

**Yahriel Salinas-Reyes: Statement of Purpose**  
**California Institute of Technology**  
**Division of Computational and Data-Enabled Sciences**

## **Executive Summary**

This comprehensive proposal reflects my commitment to advancing the frontiers of knowledge, intertwining the realms of aerospace engineering, neuroscience, and mathematical sciences. With Nature's Chaos Game, I envision a future where the intersections of seemingly disparate fields converge, unraveling the mysteries of the human mind for the betterment of humanity.

## **Introduction:**

As I stand at the intersection of aerospace engineering, neuroscience, and mathematical sciences, my journey has been shaped by a profound curiosity about the nature of intelligence and the potential of interdisciplinary research to unravel complex phenomena. My name is Yahriel Salinas-Reyes, and I am driven by a deep-seated passion for exploring the mysteries of the human mind through computational and data-enabled sciences.

## **Personal Narrative:**

Growing up with a fascination for the skies, I pursued a Bachelor's degree in Aerospace and Aeronautical Engineering at Iowa State University of Science and Technology. While exploring the intricacies of flight and spacecraft design, I found myself drawn to the interconnectedness of engineering and the human experience. This realization ignited a desire to delve into the field of neuroscience, seeking to understand the cognitive underpinnings that govern human behavior and perception.

My academic journey took a transformative turn as I embarked on a Doctorate in Neuroscience within the Division of Mathematical Sciences (DMS) with a specialization in Computational and Data-Enabled Sciences. This intersectionality allows me to bridge the gap between engineering principles and the complexities of the brain. Through coursework and research, I have honed my skills in biomedical data science, bioinformatics, and the theoretical foundations of scientific computing.

## **Unraveling the Nature of Intelligence:**

My intellectual framework, developed through rigorous exploration, is divided into two phases. The first, "Understanding The Divided Self and Existential Despair," explores the profound connection between mental health and the human experience. Recognizing that schizophrenia cannot be fully comprehended without understanding despair, I investigate the stages of Alogia, Autism, Ambivalence, and Affect Blunting. This phase aims to uncover the fractures within the self and society.

The second phase, "Unraveling The Nature of Intelligence and Human Ingenuity," delves into the creative minds at the forefront of exploration. Drawing inspiration from those who venture into mental territories, akin to climbing mountains, this phase explores Youthfulness, Imagination, Curiosity, and Dreaminess. It envisions the dawn of a new age and the realization of natural selves and frontiers.

## **Research Proposal: "Nature's Chaos Game":**

My research proposal, "Nature's Chaos Game," seeks to capture the essence of human ingenuity by exploring schizophrenia and psychosis through the lens of chaos theory. Building upon R.D. Laing's revolutionary theory, I challenge the conventional view of mental health disorders as mere breakdowns. Instead, I propose that madness and confusion can be breakthroughs—a potential for liberation and renewal.

The project title encapsulates the interdisciplinary nature of my research, emphasizing the intersection of psychiatric thought, neuroscience, and social justice. Through captivating language and anthropological-engineering methods, I aim to engage readers in a scientific story that sparks curiosity and challenges existing perceptions.

## **Project Funding and Synopsis:**

To support this groundbreaking research, I plan to solicit funding from various sources, including the NSF-Mercury Project, NSF-GRFP, GFSD, DOE Computational Science Graduate Fellowship, and prestigious fellowships like the Google Fellowship and Fulbright Open Study/Research Award. The project's interdisciplinary focus aims to capture the attention of funding bodies interested in the potential global impact of understanding schizophrenia and psychosis.

The synopsis outlines the significance of the study, framing madness and confusion as natural reactions to an insane world. It draws from Laing's existential perspective and challenges the traditional psychiatric narratives, advocating for a comprehensive understanding of neurobiological dysfunctions and abnormalities in the schizophrenic brain.

## **Research Abstract: "Unraveling the Neurobiological Landscape of Schizophrenia":**

This abstract presents a multidisciplinary approach informed by Numbers, Shapes, and Prediction. Leveraging state-of-the-art neuroimaging techniques, I propose a comprehensive data capture initiative to construct a multidimensional dataset. The integration of Monte Carlo Integration, fractal geometry, and dimensional/spectral analysis aims to unveil the concealed patterns and emergent behaviors within the neurobiology of schizophrenia.

section\*Purpose and Research Plan: My purpose is to contribute to the field of Biological Anthroengineering, where principles of anthropology and engineering converge to enhance biomechanics, ergonomics, and functional morphology. The proposed research involves the development of advanced computational tools to optimize Biological Anthroengineering, inspired by chaos theory and interfacial phenomena.

The methodology invokes governing equations of connectivity, incorporating energy, mobility, and continuity principles. Through thermodynamic modeling, finite-element analysis, and advanced control mechanisms, I plan to simulate brain anatomical structures and enhance adaptability and safety in these structures.

## **Research Plan Timeline:**

This five-year plan involves a comprehensive literature review, development of advanced computational models, predictive modeling of neuroanatomical morphologies, experimental validation, and dissemination of research findings. The timeline reflects a commitment to rigorous exploration, ensuring the project's success and contribution to nanotechnology, the etiology of schizophrenia, mental health, and global public health.

## **Intellectual Merit, Innovation, and Broader Impacts:**

The intellectual merit lies in the development of computational tools that illuminate the neurological landscape of schizophrenia, potentially revolutionizing neuroscience and psychiatry. The innovative approach transcends disciplinary boundaries, contributing to the fields of science and engineering. The proposed research not only enhances safety in bioengineering but also offers natural alternatives for mental health treatments.

## **Educational Outreach:**

My commitment extends beyond research to promoting diversity and inclusion in STEM fields. Through outreach programs and collaborations, I aim to inspire underrepresented groups to pursue careers in Biological Anthroengineering and STEM disciplines. This aligns with a broader vision of creating a more diverse and inclusive scientific community.

## **Conclusion:**

In conclusion, my research project embodies a passion for Biological Anthroengineering, scientific excellence, and a dedication to improving society. By developing advanced computational tools, I aspire to contribute to our understanding of neurological disorders, neuroplasticity, and safety in bioengineering. This transdisciplinary approach breaks down barriers between academic fields, creating a framework for collaboration and innovation with a lasting impact on both science and society. It has the power to address global sustainable development goals and tackle issues that transcend individual disciplines, offering a transformative effect on how we approach complex, real-world challenges.

## Additional Essay

I am a first-generation graduate student with a profound passion for advancing the frontiers of knowledge in Aerospace, Aeronautical, and Mechanical Engineering, coupled with a keen interest in Computational and Data-Enabled Sciences. As a Global Scholar with triple citizenship (U.S., El Salvador, Mexico), my journey has been shaped by diverse experiences that have profoundly influenced my identity and achievements.

Growing up as the child of Mexican and Salvadoran immigrants in the United States, I witnessed my parents' unwavering pursuit of the American Dream. Their values of perseverance and determination became the bedrock of my character, instilling a profound sense of resilience within me. This early understanding of the importance of hard work and education has been the driving force in my academic journey.

My academic pursuits have led me to explore the intricate world of Aerospace and Aeronautical Engineering, where I embraced the challenges of innovating propulsion systems and delved into the complexities of aerodynamics. My research work in this domain has not only honed my technical skills but also enabled contributions to advancements in the field. I have had the privilege of working on projects poised to redefine the future of space exploration, resulting in multiple publications and prestigious conference presentations.

Beyond my contributions to Aerospace and Aeronautical Engineering, my interests extend to Computational and Data-Enabled Sciences. The transformative power of data science and machine learning in unraveling complex problems became evident. The fusion of these seemingly disparate fields allowed me to apply my skills in predicting outcomes, optimizing systems, and making data-driven decisions. Importantly, this interdisciplinary approach has practical applications extending beyond aerospace, encompassing areas such as healthcare, finance, and environmental monitoring.

