Charles Phelps Taft Research Center
at the University of Cincinnati
Center Fellowship Grant Application

Each section (I-IV) should be placed at the start of a new page. All required materials must be included in a single document, uploaded to the electronic submissions system, no later than 5PM on the published day of the deadline. Intradepartmental review and two external letters of support are required for this program. Applicants should submit their application with enough time to receive all letters of support prior to the close of the deadline. Taft does not accept an obligation to review applications that have not received the required letters of support by the close of the deadline.

I. **General Information**
    a. Name: XXXXXXX
    b. M#: XXXXXXXXX
    c. Department:
    d. Position: Associate Professor
    e. Project title: Speaking, Sensing, and Abstracting Away
    f. Potential external funding that might arise from this project: The research on abstract thought in callosotomy patients could serve as evidence of feasibility and proof of concept for a larger federally funded (NSF or NIH) grant.
    g. Intended results of a funded research, e.g., concrete plans for publication or conference presentations: Three published papers in leading journals that will form the core of an eventual book.

II. Taft Grant History

Please list your grant history with Taft for the last 5 years, in reverse chronological order. Please list project title, the name, date, and amount of award, as well as development of the project subsequent to the grant, e.g. publication.

(1) Faculty Release Fellowship: "Understanding and Explaining Inner Speech and Imagination." Awarded 12/15/2016. Extended normal sabbatical by one semester. During this time, the book *Explaining Imagination* (forthcoming in 2020 with Oxford University Press) was drafted and two chapters for my co-edited volume, *Inner Speech: New Voices* (2018, OUP), were written.

(2) Publication Costs Grant: "Inner Speech Deficits in People with Aphasia." Amount: $1021.24. Awarded 5/10/2015. Covered the costs for publishing empirical findings in Open Source journal, *Frontiers in Psychology.*

(3) Domestic Conference Travel Grant: "Imagining Experiences", Syracuse Philosophy Annual Workshop and Network, Syracuse University, New York. Amount: $610.00. Awarded 11/24/2015. The paper related to this talk, entitled "Imagining Experiences," was published in 2016 one of the top philosophy journals, *Noûs.*

(4) Domestic Conference Travel Grant: "Inner Speech and Auditory Verbal Hallucinations in Schizophrenia: Lessons from the Aphasias", Southern Society for Philosophy and Psychology. Amount: $847.00. Awarded 03/30/2015. The paper "Inner Speech Deficits in People with Aphasia," growing out of this talk was published in *Frontiers in Psychology*, 2015.

(5) "Self-Knowledge and Imagination", Society for Philosophy and Psychology, International Conference Travel Grant, December 1, 2104; Amount: $1,314.60. This paper was developed into an article ("Self-Knowledge and Imagination") that was published in *Philosophical Explorations* in summer 2015.

(6) "Self-Knowledge and Imagination", Self-Knowledge, Folk Psychology, and Psychiatry, Radboud University, Nijmegen. International Conference Travel Grant, December 1, 2104; Amount: $1,385.40. This paper was developed into an article ("Self-Knowledge and Imagination") that was published in *Philosophical Explorations* in summer 2015.

III. Project Proposal

Speaking, Sensing, and Abstracting Away

Background

   Often our concerns align with those of other animals. We want to feed ourselves, avoid danger, have offspring, protect our young. But others of our passions—for baseball, politics, science, and religion— seem distinctively human. It's not that other animals are too busy to care about these things. It is that they *can't* care. Their minds don't bend in that direction.

   What accounts for this difference in possible concerns? One answer—Darwin's (1859/2004)—sees the difference as one of degree. Perhaps if we multiply many times over the mental capacities already present in the flamingo, we'll arrive at a creature that could care about fantasy football or marvel at the age of the Universe. Another approach sees a difference in kind (Penn, Holyoak, & Povinelli, 2008). Airplanes are faster than cars not because they have bigger engines. It is because they can *fly*. To many, the ability to generate and comprehend language looks like the equivalent of wings: a difference in kind between humans and other animals that explains the idiosyncratic range of human thought.

   Which of these views—"difference in kind" or "difference in degree"—is closer to the truth? The matter remains unresolved (Bar-On, 2013; Bar-On, 2013; Bermudez, 2003; Hurley & Nudds, 2006; Lurz, 2009; Penn et al., 2008). To move forward, we need to settle *two guiding questions* about language:

   First, does language indeed lie at the root of the cognitive differences between humans and other animals? Or could we lose language and retain our distinctive range of thought?

   Second, is language use properly viewed as a cognitive ability different in kind from any had by other animals? Or is it continuous with abilities found elsewhere the animal kingdom?

My hope is to address these two questions as a Taft Center Fellow during the academic year 2020-2021, through researching and writing three related papers. As will emerge in the paper summaries below, the issues explored in each cross disciplinary boundaries and speak directly to the Taft Research Center's central question of what it is to be human.

Relation to past work

Most of my work to date has focused either on *inner speech* (i.e., "the voice in the head") (Langland-Hassan, 2014, 2016a; Langland-Hassan & Vicente, 2018) or *imagination* (Langland-Hassan, 2012, 2015, 2016b, forthcoming). There is a clear line from this work to the three papers I would like to pursue as a Center Fellow—particularly with respect to the work on inner speech. However, the planned papers extend well into new areas.

