at present, there is no significant expectation that outreach is part of a successful academic research career. Third, academic institutions do not typically value outreach activities in ways that lead to recognition and promotion. To remedy these problems, we need to increase our attention to training mid-career scientists in the art of communicating to non-scientific audiences in order to make them more comfortable speaking to groups and talking to reporters. We need to create a cultural expectation that mature researchers will tithe to the field by giving (roughly) ten percent of their time to outreach activities. Finally, we need to put pressure on administrations to create awards and recognition for faculty and researchers who engage the public as part of their scientific mission.

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In the coming decade, cognitive science is poised to reach a broader community. First, as the era of cognitive computing dawns (Kelly & Hamm, 2013), demand is expected to increase for cognitive scientists with the right skills who can lead multidisciplinary teams, thereby creating more and better jobs for cognitive scientists. Multidisciplinary teams will be needed to create cognitive assistants ("cogs") for all occupations, so cognitive scientists will have to work well with others studying and producing real-world applications. These applications are expected to generate enormous quantities of performance data for the field. Understanding the performance of individual experts and novices, as well as teams of people, with their cogs will require new methods and tools. Second, as more people come to depend on assistants to improve their lives, cognitive scientists can play a bigger role informing the general public about improvement strategies. This has the potential to unlock the citizen scientist in everyone to use data and models to improve their individual and collective performance.

However, there are also pitfalls to be avoided. For example, the science of flight from the study of birds to aviation is both intellectually fascinating and of great economic significance, but job growth happens primarily in the emerging frontier aerospace or drone-based package delivery application areas. The pitfall that cognitive scientists should avoid is the pitfall of becoming overly narrow in focus. Cognitive science can reach a broader audience if the core of the cognitive science community broadens its scope appropriately and orients towards future opportunities for growth.

Cognitive science can learn a great deal and benefit from the study of other academic disciplines and professions that have thrived or dwindled into obscurity (Abbott, 1988, 2001). As a practical first step, "cognitive scientist" should to be added to the list of O*NET Online occupations with a bright future. For example, nanotechnology is documented and has a bright outlook for the future, but cognitive science appears missing. The community should rectify this.

References
Abbott, A. (1988). *The system of professions: An essay on the division of expert labor*. University of Chicago Press.
Abbott, A. (2001). *Chaos of disciplines*. University of Chicago Press.
Kelly III, J., & Hamm, S. (2013). *Smart Machines: IBM's Watson and the Era of Cognitive Computing*. Columbia University Press.
Stokes, D. E. (1997). *Pasteur's quadrant: Basic science and technological innovation*. Brookings Institution Press, Washington, DC.