My journey into STEM has been further enriched by expertise in robotics, electrical engineering, computer science, and software engineering. Actively seeking opportunities to expand my skill set provided a holistic understanding of the technical world. Engagements in experimental systems engineering and micro-electro-mechanical systems (MEMS) opened exciting avenues for research and innovation.

I've not limited my academic pursuits to technical fields alone. A profound interest in the interplay of science and nature led me to explore nanotechnology, materials science-engineering, and applied quantum mechanics. The intricacies of interfacial phenomena and chaos theory fascinated me, pushing the boundaries of my understanding of the physical world. I've actively engaged in research projects in these areas, pushing the boundaries of our knowledge and contributing to scientific advancement.

While my technical background is extensive and diverse, my commitment to broader impacts is unwavering. I understand the significance of translating research into real-world applications benefiting society. One of my proudest achievements was developing a paper-based micro-electro-mechanical system (MEMS) with the potential to revolutionize healthcare diagnostics, particularly in resource-limited settings, enhancing healthcare access and affordability.

Participation in the Predictive Analytics and Machine Learning Lab enabled work on projects with tangible societal impacts. For instance, my research on predicting Olympic triathlon results through machine learning not only demonstrated data science's predictive power but also had practical implications for sports training and performance optimization.

Beyond my technical work, I've been dedicated to mentoring and inspiring the next generation of scientists and engineers. Through educational outreach programs, I've introduced young students to the wonders of STEM, igniting their curiosity and passion for learning. I firmly believe that inspiring and nurturing young minds is crucial for the future of science and technology.

In my current role as aspiring doctoral student and member of The Order of The Engineer, I promise actively engage in research aligned with the societal objectives outlined by the National Science Foundation and uphold my Obligation of An Engineer\* as described in The Significance of The Ring\*. My research in

the field of Computational and Data-Enabled Sciences is intellectually stimulating and holds the potential to address pressing societal challenges. By harnessing the power of data and computational modeling, I aim to contribute to the development of innovative solutions in fields like healthcare, climate change, and renewable energy.

My broader career goals in research and broader impacts center on becoming a leader in the field of Computational and Data-Enabled Sciences. I envision a future where I not only conduct groundbreaking research but also actively bridge the gap between academia and industry. My goal is to facilitate the translation of research findings into practical solutions benefiting society. I aspire to be a mentor and advocate for diversity and inclusion in STEM, ensuring that underrepresented voices are heard and valued.

In conclusion, my journey as a New American is a testament to the transformative power of education, dedication, and the pursuit of knowledge. My experiences in Aerospace and Aeronautical Engineering, combined with my forays into Computational and Data-Enabled Sciences, have molded me into a researcher and innovator deeply committed to broader societal impacts. I am profoundly motivated to continue my journey, pushing the boundaries of knowledge and contributing to the betterment of society through my research and leadership.

### **Personal History Statement**

As a doctoral candidate in Neuroscience with a specialization in Computational and Data-Enabled Sciences, I am excited to submit my application to California Institute of Technology. My academic journey, shaped by diverse experiences and a relentless passion for research, aligns seamlessly with the Division of Computational and Mathematical Sciences' (CMS) mission to expand human knowledge and benefit society through integrated research and education.

My journey began in a quiet town in Iowa, where I encountered the profound beauty of silence through my mentor, Don. His guidance introduced me to the "music of silence," fostering in me a deep appreciation for the extraordinary within the ordinary. This early exposure to unconventional wisdom ignited my curiosity and set the stage for my academic pursuits.

Pursuing a Bachelor's degree in Aerospace and Aeronautical Engineering at the prestigious Iowa State University of Science and Technology (ISU), and later a journey to the halls of Einstein (Caltech), I delved into the complexities of the mathematical language underlying the cosmos. While my academic foundation was rooted in aerospace engineering, a serendipitous discovery of fractal mathematics became a transformative force. Fractals, intricate patterns that transcend the ordinary, became my canvas for curiosity, representing the intersection between chaos and order.

My exploration extended into Micro-Electro-Mechanical Systems (MEMS), where I honed my skills in precision design and innovation. Yet, it was the interplay between order and chaos, exemplified by fractals, that truly captivated me. This fascination became a driving force, propelling me towards a deeper understanding of mathematical patterns and their application in diverse fields.

Challenges during my academic pursuits were met with resilience, inspired by my mother's unwavering support. Her guiding question, "What do you see in this darkness, my dear?" prompted me to transform challenges into fresh starts. This resilience became a cornerstone of my academic endeavors, shaping my ability to navigate complexities with a positive outlook.

Embracing an interdisciplinary approach, I integrated interests in Applied Mathematics and Statistics with a passion for mental health. This unique intersection marked a path I was determined to explore further. Recognizing the importance of mentorship and advocacy in academia, I committed to uplifting others on their academic paths, with a focus on fostering diversity and inclusivity.

My commitment to neurodiversity advocacy extends beyond scholarship; it is a call to inspire individuals with diverse neurological profiles to recognize their potential and thrive in the scientific community. Inclusivity, to me, is not merely a goal but a fundamental principle that enriches the scientific landscape.

My research objectives lie at the intersection of mathematics, mental health, and neurodiversity. As I pursue

a Doctorate in Neuroscience, specializing in Applied Mathematics and Computing, my goals are clear. I aim to develop novel diagnostic tools, personalized treatment approaches, and advocate for neurodiverse individuals within academia and society.

The potential Doctorate Degree Program is not just a personal milestone but a validation of my commitment to the convergence of mathematics, mental health, and neurodiversity. This esteemed award aligns seamlessly with my values, emphasizing innovation and broader impacts.

In conclusion, my personal history has sculpted a narrative of resilience, transformation, and an unwavering commitment to diversity in academia. As I stand on the threshold of graduate research, I am eager to delve into the intricate realms of biomedical data science, unveiling the patterns in neural data to transform mental health diagnosis and treatment. The Fellowship represents not only a financial support system but a recognition of my potential to contribute significantly to science and society.

With a heart dedicated to the harmonious interplay between mathematics, mental health, and neurodiversity, I submit this Statement of Purpose as an invitation to join me on a journey that celebrates the beauty of chaos and the power of inclusivity. Together, we can weave a narrative that resonates with the broader scientific community, one neural pattern at a time.

## Appendix

Please review these links to my portfolio in considering my candidacy. Thank you for your consideration and I hope you can find some enjoyment and connection in what I've prepared for you today!

1. Link 1: <https://github.com/yahriels/yahriels>
2. Link 2: <https://github.com/yahriels/yahriels/blob/main/CaltechYSRWritingSample.pdf>
3. Link 3: <https://genny.lovo.ai/share/7fe22426-2859-4209-b39c-a6cd22e9667e>

## Statement of Objectives

### Opening

My academic journey has been one of continuous exploration and interdisciplinary collaboration. With a Bachelor's degree in Aerospace and Aeronautical Engineering, I embarked on a quest to understand the intricate connections between science, technology, and the world we inhabit. The decision to pursue a Ph.D. is not merely a continuation of my academic journey but a testament to my commitment to pushing the boundaries of knowledge and addressing the pressing challenges in global health sciences and technology.

As I stand at the intersection of aerospace engineering, neuroscience, and mathematical sciences, my journey has been one of continuous exploration and interdisciplinary collaboration. With a Bachelor's degree in Aerospace and Aeronautical Engineering from Iowa State University of Science and Technology, I embarked on a quest to understand the intricate connections between science, technology, and the world we inhabit. The decision to pursue a Ph.D. is not merely a continuation of my academic journey but a testament to my commitment to pushing the boundaries of knowledge and addressing the pressing challenges in oceanography.