My immediate hope is to publish the three papers in leading journals, with the expectation that they will eventually form the foundation of a book on the topic. This was the progression of my work on imagination: papers published in 2012, 2014, and 2015 first articulated the framework that is developed in greater depth in my book *Explaining Imagination,* forthcoming in 2020 with Oxford University Press.

Paper One: From Sensing to Speaking

The ability to sense is ubiquitous in the animal kingdom, while, as earlier remarked, language use appears distinctively human. (This is not to say that *communication* is distinctively human). One way to argue that the cognitive difference between humans and other animals is one of degree is to show that the ability for sensing can scale up to become an ability for language. In order to do that, we need to understand just what it is to sense something—how sensing relates to other ways of registering or processing information (Burge, 2010). With that account in hand, we can explore whether linguistic abilities share with sensation essentially the same form of information processing. This paper will argue that they do, by looking at contemporary speech-to-text algorithms used in products such as Amazon's Alexa.

These technologies employ artificial neural-networks—algorithms set up to mirror the structure and activation patterns of actual neural networks involved in sensing. Such algorithms have been used not only to discriminate but to produce novel photorealistic images (Denton, Chintala, & Fergus, 2015; Ledig et al., 2017). When such networks are embedded within a larger cognitive system, I will argue, they are properly viewed as *sensors* in a strict sense—even when put to the task of recognizing and producing relatively abstract linguistic items. If this is correct, the distinction between speaking and sensing begins to blur—thus shedding light on the second guiding question above.

Paper Two: What is the relation of language to abstract thought?

Words such as 'justice,' 'freedom,' 'religion,' and 'philosophy' allow us to express abstract thoughts that, intuitively, are distinctively human. What, exactly, makes these notions *abstract*? A common answer in philosophy and psychology is that they correspond to things that are relatively difficult, or

impossible, to perceive with the senses (Gilead, Trope, & Liberman, forthcoming). Easily perceptible entities such as dogs, trees, cars, and dandelions are said to be "more concrete" by comparison. Using this basic characterization of the abstract/concrete distinction, researchers have debated whether language plays a special role in facilitating thought about abstract matters (Borghi et al., 2017; Dove, 2014; Lupyan & Bergen, 2016; Yee, Jones, & McRae, 2018).

Unfortunately, this common way of defining the abstract/concrete distinction obscures another sense in which one thought process can be more abstract than another. Suppose that you are shown a picture of a piece of leather and asked to identify which of four other pictures best goes with it. The four choice images are of wine, milk, cola, and orange juice. In this (quite difficult) semantic memory task, the correct choice is the image of milk, because both leather and milk derive from *cows*. Now, cows are not particularly abstract entities—at least, not in the sense defined above. However, grasping that the answer is *cow* requires something we might rightly call "abstract thought." It requires one to *abstract away* from the many perceptual differences between leather and milk to grasp what they have in common. We can call this a *task-relative* sense of abstractness.

This paper will introduce this task-relative notion of abstractness, explain its neglect in current research, and argue that the capacity to engage in it marks a deep cognitive differences between humans and other animals. My argument—connecting to the first guiding question above—will be that we cannot understand the relationship of language human thought until we are able to assess the relationship of language to task-relative abstract thought.

Paper Three: Is language needed for abstract visual categorization?

In neurotypical individuals, each brain hemisphere shares information with the other by means of a connecting bundle of fibers called the *corpus callosum*. In a common treatment for severe epilepsy, known as a callosotomy, this connection is severed. Fortunately, this can be done without causing collateral cognitive damage. Because each eye sends signals to only one hemisphere, visual puzzles to be presented to one of a callosotomy patient's hemispheres (via one eye) without the other hemisphere's awareness (Gazzaniga, 2005). Most humans are left-hemisphere-dominant for language, meaning that the neural regions supporting language production lie primarily in the left hemisphere. Thus, differences in a person's answers that depend only on which hemisphere (and which eye) was shown a stimulus can, potentially, reveal much about the role of language is such problem-solving.

I have the opportunity to use the experimental paradigm just described, through a collaboration with Dr. Hansel Greiner, a neurologist at Children's Hospital. Some of Dr. Greiner's patients have undergone a callosotomy and, he indicates, are available to participate in research studies. In previous work, funded
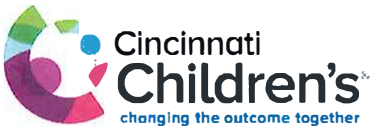
by an outside grant, I developed visual stimuli for use in experiments aimed at assessing the effect of impaired inner speech in people with post-stroke aphasia (Langland-Hassan, Gauker, Richardson, Dietz, & Faries, 2017). The stimuli consist in semantic memory puzzles of the sort described above, where a participant is asked to match a target image with whichever other image "best goes with it." I've discussed with Dr. Greiner the possibility of using the same stimuli with callosotomy patients to assess the relation of language to the completion of such tasks—and hence to the capacity for task-relative abstract thought. (See support letter). The results could shed light on whether language indeed lies at the root of task-relative abstract thought, and thus on the first guiding question above.

Timeline:

- February 2020: Draft and submit IRB protocol for experiment planned for Paper Three.
- June 2020: Receive IRB approval for experiment.
- August 2020-November 2020: Research and write Paper One. Submit Paper One to *The Journal of Philosophy.* Begin experimental sessions for Paper Three.
- November 2020-February 2021: Research and write Paper Two. Submit Paper Two to *Mind & Language.* Conclude experimental sessions for Paper Three.
- March 2021-May 2021: Analyze data and write Paper Three. Submit Paper Three to *Cognition.*

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