

INTRODUCING ACOUSTIC PSYCHOMETRY®

Acoustic Psychometry®, or "AP," is the measurement of mental states using speech acoustics. With AP, a brief sample of speech is processed to identify its essential acoustic patterns. These patterns, in turn, can be interpreted for what they reveal about the speaker's way of thinking and feeling. To understand the great potential of AP it is useful to first consider the current status of mental measurement methods.

Until now, mental life has been refractory to inspection by technology. The high tech tests you hear about for autism, ADD, personality styles, and so on, are highly non-specific, and their validity is vastly exaggerated by corporate and academic marketers. Scientists who are immersed in the field recognize that decades of research in brain imaging, genomics, and other technologies have failed to yield even a single valid test of mental functioning.

The problem is primarily conceptual rather than technical. It has proven impossible to translate the findings of brain science to the realm of psychology because no conceptual template for doing so exists. The concepts and methods of biology and psychology have nothing in common. Speech-based methods, in particular, have relied almost exclusively on statistical correlations of random collections of acoustic variables and human traits, without regard for conceptual linkage. As a result, attempts to locate psychological characteristics within the brain, genome, or speech signal repeatedly fail to differentiate specific mental qualities from one another, yielding tantalizing "p values," in other words, but discouraging "effect sizes."

Acoustic Psychometry solves these conceptual problems by focusing on what are called "acoustic transformational structures." These are the mental structures, or rules, that people employ as they speak. They are properties of the person, created over time, that reside simultaneously within the neurological and the mental apparatus. They embody an utterance with specific patterns of thinking and feeling. The existence of these structures was discovered by the pioneers of speech science and psychology in the last century, and it has become possible to measure them quickly using modern methods of signal processing. It is our belief that by measuring acoustic transformational structures AP will provide the best conceptual template for linking biological and psychological systems and thereby enable mental measurement to attain the precision of biological measurement.

The system used to identify, quantify, and display acoustic transformational structures is called the "Acoustic Psychometer®." It is a powerful and nimble instrument, capable of extracting a variety of structures from a thirty-second sample of speech. The structures are selected, displayed as images, and measured according to the needs of the user.

At this time, the interpretation of AP images and measurements requires special knowledge and understanding of the system. A validating process has begun with several informal preliminary studies (e.g. acoustic markers of recovery from depression: $N=19$, $p<.009$, $d=1.05$; acoustic correlates of conscientiousness: $r=.77$; and susceptibility to SSRI-induced agitation: $p<.0002$ and $p<.0009$, $d=3.85$ and $d=2.21$). An IRB-approved study of placebo responsiveness is underway, and studies are envisioned of terrorist speech, competitive athletic performance, fundamental personality structure, clinical states, and other human phenomena. Future users of AP will certainly find new applications for it and make original contributions to its development.

Two eminent scientists well versed in the areas of linguistics, psychology, and brain science have examined AP and foresee a prominent role for it. Ray Kent, Professor Emeritus at the University of Wisconsin and one of the world's preeminent speech scientists, has commented upon the "unique capabilities" of AP, and its "flexible and dynamic analysis that is well suited to the complexities of human speech and underlying mental states." William Sledge, M.D., the George D. and Esther S. Gross Professor of Psychiatry at Yale, has described AP as a "unique window to the mind" that bridges both the biological and psychological realms "without sacrificing complexity in either one."

Acoustic Psychometry and its methods are the creation and intellectual property of Dan Begel, M. D., whose company, Acoustic Psychometry Systems, Inc., is located in Santa Monica, California.