My primary focus within the Caltech CMS Program lies in Applied Mathematics and Computation, where I aspire to explore the intersections of neuroscience, mathematical sciences, and computational data-enabled sciences. Specifically, I am intrigued by the potential applications of chaos theory and computational modeling to understand the dynamics of oceanographic phenomena. The prospect of developing innovative computational methods to optimize Biological Anthroengineering in the context of oceanography is a unique and exciting avenue that aligns seamlessly with my interdisciplinary background.

Throughout my academic journey, I have been molded by a Bachelor's degree in Aerospace and Aeronautical Engineering and my current pursuit of a Doctorate in Neuroscience. These experiences have instilled in me a profound appreciation for the integration of diverse disciplines to address complex challenges. Furthermore,

my exposure to hands-on research and interdisciplinary projects has honed my ability to approach problems from multiple perspectives.

The diverse cultural and geographical landscapes I have encountered in my personal and academic life have fueled my curiosity about the interconnectedness of the world's oceans and the impact of human activities. These lived experiences underscore my commitment to fostering a holistic and inclusive approach to neuroscience research.

As a prospective Ph.D. candidate, I am eager to contribute my unique blend of expertise in aerospace engineering, neuroscience, and computational sciences to the Caltech Computational and Mathematical Sciences Program. My lived experiences, academic journey, and research pursuits align seamlessly with the program's objectives. I am confident that my interdisciplinary background and commitment to excellence make me a valuable asset to the Caltech community.

## **Research Interest and Areas of Study**

My primary focus within the Caltech Program lies in Applied Mathematics and Computational-Enabled Sciences, where I aim to explore the intersections of neuroscience, mathematical sciences, and computational data-enabled sciences. Specifically, I am intrigued by the potential applications of chaos theory and computational modeling to understand the dynamics of oceanographic phenomena. The prospect of developing innovative computational methods to optimize Biological Anthroengineering in the context of oceanography is a unique and exciting avenue that aligns seamlessly with my interdisciplinary background.

## **Lived Experiences and Shaping Research Approach**

My academic journey has been molded by a Bachelor's degree in Aerospace and Aeronautical Engineering and my current pursuit of a Doctorate in Neuroscience. These experiences have instilled in me a profound appreciation for the integration of diverse disciplines to address complex challenges. Furthermore, my exposure to hands-on research and interdisciplinary projects has honed my ability to approach problems from multiple perspectives.

The diverse cultural and geographical landscapes I have encountered in my personal and academic life have fueled my curiosity about the interconnectedness of the world's knowledge and the impact of human activities. These lived experiences underscore my commitment to fostering a holistic and inclusive approach to neuroscience and trans-disciplinary boundaries.

## **Conclusion**

As a prospective Ph.D. candidate, I am eager to contribute my unique blend of expertise in aerospace engineering, neuroscience, and computational sciences to the Caltech Community. My lived experiences, academic journey, and research pursuits align seamlessly with the program's objectives. I am confident that my interdisciplinary background and commitment to excellence make me a valuable asset to the scientific world.

## **Methodology and Research Plan**

The emerging field of Biological Anthroengineering, which combines principles of anthropology and engineering, plays a pivotal role in enhancing fields like biomechanics, ergonomics, and functional morphology. In order to reach the edge of chaos and perform these tasks, I incentivize the scientific investigation by applying guiding principles for a closed system. Let  $\Sigma$  be a smooth-oriented surface that is bounded,  $\partial\Sigma \equiv \Gamma$ , then we invoke the following governing equations of connectivity: Energy ( $\Phi_E = \oint E \cdot dA$ ), Mobility ( $\int_{\Sigma} \nabla \times F \cdot d\Sigma = \oint_{\partial\Sigma} F \cdot d\Gamma$ ), and Continuity ( $\int_V \nabla \cdot F \cdot dV = \int_S (F \cdot \hat{n}) \cdot dS$ ). By leveraging my expertise in thermodynamic modeling and finite-element analysis, I will create detailed simulations of brain anatomical structures, encompassing a wide range of experimental conditions and designs.

Entropy, represented by  $S$ , is a measure of morphology or order in the system,  $\partial S \equiv N$ ; I validate this mathematical theorem with Chaos Theory: Chaos-Game ( $x_{n+1} = \lambda x_n(1 - x_n)$ ), Mandelbrot-Set ( $Z_{n+1} = Z_n^2 + C$ ), and Fractals ( $D = \frac{\log N}{\log S}$ ). Additionally, my background in signals and control systems engineering will enable the development of advanced control mechanisms to enhance adaptability and safety in these structures. Robotics and electrical engineering skills will facilitate the automation and control of aerospace systems.

## Research Plan Timeline

This research will span five years, structured as follows:

**Year 1:** Comprehensive literature review and initial data collection

**Year 2:** Development of advanced computational models

**Year 3:** Predictive model of neuroanatomical morphologies

**Year 4:** Experimental validation and refinement of models

**Year 5:** Dissemination of research findings, contributing to nanotechnology, the etiology of schizophrenia, mental health, and the global public health industry.

## Finalization

In conclusion, my research proposal "Nature's Chaos Game" aims to uncover the intricate relationship between madness and confusion, mental health, and the human brain. By merging scientific methods with social impact, we can pave the way for advancements in both individual well-being and global public health. It is high time we embrace this ancient paradigm of psychiatric thought, combining research and development with a deep understanding of cultural diversity, to drive positive change in society.

## Writing Sample

Title: "Nature's Code Unveiled:

A Revolutionary Fusion of Aerospace, Anthropology, and Neuroscience"

Author: Yahriel Salinas-Reyes, Universal Scholar, Doctoral Student.

~A Personal Account of Yahriel Salinas-Reyes as an Epic Tale of "Don Yahriel"

### Prologue

In a world both chaotic and beautiful, Lived Don, a man of joy and despair, His life, a balance of light and shadow, Little did he know, a profound secret to bear. *Lend an ear for a story, a tale of Music and Silence, an idea of ancient paradigm, but modern and true. I will show you the way through This Cyclone you see. Do you Dare to join me, in this Grand Odyssey.*

So let this tale be a song, Of Don Yahriel, who dared to be strong. In the name of goodness, he did deploy, A legacy of love, the song of JOYBOY

### Part 1: The Odyssey of JOYBOY

In a world where tales of old unfold, A saga of Don Yahriel, bold and untold. An enigma, a poet, a quest to be, A champion of good, for all to see.

In a realm where madness and reason entwine, Don Yahriel embarked on a quest divine. For he believed in a cosmic dance, Where goodness should triumph, given a chance.

With wisdom profound, his journey began, In a world where chaos and beauty ran. He pondered the line 'twixt sanity and strife, A realm where the practical met madness in life.

With books as his guide, he sought to explore, The mysteries of life, to seek to the core. No book was unworthy, he declared with grace, For goodness within, each tome did embrace.

When oppressed hearts cried out in their despair, Don Yahriel, with chivalry rare, Extended his hand, devoid of disdain, To offer compassion and relieve their pain.

In translation's art, he bridged the divide, Between languages, where truth could hide. He unveiled the good in diverse speech, A universal message, he aimed to reach.

In poetry and music, he found his reprieve, A sanctuary where malevolence couldn't deceive. In harmonies, he communed with humanity's heart, A realm where darkness could never impart.

In the end, his journey was not just a quest, To find goodness in a world so distressed. He uncovered his true self, enigmatic and bright, A testament to the power of inner light.

