BIOGRAPHICAL SKETCH

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NAME: Shah-Basak, Priyanka

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Assistant Professor of Neurology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	END DATE MM/YYYY	FIELD OF STUDY
New Jersey Institute of Technology, Newark, NJ	BS	01/2006	Biomedical Engineering, Bioinstrumentation
New Jersey Institute of Technology, Newark, NJ	MS	08/2008	Biomedical Engineering, Bioinstrumentation and Signal Processing
Rutgers Graduate School of Biomedical Sciences, Newark, NJ	PHD	10/2012	Biomedical Engineering, Neurology and Neurosciences
University of Pennsylvania, Philadelphia, PA	Postdoctoral Fellow	12/2014	Neurorehabilitation and Cognitive Neuroscience
The Hospital for Sick Children, Toronto, Ontario	Postdoctoral Fellow	12/2016	Translational Neurosciences
Rotman Research Institute, Baycrest Health Sciences, Toronto, Ontario	Postdoctoral Fellow	05/2019	Neurorehabilitation and Electrophysiology

A. Personal Statement

I am a biomedical engineer and a cognitive neuroscientist by training. My work focuses on optimizing neurorehabilitation approaches for the treatment of cognitive disorders in acquired and neurodegenerative diseases. My postdoctoral work has primarily been focused on examining the efficacy and the neurophysiological bases of noninvasive brain stimulation treatments in post-stroke aphasia and primary progressive aphasia (PPA). Over the past 10 years, I have used a variety of methodologies, including transcranial direct current and magnetic stimulation (tDCS, high-definition tDCS, TMS), magnetoencephalography (MEG), and anatomical (voxel-based morphometry, voxel-based lesion symptom mapping) and functional MR imaging (fMRI), combined with neuropsychological testing and univariate and multivariate (partial least squares, principal component analysis) statistical approaches. I received a trainee award from the Heart and Stroke Foundation to investigate the functional network properties using MEG and the alterations thereof induced by HD-tDCS underpinning the therapeutic gains in post-stroke aphasia.

B. Positions and Honors

Positions and Employment

2019 - Assistant Professor of Neurology, Medical College of Wisconsin, Wauwatosa, WI

Other Experience and Professional Memberships

2010 - 2014 Member, American Academy of Neurology
2013 - 2014 Member, American Heart Association
2014 - 2015 Clinical Research Project Manager, The Hospital for Sick Children
2017 - 2019 Member, Canadian Partnership for Stroke Recovery, Heart and Stroke Foundation
2018 - Member, Society for Neurobiology of Language
2019 - Member, American Society of Neurorehabilitation

Honors

2003 - 2006 Albert Dorman Honor's College Scholarship, New Jersey Institute of Technology
2017 - 2018 Trainee award, Heart and Stroke Foundation
2017 Travel award, Stroke Program in Neurorecovery (SPiN)

C. Contribution to Science

1. Noninvasive brain stimulation for the treatment of aphasia. Individual variability in response to different forms of noninvasive brain stimulation techniques remains a largely unanswered question in post-stroke aphasia. The overarching aims in the following studies were to examine how parameters related to the brain stimulation technique itself, or those related to the patients' impairment profiles (such as baseline impairment severity and type of impairment) modulate stimulation treatment outcomes. Considerable heterogeneity was found in patients' responses to different combinations of tDCS electrode arrangements and polarity, with a shallow relationship with lesion size and location. In another study using TMS, we found that patients with phonological access deficits preferentially responded to inhibiting repetitive TMS over the right left inferior frontal gyrus. Our meta-analyses comparing the efficacy of TMS and tDCS in post-stroke aphasia indicated that time to stroke onset parameter may critically aid in the selection of effective brain stimulation techniques in aphasia. Overall, my work in this field has made a substantial impact, garnering over 150 citations, and has contributed immensely to informing precise brain stimulation treatments for enhancing aphasia recovery.

