TEXAS A&M UNIVERSITY-SAN ANTONIO

Office of Research and Health Sciences

Research Newsletter

September 2024

Curiosity in Action: A Glimpse Inside A&M-SA's Research Engine

I'm enthusiastic and excited to share details as we embark on a thrilling journey into the heart of A&M-SA's vibrant research and innovation scene. In our quarterly research newsletter, we share groundbreaking experiments, mind-bending discussions, and creativity that'll leave your neurons buzzing.

Think you're not a "researcher"? Think again! Whether you're a science whiz, a tech enthusiast, or an artistic soul with a knack for the unconventional, there's a place for you in this vibrant ecosystem. I welcome you to dive into the fascinating world of biology, enter the gateway to the world of circuits, motors, or apps and computing, and travel to distant locations where our researchers work. In this issue, we highlight three projects that provided hands-on experience to our students.

I welcome you all to join this effort in sharing the research conducted by our faculty, staff, and students. We also welcome your sharing of your research achievements or outcomes.

Vijay Golla, Vice Provost for Research and Health Sciences

Featured Faculty Research

Ocean Secrets Unveiled in Deep Sea Dives

Dr. Liz Borda, College of Arts & Sciences

Sustainability, monitoring, and health of water resources and associated aquatic ecosystems are foundational for the economic, social, and environmental well-being of communities and the biological communities that depend on them. Dr. Elizabeth Borda and her team in WATER Programs in the Department of Natural Science participate in scientific marine dives through the ocean caves to study the biodiversity, hydrogeology, ecology, and microbiology of marine habitats.
Scientific diving for research and exploration requires special training to acquire underwater skills and techniques. Its importance is multifaceted and extends across various fields.
Dr. Borda's laboratory welcomes new students interested in learning and researching marine biology, oceanography, and marine ecosystems. Click here to contact Dr. Borda for more information.

Missouri Cave, Cannon Ball Spring Cave (300+ feet deep) . Dr. Fernando was at a depth of 30 ft., 40 min "deep" into the cave and 56 F (temperature).

Where I work
Fernando Calderón Gutiérrez

I was always interested in biology, but it wasn't until I saw a film about cave diving in secondary school – in which I watched divers glide past massive stalactites – that I realized I wanted to study cave fauna. The video didn't mention the creatures inhabiting those underwater chambers, but I knew they must be there. More than just naming them, I wanted to understand their ecology, which meant I needed to study them in their natural habitat.

Cave diving requires specialized equipment and coordinated groups. In this photo, taken in March in Belize, you can see that I always carry duplicate lights and navigation tools, and bring extra air tanks. During this sampling trip, I was using a plankton net and test tubes to collect tiny, nearly invisible animals floating in the water.

We've come to understand that caves are full of life, brimming with sponges; shrimp; sea stars and urchins; and bristled, segmented worms, all adapted for life in low-light environments. Cave species are often paler and have slower metabolisms and fewer sensory appendages, such as eyes, than those that live in brighter conditions. Sometimes we find one species in only a single cave, whereas others seem to appear all over.

Although underwater caves might seem far removed from surface environments, research has shown that these worlds are linked in many ways. In places such as the Yucatán Peninsula in Mexico, jungles pull water directly from underground sinkholes as it flows towards the sea, where it connects with offshore coral reefs. If pollutants get underground, they can contaminate these ecosystems. I'm researching the resilience of cave ecosystems to climate change, including how heavy rain and sea-level rise might affect cave fauna by changing the proportions of fresh and salt water.

If we don't commit to conserving these mysterious places, they could be gone before we have the chance to understand them, and everything that makes them unique will disappear too.

Fernando Calderón Gutiérrez is a marine biologist at Texas A&M University in San Antonio. Interview by Amanda Haidt.

Photographed for *Nature* by Natalie L. Gibb.

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Analytical Modeling of Firm Competitions

Dr. Weixing Ford, College of Business

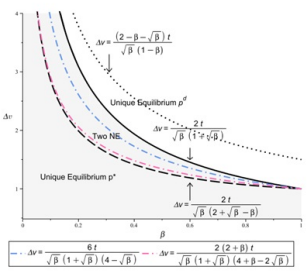
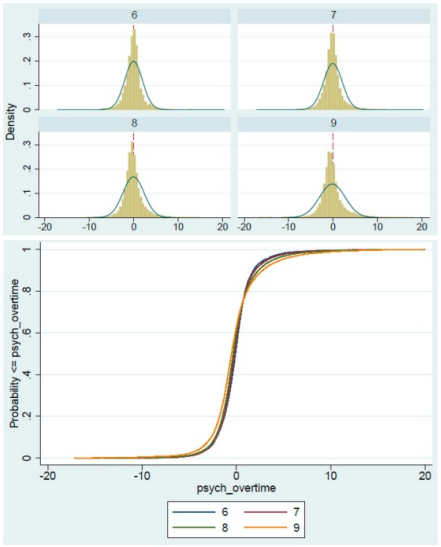


Figure 6: Global Equilibrium When $\beta\Delta v$ is relatively low (shaded), the equilibrium price is p^*; when $\beta\Delta v$ is relatively high (non-shaded), the equilibrium price is p^d.

My other research stream is in the area of consumer judgment and decision-making. Sympathizing on consumers' inevitable fate of fallen prey to powerful marketing manipulations, I looked into consumers' decision heuristics as

One stream of my research focuses on analytical modeling of firm competitions, and I predominantly use game theory to solve economic equilibrium for business, since competition (aka game-like interactions) is the perpetual essence for all business. My most notable work in this stream is on one of the greatest business challenges in our era: the broad retail landscape is undergoing revolutionary changes (such as the massive closure of brick-and-mortar stores), and the industry is in dire need of theoretical guidance. My research analyze the competitive equilibrium of different types of retailers such as brick-and-mortar stores versus online stores, and give managerial recommendations on optimal strategies on pricing, product assortment, and return policy, etc. One of my papers in this research stream was ranked as the 4th in SSRN Top 10 Download List in just 4 months after its publication because of its significant impact on the industry.

well as the factors that may influence their subconscious mind. Several of my papers gained greater insight on the vulnerability and susceptibility of consumers' decision-making process. Ultimately, I hope that my behavioral research will both benefit consumers by helping them improve decision quality and benefit business by providing managerial recommendations on product communications, advertising, promotions, etc.



TU CASA: Transition University for Career Advancement and Successful Adulthood

Dr. Mariya Davis, College of Education and Human Development

Texas A&M University-San Antonio developed and implemented an inclusive, comprehensive model that promotes successful transition into higher education, competitive integrated employment, and independent living outcomes for individuals with intellectual disabilities (ID) in the TU CASA project. This project addresses the critical needs in the immediate and wider community by establishing a sustainable program that: (a) provides 18 months fully inclusive post- secondary education (PSE) opportunities with access to typical and

specialized A&M-SA services and supports; (b) offers a meaningful credential upon completion that addresses academic, employment, and independent living domains; (c) utilizes a person-centered approach to meet unique student needs and enhance their quality of life; (d) employs comprehensive program evaluation; and (e) includes a plan for replication on regional and state levels. In the last four years, TU CASA recruited and admitted 22 students.

TU CASA research focuses on developing effective support programming for our students, with an aim to increase long-term employability and independence and the quality of life for individuals with intellectual disabilities.

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