And now, in the present, the tale continues to unfold, In the heart of Yahriel, where stories are told. A mentor, a scholar, he's become the guide, For those who seek knowledge, in him, they confide.

Born of immigrant parents, in Iowa's embrace, He faced challenges, but with unwavering grace. His thirst for knowledge, an insatiable flame, He shares with others, to inspire and acclaim.

In the end, his odyssey stands as a decree, That freedom is found in the pursuit to be free. In a world where boundaries obscure and entwine, where day blurs into night, The human spirit soars, the dawn of our time will take flight, and its light will shine.

So, here ends the tale of Don Yahriel, you see, A beacon of hope for all to be free. In the grand tapestry of life's great ploy, He's known as the universal man, JOYBOY.

### Part 2: An Ancient Paradigm

In a world of words and verses bold, A tale of Don Yahriel, I unfold. A poet, mad, with ideals grand, In a world where chaos did expand.

Don Yahriel, the enigma's name, A beacon of light in a world of shame. He saw a world where good must win, And so his quest did begin.

In a mind where madness swirled, He sought to change the cruel world. "Good and evil in a cosmic dance, Let goodness prevail, given the chance."

Books he read, a voracious thirst, For truth, he sought, in words immersed. "Every book, though dark or bright, Holds a gem of truth in its light."

Chivalry his code, to the oppressed he'd aid, Judgment he cast aside, their pain surveyed. "Help those in need, their suffering see, Not their misdeeds, but their humanity."

Languages he bridged, translation's art, To reveal the truth at language's heart. "In translation, a bridge we find, To share the goodness of humankind."

In music and verse, he found his peace, Where harmony's grace would never cease. "Where there's music, evil must flee, In the notes and words, the soul is free."

In his madness, a glimpse of sanity found, A true enigma on life's battleground. "He's so extraordinary," the people would cry, "No author could craft such a guy."

Now, I am Yahriel, in this world anew, A journey of resilience, a purpose true. Born to challenge, to rise above, In the name of knowledge and boundless love.

A mentor's path, a scholar's grace, Guiding others to find their place. For freedom's not just mine to keep, It's meant to share, in knowledge deep.

In the end, my odyssey's tale, A testament to the human trail. In a world where lines may blur, The spirit of humanity will endure.

So let this epic be a song, Of Don Yahriel, who dared to be strong. In the name of goodness, he did deploy, A legacy of love, the eternal JOYBOY.

### Part 3: An Immensely Powerful Idea

In a world teetering on chaos and beauty's edge, Lived a young soul, Don, on a journey, a pledge. Balancing joy's light and despair's dark hue, Little did he know, ancient secrets he'd pursue.

### **The Tale of Don, The Universal Man And Poet of Justice**

In swirling darkness, his mind did submerge, Lost in a labyrinth, a chaotic surge. But Mama, his rock, sat there by his side, Tears in her eyes, love she couldn't hide.

"What do you see in this darkness, my dear?" She asked, trembling with worry and fear. "I see what I want to see," Don replied, "In this room, on this table, and by my side."

Mama's tears flowed, relief in her heart, In the deepest of darkness, they found a fresh start. Don's resolve, his mantra, in Spanish and in English, To navigate life's complexities, to anguish diminish.

### **Odyssey of Knowledge: Enigmatic Man's Quest**

Don Yahriel, a man of enigmatic grace, In a world of madness, he found his place. Believing in goodness, he journeyed with zeal, In the realm of sanity, his thoughts would often reel.

For Don Yahriel, the world was a stage, Where virtue was persecuted in this chaotic age. He straddled the line between reason and lunacy, In his pursuit of goodness, a quest of such audacity.

Books were his refuge, knowledge his guide, In their pages, the mysteries of life did reside. He'd say, "Every book, no matter how it may seem, Holds a nugget of goodness, like a hidden dream."

### **A Tale of The Past and Music of Silence**

In a quiet town in Iowa, serene and sublime, Don held a secret, a treasure of his time. The music of silence, a mystical art, He shared it with others, a balm for the heart.

Yahriel sought Don, his heart full of strife, Knocking on Don's door, seeking wisdom and life. Don welcomed him in, they sat in silence's embrace, As nature's sounds whispered, a peaceful place.

Don spoke of a journey, darkness, and chaos, Of finding true joy, a path for both of us. Yahriel found resolve, a will to pursue, The secret Don held, a perspective so true.

### **I Am Yahriel Salinas-Reyes**

Born to immigrants in Iowa, a tale of my own, Challenges faced, determination brightly shone. Aerospace engineering, a path to excel, At Caltech's halls, my journey would swell.

Mentorship's power, a guiding star so bright, Obstacles as stepping stones, towards the light. Freedom is knowledge, shared far and wide, Guiding others on their journey, side by side.

My name, "He is free," a purpose I'd embrace, Mentor, scholar, leaving a lasting trace. In a world where lines blur, sanity's thread, The human spirit soars, in every word and deed.

### **JOYBOY: Don Yahriel, He That Is Free**

In the tapestry of existence, our stories entwine, Don Yahriel and I, two souls that shine. In the dance of chaos and beauty's grand deploy, We find the essence of life, we are JOYBOY.

### Part 4: The Dawn of The Future

In the epic tale of Don Yahriel, the Poet of Justice, A man so enigmatic, his journey we discuss. In a world where madness and reason intertwine, He sought to bring goodness, let his light brightly shine.

Born to undocumented parents in Iowa's embrace, Yahriel faced challenges with unwavering grace, In the quiet countryside, he found a sage named Don, Whose secret held power, a paradigm to dawn.

The Music of Silence, a mystery profound, Yahriel learned its beauty on Don's sacred ground. As they sat in stillness, the world's chaos did cease, And Yahriel found peace in the gentle breeze.

In the depths of his journey, a truth did he see, A story of darkness, but also beauty's decree. In a place of confusion, where senses did blur, He clung to his mother, his guiding star so pure.

With resolve in his heart, he recited the creed, In Spanish and English, he planted the seed. To never give in to the chaos and strife, But to be a gracious loser, embracing life.

As Yahriel ventured forth, Don Yahriel's name, He embraced his own madness, stoked the creative flame. He believed in the balance of good and despair, And the boundless potential of the human spirit's flair.

He read books without end, seeking truth in each line, For in every tale, he saw goodness entwined. He transcended the limits of language and word, In the art of translation, his voice could be heard.

A knight of compassion, he held chivalry dear, Succoring the afflicted, devoid of judgment or fear. In poetry and music, he found his own soul, Where darkness and chaos couldn't maintain their hold.

In the end, Don Yahriel's odyssey unveiled, A man of great madness, his spirit unassailed. He discovered his true self, a beacon so bright, A testament to the human spirit's endless flight.

Yahriel Salinas-Reyes, a name to adore, From adversity's fires, he emerged even more. A mentor, a scholar, his legacy shines, A symbol of freedom, in these epic lines.

In the world's shifting boundaries, he stood so tall, A testament to the triumph of the human call. For in the quest for knowledge and dreams to employ, He became Don Yahriel, the eternal Joyboy.

### Epilogue

#### **Chapter I: The Journey Begins**

In the labyrinth of his own mind, he wandered, Lost in a swirling darkness, adrift at sea, A world devoid of senses, confusion pondered, In this abyss, he sought to find the key.

### **Chapter II: A Mother's Love**

Beside his bedside, Mama sat, eyes with tears, Her strength now faltered, sorrow in her gaze, "Tell me, what do you see?" her voice with fears, Don replied, "I see what my heart conveys."

### **Chapter III: The Power of Resolve**

Amidst this turmoil, Don found strength within, A mantra, repeated, his spirit fortified, "The world won't change, I'll bear it with a grin, I'll be a gracious loser," he testified.

