

Brian Romaner Danra Kazenski, & Michael Cannizzaro

Abstract

Exploratory acoustic analysis of speech and voice characteristics in persons with PTSD.

Posttraumatic stress disorder (PTSD) is an anxiety disorder caused by one or more distressing experiences that threatens or causes immense physical harm. Diagnosis of PTSD is often difficult due to the variety of symptoms experienced or observed, and the reluctance of some patients (e.g., military personnel) to seek help because of the associated stigma (Schneiderman, Braver, & Kang, 2008; Whyche, 2008). Additionally, there are cost, time, and distance barriers to assessing potential PTSD sufferers deployed in combat. The early identification and treatment of PTSD is important and supported by preliminary evidence indicating that early intervention leads to significant improvements in PTSD related depression (Darkins et al., 2008; Schell & Marshall, 2008). Our current research suggests a low cost, non-invasive tool for monitoring PTSD symptomatology via acoustic analysis of several prominent speech and voice features. In this pilot project, publicly available voice data was acquired to perform between-group acoustic analyses comparisons for 5 persons with and 5 persons without PTSD. Multiple acoustic variables associated with severity and treatment response in other psychiatric disorders (e.g., schizophrenia & depression) were used as potential candidates for distinguishing between groups (Cannizzaro, Harel, Reilly, Chappell, & Snyder, 2004; Mundt, Snyder, Cannizzaro, Chappie, & Gerals, 2007; Cannizarro, Cohen, Rappard & Snyder, 2004). Differentiating variables were found in both pause and frequency domains. These variables were easily extracted and analyzed, potentially providing a low-cost biometric tactic for monitoring the mental health of individuals (e.g., soldiers at war) prone to PTSD. Alone this method is simplistic, however, if coordinated with assessment of psychological measurements and other

predictors of the disorder (e.g., exposure to traumatic events, previous distress or other mental health issues), acoustic analysis could provide a repeatable screening tool for PTSD symptoms and indicate if more in-depth clinical assessment and intervention are warranted.

Selected References

- Cigrang, J. A., Peterson, A. L., & Schobitz, R. P. (2005). Three American Troops in Iraq: Evaluation of a Brief Exposure Therapy Treatment. *Pragmatic Case Studies in Psychotherapy, 1*, 1-25.
- Darkins, A., Gerardi, M., Rothbaum, B. O., Ressler, K., Heekin, M., & Rizzo, A. (2008). Virtual reality exposure therapy using a virtual Iraq: case report. *J Trauma Stress, 21*, 209-213.
- Gros 2010Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med, 351*, 13-22.
- Lapierre, C. B., Schwegler, A. F., & Labauve, B. J. (2007). Posttraumatic stress and depression symptoms in soldiers returning from combat operations in Iraq and Afghanistan. *J Trauma Stress, 20*, 933-943.
- Marx, B. P., Doron-Lamarca, S., Proctor, S. P., & Vasterling, J. J. (2009). The influence of pre-deployment neurocognitive functioning on post-deployment PTSD symptom outcomes among Iraq-deployed Army soldiers. *J Int Neuropsychol Soc, 15*, 840-852.
- Reger, G. M., & Gahm, G. A. (2008). Virtual reality exposure therapy for active duty soldiers. *J Clin Psychol, 64*, 940-946.
- Schell, T., & Marshall, G. (2008). Survey of Individuals previously deployed for OEF/OIF. In T. Tanielian & L. Jaycox (Eds.), *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery*. Washington, D.C.: RAND Corporation.
- Schneiderman, A. I., Braver, E. R., & Kang, H. K. (2008). Understanding Sequelae of Injury Mechanisms and Mild Traumatic Brain Injury Incurred during the Conflicts in Iraq and Afghanistan: Persistent Postconcussive Symptoms and Posttraumatic Stress Disorder. *American Journal of Epidemiology*, kwn068.
- Sundin, J., Fear, N. T., Iversen, A., Rona, R. J., & Wessely, S. (2010). PTSD after deployment to Iraq: conflicting rates, conflicting claims. *Psychol Med, 40*, 367-382.

Vasterling, J. J., Schumm, J., Proctor, S. P., Gentry, E., King, D. W., & King, L. A. (2008).
Posttraumatic stress disorder and health functioning in a non-treatment-seeking sample of
Iraq war veterans: a prospective analysis. *J Rehabil Res Dev*, 45, 347-358.

Whyche, S. (2008). New Army General Leads PTSD, TBI Initiatives. *Psychiatric News*, 43, 10

1.