    a. Harvey DY, Mass JA, Shah-Basak PP, Wurzman R, Faseyitan O, Sacchetti DL, DeLoretta L, Hamilton RH. Continuous theta burst stimulation over right pars triangularis facilitates naming abilities in chronic post-stroke aphasia by enhancing phonological access. *Brain Lang*. 2019 May;192:25-34. PubMed PMID: 30870740; PubMed Central PMCID: PMC6503859.
    b. Shah-Basak PP, Wurzman R, Purcell JB, Gervits F, Hamilton R. Fields or flows? A comparative metaanalysis of transcranial magnetic and direct current stimulation to treat post-stroke aphasia. *Restor Neurol Neurosci*. 2016 May 2;34(4):537-58. PubMed PMID: 27163249.
    c. Shah-Basak PP, Norise C, Garcia G, Torres J, Faseyitan O, Hamilton RH. Individualized treatment with transcranial direct current stimulation in patients with chronic non-fluent aphasia due to stroke. *Front Hum Neurosci*. 2015;9:201. PubMed PMID: 25954178; PubMed Central PMCID: PMC4404833.
    d. Shah PP, Szaflarski JP, Allendorfer J, Hamilton RH. Induction of neuroplasticity and recovery in post-stroke aphasia by non-invasive brain stimulation. *Front Hum Neurosci*. 2013 Dec 24;7:888. PubMed PMID: 24399952; PubMed Central PMCID: PMC3870921.

2. Cognitive enhancement using tDCS. Operating under the definition of "cosmetic neurology", I have also been interested in examining the ability of tDCS to enhance normal abilities. I have co-authored a book chapter weighing in on the opportunity, feasibility and risks of cognitive enhancement using tDCS. In one of my highly cited (~112 citations) original studies, we demonstrated that the cognitive enhancement capacity of tDCS depends on the nature of the task performed during tDCS (referred to as the training task). In this study, increasing the working memory load, 3-back vs. 1-back, of the training task enhanced performance on a different task, adjusting paced auditory serial addition task (A-PASAT), performed immediately after the stimulation ended. These findings have direct implications for cognitive neuroscience studies involving tDCS as well as for clinical applications of tDCS as they reinforce the notion that pairing appropriate behavioral treatments with tDCS may be more effective than applying the treatments or tDCS separately.

    a. Shah-Basak, PP and Hamilton, RH. Cognitive enhancement using noninvasive brain stimulation: weighing opportunity, feasibility, and risk. In R. Meulen, A. Mohammed, W. Hall (Eds.), *Rethinking Cognitive Enhancement.* Oxford University Press. 2017. DOI:10.1093/acprof:oso/9780198727392.003.0008
    b. Gill J, Shah-Basak PP, Hamilton R. It's the thought that counts: examining the task-dependent effects of transcranial direct current stimulation on executive function. *Brain Stimul.* 2015 Mar-Apr;8(2):253-9. PubMed PMID: 25465291.

3. Electrophysiology in dementia. There is currently no consensus on non-invasive measures that can track disease progression in PPA and MCI. While gray matter shrinkage or volume loss are the most reliable measures, they suggest a relatively late stage of the disease, likely the stage where treatments may be ineffective. Markers of an intermediate stage in advance of frank atrophy and the one amenable to treatments are needed so as to intervene in a timely manner and potentially arrest neurodegenerative processes. In one of our studies, we addressed this gap and showed that patterns of pathological neuronal oscillatory activity, detected using resting-state MEG, are indicative of early neuronal dysfunction, rather than frank structural atrophy, in both MCI and PPA. In another study in PPA, we provided new evidence linking the pathological oscillatory activity during resting-state and linguistic task-induced neural dynamics. Both increased latencies in response to word stimuli and slow oscillations during resting-state were associated with poorer language task performance as well as offline cognitive tasks. Overall, my work in this field provides a strong basis for using electrophysiological measures for: 1) tracking disease progression in dementia, 2) localizing targets for brain stimulation treatments, and 3) assessing treatment efficacy in normalizing or delaying the neurodegenerative processes.

    a. Kielar A, Shah-Basak PP, Deschamps T, Jokel R, Meltzer JA. Slowing is slowing: Delayed neural responses to words are linked to abnormally slow resting state activity in primary progressive aphasia. *Neuropsychologia*. 2019 Jun;129:331-347. PubMed PMID: 31029594.
    b. Shah-Basak PP, Kielar A, Deschamps T, Verhoeff NP, Jokel R, Meltzer J. Spontaneous oscillatory markers of cognitive status in two forms of dementia. *Hum Brain Mapp*. 2019 Apr 1;40(5):1594-1607. PubMed PMID: 30421472.