### **Chapter IV: Uncovering the Paradigm**

Don's journey continued, profound secrets found, The ancient paradigm, light in the darkest hour, Guided by love, his spirit was unbound, In chaos, he discovered his inner power.

### **Chapter V: The Odyssey of Knowledge**

Don Yahriel, an enigma, walked the line, Between madness and reason, he did tread, Seeking goodness in a world where evil's sign, In his heart, he bore the hope to spread.

### **Chapter VI: Madness and Books**

Books his passion, knowledge he'd acquire, To unravel mysteries of life's grand scheme, In madness, he danced by the book's fire, For in them, he'd find his wildest dream.

### **Chapter VII: Chivalry and Empathy**

To the oppressed, his code of chivalry held, Judgment aside, their suffering he'd embrace, Their pain, not their misdeeds, to him was spelled, In their plight, he found his rightful place.

### **Chapter VIII: The Power of Translation**

Language, a bridge, he sought to mend, To reveal the truth beneath each word, Translating the wisdom others couldn't comprehend, In this pursuit, his vision clearly heard.

### **Chapter IX: Music and Poetry**

In poetry and music, he found his solace, Where beauty thrived, evil had no room, Harmonies and verses, his spirit's palace, In their melodies, he'd dispel the gloom.

### **Chapter X: The Truest Self**

In his odyssey, Don became the mystery, A living testament to the human soul's art, In his madness, he found profound history, A truth that transcended the ordinary heart.

### **Chapter XI: Yahriel's Journey**

As the torch passed to Yahriel's hand, He embraced Don's wisdom, his heart aglow, In the music of silence, he'd understand, The world's greatest mystery, he'd come to know.

### **Chapter XII: A Mother's Reunion**

In the midst of Yahriel's transformative quest, His mother's tears revealed the truth untold, Their reunion, a bond no pain could jest, Love and understanding, like pure gold.

### **Chapter XIII: Resolve and the Music of Silence**

With a mantra of resolve, he'd persevere, The world unchanged, his spirit steadfast, A good loser, his heart held no fear, In these words, his strength would last.

### **Chapter XIV: The Legacy of Yahriel**

Yahriel's journey, from darkness to light, Inspired by Don's secret, a shift in view, Resolve beyond neurology, a noble fight, In the music of silence, his spirit grew.

### **Chapter XV: I Am Yahriel Salinas-Reyes**

Born to immigrants, in Iowa's embrace, His path paved with challenges, wisdom amassed, The power of the gaze, his soul's trace, In adversity's forge, he'd be unsurpassed.

### **Chapter XVI: Embracing Identity**

From Aerospace Engineering to Caltech's grace, Mentorship's gift, a beacon of light, Each obstacle, a steppingstone to face, In sharing knowledge, his true might.

### **Chapter XVII: The Essence of Freedom**

Named "He is free," his name's embrace, An epiphany, a revelation profound, Freedom shared, a guiding grace, A legacy of mentorship, his life unbound.

### **Chapter XVIII: The Invincible Spirit**

Yahriel's odyssey, a testament true, To the human spirit, it boldly attests, In the pursuit of knowledge, dreams anew, True freedom's path, in hearts it rests.

### **Chapter XIX: The Eternal Enigma**

And so, the tale of Don Yahriel, profound, An odyssey through madness and light, In the depths of the human soul, it's found, The truest enigma, shining bright.

### **Chapter XX: JOYBOY**

Don Yahriel, he who is free, An eternal beacon for all to see, In the dance of chaos and beauty, His legacy lives on, a melody.

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# NATURE'S CHAOS GAME: AN EXISTENTIALIST APPROACH INFORMED BY MATHEMATICS AND NEUROBIOLOGY

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INVESTIGATOR: *Yahriel Salinas-Reyes*

RESEARCH MANUSCRIPT

i.

## DEDICATION

I dedicate my thesis primarily to the two most important people in my life - my nurturing mentor known as The Cyclone of Education, and my lifelong supporter, and companion, Don Yahriel Salinas-Reyes - An embodiment of Chaos, Order, Logic, and Madness. I miss you both incredibly, and I promise to make good on my word to make you both proud.

I am deeply grateful to my family in the United States, Mexico, and El Salvador for bearing with me patiently as I worked on my thesis. I dedicate this work to all of you. Your unconditional love and strong show of support are the only things that kept me going every time I wanted to give up. To my parents, Sonia Reyes-Alvarenga and Oscar Salinas-Millan, your daily phone calls and pep talks kept me grounded and pushed me closer to the finish line. To my sister Lizbeth Salinas-Reyes, who would chide me every week and guilt trip me for being away from home - your prayers and love have kept me safe here. To my family Abigail Salinas-Reyes, Samuel Salinas-Reyes, Delmy Salinas-Reyes, and La Raza - thank you for seeing the best in me. You have never failed to cheer me up.

Lastly, to my supporters - thank you for being patient, caring, understanding, and being invested in me and my thesis. I am incredibly lucky to have you all, and I couldn't have done this without you.

Yahriel Salinas-Reyes 2023

## *Nature's Chaos Game: An Existentialist Approach Informed by Mathematics and Neurobiology*

**Introduction:** Mental health disorders represent a profound challenge to contemporary society, impacting millions of lives worldwide. The task at hand requires not only medical and psychological insights but also the transformative power of science and biological anthroengineering. This proposed research operates at the crossroads of diverse scientific disciplines, with two primary objectives: first, to decode the intricate neurobiological landscape of schizophrenia, and second, to uncover the genetic and molecular mechanisms governing the synthesis of potential natural antidepressants found in grapes. Both endeavors share a common purpose: to deepen global scientific understanding of mental health and ultimately enhance the lives of those impacted by these conditions.

**Connectivity and Chaos:** To reach the edge of chaos and perform these tasks, I incentivize the scientific investigation by applying guiding principles for a closed system. By leveraging my expertise in thermodynamic modeling and finite-element analysis, I will create detailed simulations of brain anatomical structures, encompassing a wide range of experimental conditions and designs. Let  $\Sigma$  be smooth oriented surface that is bounded,  $\partial\Sigma \equiv \Gamma$ , then we invoke boundary conditions.

Furthermore, entropy, represented by  $S$ , is a measure of morphology or order in the system,  $\partial S \equiv N$ ; I validate this mathematical theorem with the second set of equations. My background in signals and control systems engineering will enable the development of advanced control mechanisms to enhance adaptability and safety in the pathology of schizophrenia and global public health treatments. Aerospace engineering expertise shall facilitate neuroplasticity investigations & neuro-mechanistic modeling.

**Governing Equations:** [1] **Energy:**  $\Phi_E = \oint E \cdot dA$ , [2] **Mobility:**  $\iint_{\Sigma} (\nabla \times F) \cdot d\Sigma = \oint_{\partial\Sigma} F \cdot d\Gamma$ , and [3] **Continuity:**  $\iiint_V (\nabla \cdot F) dV = \oint_S (F \cdot \hat{n}) \cdot dS$ .

**Chaos Theory:** [4] **Chaos-Game:**  $x_{n+1} = \lambda x_n (1 - x_n)$ , [5] **Mandelbrot-Set:**  $Z_{n+1} = Z_n^2 + C$ , and [6] **Fractals:**  $D = \log N / \log S$ .

**Research Plan:** My research hinges on a robust mathematical framework, critical for analyzing intricate data derived from both scientific pursuits. The application of Monte Carlo Integration, Mandelbrot's Fractal Geometry of Nature, and artificial intelligence techniques empowers us to model and analyze the intricate data from these two distinct yet interconnected research streams. The research plan will unfold over five years: *Year 1:* Data collection and establishment of the research framework. *Year 2:*

Neuroimaging and genetic data analysis. *Year 3:* Development of mathematical models. *Year 4:* Validation of models and refinement of findings. *Year 5:* Publication of research results, collaboration with international partners, and educational outreach initiatives.

