Tillyer Award Introduction Speech
Awardee: Wilson S. Geisler
November 18th, 2021
Johannes Burge

I'm very pleased to be introducing Bill Geisler, the 2020 Tillyer Award winner.

Bill and I met when I moved to Austin in 2009 to start a post-doctoral position with him.

I will start with a brief biographical sketch, and a less brief overview of some of his career highlights. Then I'll shift to more personal notes.

Bill graduated from Stanford University in 1971. He received his PhD from Indiana University under the supervision of Rich Shiffrin and Lee Guth, though Rich told me recently that, and I quote, "Bill pretended he was my advisee as a graduate student. He trained me more than I trained him."

Then Bill began an assistant professorship at University of Texas at Austin in 1975, where he has remained for his entire career. In his early years in Texas, he has told me, he rode a motorcycle and played guitar in a band, almost to the exclusion of science. My understanding is that it got to the point where senior members of his department sat him down and told him that he better decide whether he wanted to be a scientist or the next incarnation of somebody like Willie Nelson.

He became full professor in 1987, founded the Center for Perceptual Systems in 2001, and was elected into the National Academy of Sciences in 2008, a Silver Fellow of the Association for Research in Vision and Ophthalmology in 2011, and a Fellow of the Society of Experimental Psychologists in 2012. All the accoutrements of a distinguished career in the sciences.

Bill's work has had a profound effect on the trajectory of vision science over the last 40 years. He chooses important problems to work on, and he attacks those problems with an uncommon degree of rigor and quantitative incisiveness.

Bill is probably most prominently associated with the introduction of ideal observer analysis to the study of sensory-perceptual systems.

For those listening who may not be familiar… ideal observer analysis characterizes all the information available for a particular task, and then determines how to utilize that information in the best way possible. The resultant performance benchmarks are used to predict, analyze, and understand human (or animal) performance.

In the 1980s, he applied ideal observer analysis to bedrock visual tasks (intensity and location discrimination, vernier acuity, contrast sensitivity, others), described the flow of information through various stages of visual processing, specified the physical limits of performance in those tasks, and showed that the patterns of human performance are tightly predicted by those physical limits This initial flurry of work culminated in a landmark 1989 paper in *Psychological Review*--"Sequential ideal-observer analysis of visual discriminations".

Throughout the 1990s, in close collaboration with Duane Albrecht, he published multiple papers that characterized the response properties of individual neurons in early visual cortex, with a special focus on how they support target detection and identification, and on how they select for and process motion. In this period, he published a normalization model to account for the response properties of neurons early in the visual system. This was before normalization models were in vogue. Bill and David Heeger, who published closely related ideas independently, tend to share credit for introducing the idea of response normalization into visual neuroscience. He was also in the vanguard that started applying Bayesian methods to the study of sensation and perception.

During the 2000s, an astonishingly productive decade, he helped make the analysis of natural scene statistics mainstream. Bill, and a few others, with a series of beautiful studies, showed that many of the Gestalt laws of grouping have their roots in the statistical relationships between images and scenes. My favorite paper from this bunch is the 2009 *Visual Neuroscience* paper: “Contour statistics in natural images: grouping across occlusions”. This body of work helped resurrect--and add quantitative teeth to--the seminal proposals of Egon Brunswick regarding perceptual organization.

Also during the 2000s, he published a remarkable 2005 paper in *Nature* titled “Optimal eye movement strategies in visual search”. It showed that when humans actively search for a target embedded in a cluttered scene, the seemingly haphazard eye movements follow a near-optimal strategy. It can only be called a classic. Fifteen years later, this broad line of work on visual search is still being developed. And we’ll hear about some of those developments today.

The 2010s were marked by projects examining target detection and the estimation of various cues to depth in images of natural scenes, and showing how various forms of uncertainty across the visual field impact processing and performance.

Again, you would be hard pressed to find anyone who has done more to advance our understanding of vision in the last 40 years than Bill.

Now, to turn to more personal notes...

In preparation for this introduction, I solicited remarks from colleagues, friends, and mentors that have known Bill over the years.

For all of you that know Bill well—and I say this with tongue planted firmly in cheek—one of his very favorite things is to be the center of attention and to hear people laud him unreservedly. So, at the risk of making him just a bit uncomfortable, I have been told things like: “He is the best”. “I have been in awe of research contributions over the years”. “He is the smartest guy in the field”.

Colleagues at UT Austin mentioned "Geisler's First Maxim”… Whenever one is stuck in some morass that involves politics or resources you ask ‘What would be best for the science?’, and you let the answer to that question guide the decision making. This approach helped set a tone for the functioning of the Center of Perceptual Systems at UT Austin, a center that Bill founded and directed for almost 20 years, that freed people to focus on their science and created a great atmosphere for learning and discovery that I, myself, benefited mightily from.

Marty Banks, my former PhD advisor and previous recipient of this same award, relayed to me the following note: “Bill enabled Gibson’s insight about the information available for perceptual tasks. Gibson was vague. Bill was not. Bill’s great talent is to able to turn insights into a quantitative expression. Bill changed my way of thinking about how to pursue questions in perceptual science.”

I think it is fair to say that Bill’s work has changed the way a lot of us think about perception science.

I’ll close with something Bill once said to me that replays itself in my head surprisingly often. He said: Pick a topic in the science, even a venerable, heavily-studied one, and examine the findings. Push on it for a while. You’ll find out it is soft.

It is his way of saying, there is often a deeper understanding to be had, there is always more to learn, and there is always better science to do.

I am thankful your mentorship when I was in Austin and since, for the fact that we are colleagues, and for the friendship that has developed over the years.

Congratulations on this very well deserved award. It couldn’t happen to a better guy. I look forward to hearing what’s next.