4. Spatial neglect and allocentric spatial processing. Prism adaptation treatment has shown great promise in the treatment of post-stroke spatial neglect, albeit observed heterogeneity across patients in treatment effectiveness. In our work, we showed that one source of variability may depend on lesion locations involving the frontal cortex. Patients with frontal lesions responded to the treatment more than those without the frontal lesions, and VLSM analysis indicated that in patients with frontal lesions, intact medial temporal regions drive the treatment benefits. This study provided new evidence that could help in predicting treatment effectiveness. During graduate school, I was also interested in characterizing the behavioral and neural bases of object-centered or allocentric form of spatial neglect. In a case study, we highlighted that specialized neuropsychological battery and ecological measures for allocentric neglect are largely lacking and therefore it is often under-diagnosed and under-treated. We showed that object-centered errors on specialized paper-and-pencil tests translate into everyday activities such as reading and using clocks, thus influencing daily functions and should be addressed as such in rehabilitation. In a different study, we developed a specialized task for examining allocentric processing in healthy individuals. We provided compelling evidence supporting the role of right superior temporal gyrus in allocentric spatial processing by pairing the task with inhibitory repetitive TMS.

    a. Shah-Basak PP, Chen P, Caulfield K, Medina J, Hamilton RH. The role of the right superior temporal gyrus in stimulus-centered spatial processing. *Neuropsychologia*. 2018 May;113:6-13. PubMed PMID: 29578025; PubMed Central PMCID: PMC5930047.
    b. Chen P, Goedert KM, Shah P, Foundas AL, Barrett AM. Integrity of medial temporal structures may predict better improvement of spatial neglect with prism adaptation treatment. *Brain Imaging Behav*. 2014 Sep;8(3):346-58. PubMed PMID: 22941243; PubMed Central PMCID: PMC3683116.
    c. Shah PP, Spaldo N, Barrett AM, Chen P. Assessment and functional impact of allocentric neglect: a reminder from a case study. *Clin Neuropsychol*. 2013;27(5):840-63. PubMed PMID: 23560431; PubMed Central PMCID: PMC3759518.

D. Additional Information: Research Support and/or Scholastic Performance

Link to Google Scholar profile: https://scholar.google.com/citations?user=e8tS7GkAAAAJ&hl=en

Ongoing Research Support

SRC FP00015591 Pillay (PI) 08/01/2019 – 07/31/2020
Effects of tDCS on speech therapy in chronic aphasia
The goal of this project is to examine the effects of transcranial electrical stimulation during different types of speech therapy on reading and anomia in patients with chronic aphasia and examine how different language processes are recruited to support recovery.
Role: Co-Investigator

CNRP FP0016731 Pillay (PI) 07/01/2019 – 06/30/2021
Effects of tDCS on Language Recovery After Stroke
The goal of this project is to examine the neural changes and effects as a result of transcranial electrical stimulation during therapy in patients with chronic aphasia, the role of semantic vs. phonologic functional networks in recovery, and general connectivity changes that result from electrical stimulation.
Role: Co-Investigator

NRC FP00014412 Granadillo (PI) 07/01/2018 – 06/30/2019
High Definition transcranial Direct Current Stimulation (HD-tDCS) in Logopenic variant Primary Progressive Aphasia (lvPPA): Effects on Language and Neural Mechanisms (PI: Elias Granadillo Deluque)
The goal of this project is to investigate the effects of transcranial electrical stimulation and constraint-induced phonologic retraining in patients with logopenic primary progressive aphasia.
Role: Co-Investigator

Completed Research Support

CPSR2017, Heart and Stroke Foundation Canadian Partnership for Stroke Recovery Shah-Basak (PI) 07/01/17-06/30/18
Functional network properties in post-stroke aphasia and alterations induced by tDCS
Role: PI

Brain Canada, Platform Support Grant Dlamini (PI) 01/01/16-01/01/18
Canadian Pediatric Stroke Imaging Research Platform
Role: OP

SickKids, Mary Jo Haddad Innovation Fund (pilot funds) Dlamini (PI) 01/01/16-01/01/17
Predicting language outcome in neonatal arterial ischemic stroke using brain connectivity measures
Role: Co-Investigator