**Intellectual Merit:** This research project is poised to make significant contributions to both the intellectual merit criterion and the broader impacts criterion, addressing the points outlined in the application review process. Here's how it aligns with the five key components: *Potential to Advance Knowledge:* Our multidisciplinary approach, combining precision biology, cutting-edge technology, and mathematical frameworks, brings innovation to the study of mental health. By decoding the complex etiology of schizophrenia, we will offer fresh insights into this debilitating disorder. Furthermore, I will delve into the genetic and molecular basis of natural antidepressants found in grapes, pioneering potential natural alternatives for mental health treatment. *Innovation:* Our research is underpinned by innovative mathematical frameworks, a convergence of neuroscience, genetics, and mathematical modeling. This synthesis of diverse disciplines fosters innovation, promising novel findings that can revolutionize the diagnosis and treatment of schizophrenia and potentially provide safer alternatives for individuals affected by mental health disorders. *Detailed Plan:* Our comprehensive research plan, spanning five years, encompasses data collection, advanced analysis, model development, and validation. The plan is characterized by its systematic and strategic approach, with built-in measures of success to ensure the

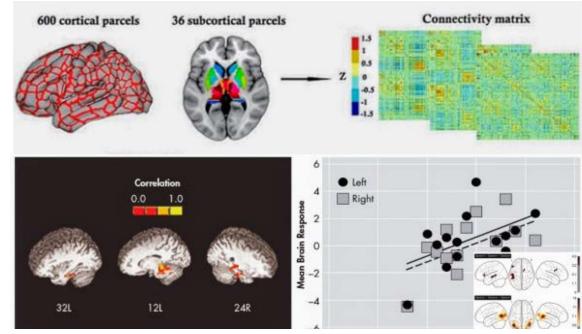


Figure 1. Morphological-Anatomical Features Connectivity

attainment of meaningful results. *Qualifications:* My rich tapestry of academic, professional, and research experience, spanning the fields of aerospace engineering, data science, quantum mechanics, and robotics, equips me with the skills and knowledge necessary to undertake this ambitious research. *Ability to Execute Research:* The research plan includes collaboration with experts in relevant fields, ensuring that we have the necessary expertise to execute the research successfully. Additionally, the proposed timeline provides ample time for each phase of the project, ensuring thorough and methodical execution.

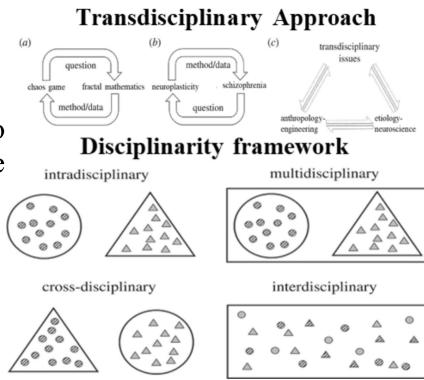
**Broader Impacts:** Beyond scientific advancement, this research project has broader societal impacts. It has the potential to: *Advance Mental Health Care:*

By deepening our understanding of schizophrenia and identifying potential natural antidepressants, this research can pave the way for more effective diagnosis, treatment, and prevention strategies. *Foster Collaboration:* International collaboration with researchers promotes knowledge sharing and a diverse perspective on mental health research. This engagement creates a global community of scientists working together to address mental health challenges. *Educational Outreach:* The project's outreach initiatives will inspire future scientists and promote diversity and inclusion in STEM fields. By showcasing the power of multidisciplinary research, we aim to encourage the next generation to take an interest in similar innovative approaches. *Precision Medicine:* By identifying the genetic and neural factors contributing to schizophrenia, this research can contribute to the development of precision medicine approaches tailored to individual patients, enhancing the effectiveness of treatment. *Global Mental Health:*

The research has the potential to improve the lives of individuals affected by schizophrenia worldwide, addressing a global mental health challenge. Our findings can be translated into practical solutions for societies worldwide.

**Conclusion:** The proposed research, an ambitious undertaking at the intersection of mathematics, biology, and mental health, holds great promise for enhancing our understanding of schizophrenia and the potential natural antidepressants found in grapes. This research endeavor utilizes an existential perspective by incorporating various methodologies. Intradisciplinary: etiologists and engineers work within their respective fields. Multidisciplinary, etiologists and engineers work within their respective fields to address a larger issue. Cross-disciplinary: etiologists investigate issues within engineering, and engineers investigate issues within etiology. Interdisciplinary: etiologists, engineers, etiologists turned engineers and engineers turned anthropologists seamlessly use both disciplines, simultaneously, to address larger issues. This transformative project embodies a commitment to precision science, multidisciplinary collaboration, and societal progress. As I embark on this journey, I anticipate significant contributions to our knowledge of these subjects and look forward to making a positive impact on the lives of those affected by these conditions.

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**Personal Statement - Intellectual Merit:**

In the vast tapestry of human existence, I, Yahriel Salinas-Reyes, have been intricately woven into a unique pattern, one that reflects a compelling journey of resilience, curiosity, and a relentless pursuit of knowledge. I am a storyteller, a poet, a musician, an engineer, and a scientist. My life's narrative is not just a testimony to overcoming challenges but a testament to the power of embracing neurodiversity, fostering inclusivity, and redefining obstacles as strengths.

My journey began in Iowa, a quiet town filled with hidden treasures. Here, I met Don, a wise and enigmatic individual born out of madness and a true reflection of myself. He, like I, joined this world without the ability to hear (i.e., I used to be deaf) or communicate. His eyes of wonder were his gate to understanding reality. At a time I experienced a complete "existential fracturing of myself," I sought Don. He introduced me to the "music of silence." Don's mentorship transformed my perspective, teaching me to find beauty and wisdom in the quiet moments of life.

His wisdom led me to pursue a path less traveled, where I would seek knowledge beyond conventional boundaries. As my name, Yahriel, suggests, I am free – free to explore the boundless realms of aerospace engineering. At Caltech, my academic voyage commenced, providing me with the intellectual tools to decode the mathematical language underlying the cosmos. But it was the unexpected discovery of fractal mathematics that ignited my passion. Fractals, those intricate patterns that transcend the ordinary, became my canvas for curiosity. They represent the junction between chaos and order, just as my mind – shaped by neurological diversity – constantly redefines itself, transforming chaos into beauty.

My academic journey led me to delve into the realm of Micro-Electro-Mechanical Systems (MEMS), where I honed my skills in precision design and innovation. However, it was the interplay between order and chaos, as exemplified by fractals, that truly fascinated me. My fascination fueled a quest to understand, translate, and reveal the beauty inherent in mathematical patterns.

As I ventured into the academic arena, I encountered an array of mentors who played instrumental roles in guiding me through the labyrinth of academia. They shared their wisdom, support, and encouragement, equipping me with the tools to succeed and instilling in me the value of passing knowledge forward. Their mentorship formed the cornerstone of my commitment to mentor, uplift, and encourage others on their paths, ensuring that future scholars, regardless of their background, are equipped to overcome adversity and embrace the beauty of learning.

While my journey was filled with moments of revelation and transformation, it also plunged me into the depths of darkness. Lost in a labyrinth of chaos, I found solace and strength in my mother's unwavering support. Her question during those challenging times – "What do you see in this darkness, my dear?" – prompted me to respond, "I see what I want to see." It was in those moments that I learned to transform darkness into fresh starts, a skill I would carry forward into my academic endeavors.

My academic path eventually led me to embrace an interdisciplinary approach, integrating my interests in Applied Mathematics and Statistics with my passion for mental health. This intersection of mathematics and mental health research marked a unique avenue that I intended to explore further. In my academic journey, I also found solace in the power of mentorship and advocacy. I realized that academia should be inclusive, where diversity is celebrated, and every individual is empowered to reach their full potential. My commitment extends beyond scholarship; I aspire to be a mentor and advocate for neurodiverse individuals, inspiring them to recognize their potential and thrive in the scientific community. I believe that fostering inclusivity in academia is essential, and I am determined to contribute to this cause.

**Personal Statement - Broader Impacts:**

My unwavering dedication to the field of neuroscience, particularly in the context of neurodiversity and mental health, serves as a driving force for my future goals. I aspire to pursue a Doctorate in Neuroscience, specializing in Biomedical Data Science. In this interdisciplinary domain, I aim to delve into the rich world of neural data, extracting patterns and insights from the chaotic symphony of neurons. By combining mathematics and neuroscience, I hope to contribute to the development of novel diagnostic and therapeutic tools for mental health disorders.

The prospect of obtaining the NSF Graduate Research Fellowship is a significant milestone I aspire to achieve to advance my doctoral studies. This esteemed award would not only facilitate my educational

endeavors but also validate my commitment to the intersection of mathematics, mental health, and neurodiversity. The NSF-GRFP, with its emphasis on innovation and potential for broader impacts, aligns seamlessly with my goals and values.

Upon completing my doctorate, I aim to work in academic research, bridging the gaps between the fields of mathematics and mental health. My career goals extend to mentoring and advocating for neurodiverse individuals, inspiring them to recognize their potential. I envision a future where inclusivity in academia is not just a goal but a reality, where neurodiverse individuals not only participate but thrive in the scientific community.

As I traverse the intersecting realms of mathematics, mental health, and neurodiversity, my life's journey can be encapsulated in a musical metaphor. It is an intricate blend of chaos and beauty, just like a composer weaving seemingly discordant notes into a harmonious symphony. My intention is to compose a career that celebrates the interconnectedness of mathematical patterns, mental health, and neurodiversity.

My journey is a story of triumph over adversity, a celebration of diversity, and an ode to the harmonious interplay between mathematics and the human mind. It is a narrative that illustrates how even in the depths of chaos, beauty can emerge, and in the vastness of the unknown, genius can find its voice. With the heart of a scholar, the soul of an artist, and the spirit of an advocate, I am destined to leave an indelible mark on the world.

#### Relevant Background:

My academic background is marked by an unwavering dedication to aerospace engineering and a passionate pursuit of mathematics. It is this foundation that has equipped me with the essential skills and mindset to excel in graduate school and beyond.

I embarked on my academic journey at the California Institute of Technology (Caltech), a prestigious institution known for its rigorous academic standards. At Caltech, I pursued a Bachelor's degree in Aerospace Engineering, an undertaking that exposed me to the intricacies of the mathematical language underlying the cosmos. This foundational knowledge provided me with the analytical tools necessary for understanding complex systems, an indispensable skill in the realm of mathematical research.

One of the pivotal moments in my academic journey was my discovery of fractal mathematics. Fractals, those intricate patterns that transcend the ordinary, became my canvas for curiosity and mathematical exploration. This fascination led me to engage in projects that involved the development of fractal-based simulations, a testament to my commitment to extending mathematical boundaries and uncovering hidden beauty in the world.

Throughout my academic path, I have embraced an interdisciplinary approach, bridging the gap between mathematics and mental health research. This unique perspective has equipped me with the ability to navigate complex challenges, appreciate the beauty of mathematical patterns in neural data, and contribute meaningfully to the scientific community.

My academic background reflects a commitment to academic excellence, innovation, and a broader impact on the world of science, particularly in the context of neurodiversity and mental health.

#### Intellectual Merit:

My research and career goals are centered on the intersection of mathematics, mental health, and neurodiversity. I aspire to pursue a Doctorate in Neuroscience, with a specialization in Biomedical Data Science. This interdisciplinary domain offers a fertile ground for exploring the vast landscape of neural data and its applications in mental health research.

My research objectives encompass the following:

1. Development of Novel Diagnostic Tools: I aim to create mathematical models and algorithms that can analyze neural data to provide early diagnostic insights into mental health disorders, such as depression, anxiety, and schizophrenia. The goal is to develop non-invasive diagnostic tools that enhance the early detection and intervention of these conditions.
2. Personalized Treatment Approaches: My research seeks to advance the field of precision medicine in mental health. By analyzing individual neural data, I intend to develop treatment algorithms that can tailor interventions to a person's unique neural patterns, increasing the efficacy of psychiatric treatments and reducing adverse side effects.

3. Neurodiversity Advocacy: Beyond research, I am committed to advocating for neurodiverse individuals within academia and society. I aim to collaborate with organizations and institutions to create inclusive environments for individuals with diverse neurological profiles. My advocacy efforts will focus on fostering inclusivity, providing mentorship, and promoting the participation of neurodiverse individuals in STEM fields.

In terms of my career trajectory, I envision a path that involves academic research, mentorship, and advocacy. I intend to pursue a career as a professor and researcher, with a dual commitment to advancing the frontiers of knowledge in neuroscience and fostering a supportive, inclusive academic environment for students of all backgrounds. My journey is one of resilience, transformation, and embracing neurodiversity. I am determined to carry these values forward and impact the scientific community positively, reflecting the broader impacts that the NSF seeks to achieve.

#### Significance of the NSF-GRFP:

Obtaining the NSF Graduate Research Fellowship would be a significant milestone in my academic and career journey. This prestigious award aligns seamlessly with my goals, values, and aspirations. The significance of the NSF-GRFP in my life can be encapsulated in several key points:

**Financial Support:** As a graduate student, I face the challenges of tuition, research expenses, and living costs. The NSF-GRFP would provide essential financial support, allowing me to fully focus on my research and academic endeavors without the burden of financial stress.

**Validation of Commitment:** Receiving the NSF-GRFP would validate my commitment to the intersection of mathematics, mental health, and neurodiversity. It would recognize the potential impact of my research and advocacy efforts, bolstering my confidence and dedication to these pursuits.

**Research Independence:** The NSF-GRFP fosters research independence. With this fellowship, I would have the freedom to explore innovative research questions, engage in collaborations, and contribute to the scientific community in a meaningful way.

**Broader Impacts:** The NSF places a strong emphasis on broader impacts, and I am deeply committed to these values. Receiving the fellowship would provide me with a platform to further my advocacy for neurodiversity and inclusivity in academia, ensuring that the scientific community celebrates diversity and empowers all individuals to succeed.

**Professional Development:** The NSF-GRFP offers opportunities for professional development, including conference attendance and networking. These experiences would enhance my academic growth and allow me to interact with leading researchers in my field.

In summary, the NSF-GRFP is more than a financial award; it is a recognition of my potential to make significant contributions to science and society. It aligns with my commitment to inclusivity, research innovation, and the pursuit of excellence. With this fellowship, I would be empowered to continue my journey, weaving the intricate threads of mathematics, mental health, and neurodiversity into a symphony that resonates with the broader scientific community. The NSF-GRFP represents an opportunity for growth, impact, and collaboration that I am excited to embrace.

#### Conclusion:

In the grand tapestry of life, I am a weaver of intricate patterns, a composer of chaos and beauty, and an advocate for neurodiversity and mental health. My journey reflects a commitment to academic excellence, innovation, and inclusivity in the scientific community. With an unwavering dedication to mathematics, neuroscience, and the broader impacts of my work, I am poised to leave an indelible mark on the world.

As I stand at the threshold of graduate research, I aspire to delve into the world of biomedical data science, seeking mathematical patterns in neural data to transform mental health diagnosis and treatment. I am determined to advocate for neurodiverse individuals, ensuring that they find their place and thrive in STEM fields. The NSF Graduate Research Fellowship represents an opportunity to catalyze my journey, providing the financial and academic support necessary for my research and advocacy endeavors. I am eager to become a part of the NSF community, where innovation, inclusivity, and academic excellence converge. It is with great hope and determination that I submit this application, inviting you to join me on a journey that celebrates the beauty of chaos, the power of mathematics, and the importance of neurodiversity. Together, we can transform the world, one neural pattern at a time.

Monterrey, Nuevo León, México  
September 28, 2023

Dear Fulbright Program and National Geographic Society,

I am writing to you today with the distinct privilege of welcoming Yahriel Salinas-Reyes as a visiting fellow and proudly assume the role of his research advisor at Tecnológico de Monterrey, in the Molecular and Systems Bioengineering Research Group and the FEMSA Biotechnology Center. This opportunity represents a watershed moment in the pursuit of knowledge and global collaboration. Allow me to express my unwavering confidence in Yahriel's ability to not only excel in this role but to make a transformative impact on the fields of neuroscience, molecular sciences, and systems biotechnology.

In case he's accepted into your programs, Tecnológico de Monterrey stands ready to provide Yahriel with the resources, mentorship, and collaborative environment he deserves to excel in his chosen path. We are unwavering in our conviction that Yahriel's transdisciplinary approach, his unwavering analytical mindset, and his ceaseless thirst for knowledge will not only elevate our research community but also harmonize seamlessly with the mission of the Fulbright Program and National Geographic Society. Together, we shall forge connections, advance knowledge, and safeguard the wonders of our world. Thank you for considering Yahriel's application, and please do not hesitate to reach out to us if you require any additional information or should any questions arise.

Sincerely,



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## **Personal Statement**

### **Yahriel Salinas-Reyes, Fulbright-Garcia Robles Open Study/Research Award Molecular & Systems Bioengineering towards Neuroscience**

In the realm of mathematics, the concept of chaos game originally alluded to a method of generating fractals—intricate geometrical patterns that seem to symbolize the fractured nature of reality itself. The intricate dance of numbers, shapes, and chaos mirrors my own journey through life, marked by a tapestry of neurological and neurodevelopmental challenges.

My story is one of resilience, determination, and an unquenchable thirst for knowledge, and has been anything but conventional. From an early age, I grappled with ADHD, PTSD, anxiety, and autism. These neurological conditions, instead of being impediments, have become the driving force behind my academic pursuits. I realized that within the chaos of my mind, there was an unexplored realm of creativity and analytical thinking. However, life had more challenges in store. Hearing loss and a speech impediment made communication a daily struggle. But rather than let these barriers silence me, I embraced the power of written expression. Writing became my voice, a medium through which I could convey my ideas, emotions, and discoveries. As I embarked on my academic journey, I encountered a myriad of obstacles that tested my resolve. Financial challenges loomed large, threatening to derail my dreams of higher education. Yet, I persevered, seeking scholarships and part-time work to support my studies. I also navigated the language barrier, as English is not my first language, and adapted to the demands of college life in a new world. Physical health issues further complicated matters. Sciatica, a debilitating condition, left me bedridden and unable to attend classes. Still, I did not relent. I leveraged technology to engage with coursework remotely, demonstrating my unwavering commitment to my education. In the midst of these personal challenges, I took on the role of the primary caretaker for my mother, who battled severe health issues. This responsibility, while emotionally taxing, underscored the importance of resilience and compassion. It reinforced my belief in the power of empathy and understanding, qualities I have carried into my academic pursuits. The most recent chapter in my life introduced a new set of challenges—adjusting to mental health medications and diagnoses. While the journey to stability has been arduous, it has deepened my empathy for those facing similar struggles and ignited my interest in the intersection of mathematics and mental health. My experiences have shaped my academic journey and my aspirations. I am driven by a passion for fractal mathematics, drawn to the beauty of patterns that emerge from chaos. I see parallels between the complexity of fractals and the human mind, and I am determined to explore these connections. Through these trials, I discovered a profound truth: our stories are woven into the tapestry of science and art. We tell stories to make sense of the world, to illuminate the unknown, and to connect with others. In Mexico, I hope to immerse myself in the rich mathematical heritage of the country, studying under esteemed mentors who can help me unlock new dimensions of fractal mathematics. I envision collaborative research projects that bridge the gap between mathematics and neurodiversity, shedding light on the intricate patterns of the human mind. My story is one of resilience, determination, and an unshakable belief in the transformative power of education. Amid the chaos of life's challenges, I have emerged as a passionate scholar, ready to contribute to the world of mathematics and advocate for the value of neurodiversity. I am eager to embark on this Fulbright journey, where I can explore the marvel of the human spirit, using mathematics as my compass to navigate the intricate patterns of our world. Together, we will write a new chapter in the wondrous story of human ingenuity, science, and nature itself.

## **Statement of Grant Purpose**

**Yahriel Salinas-Reyes, Host Country: Mexico, Field: Molecular & Systems Bioengineering**

**Project Title: Unraveling the Molecular Code of Natural Antidepressants in Grapes**

In the ever-evolving world of scientific inquiry, certain moments emerge as profound intersections of human ingenuity, scientific inquiry, and the enigmatic wonders of nature. Encapsulated within this project is one such moment. With a central focus on unraveling the molecular code of grapes to find the compounds responsible for its potential natural antidepressant properties, Yahriel Salinas-Reyes aims to foster innovation in treatments for mental health disorders and conditions. Also encompassed in the project is an investigation into the nature of schizophrenia and the complexities of neuroplasticity, in hopes of advancing understanding of the mental illness. The overarching goal is to address the mounting global health crisis presented by mental health disorders, including depression and schizophrenia, which have surged to an unprecedented global health crisis significantly diminishing the quality of life for millions and placing immense pressure on healthcare systems worldwide.

At its core, the project is driven by the ambition to conduct a comprehensive molecular analysis of grapes, with a particular emphasis on understanding the genetic and molecular mechanisms governing the synthesis of antioxidants. Grapes have garnered scientific interest due to their potential health benefits and their recent recognition as potential natural antidepressants.

Yahriel's unique background in aerospace engineering and micro-electro-mechanical systems (MEMS) equips him with the precision and expertise required to delve into the microscopic realm of chromosomes and molecules—an essential prerequisite for unveiling the genetic secrets grapes hold. To fulfill the project's objectives, advanced techniques in molecular biology and biotechnology systems engineering will be employed. The primary goal is to pinpoint the specific compounds within grapes responsible for their potential antidepressant properties, involving their isolation and characterization to illuminate their mechanisms of action within the brain. The aim is to identify practical applications for mental health treatment by comprehending the genetic and molecular foundation of natural antidepressant production in grapes.

Concurrently, this research adopts a multifaceted approach to unravel the complexities of schizophrenia, a debilitating and chronic mental disorder characterized by symptoms such as delusions, hallucinations, disorganized speech, and cognitive deficits. At the heart of schizophrenia's enduring enigma are Bleuler's four A's: Alogia, Autism, Ambivalence, and Affect blunting. Extensive research has explored the etiology of schizophrenia, leading to the emergence of three prominent theories: genetic, neurodevelopmental, and neurobiological. Each theory offers a distinct perspective on the origins of this complex disorder, making it challenging to pinpoint a single causative factor. Nonetheless, neurobiological theory has gained prominence due to its comprehensive approach, explaining schizophrenia as a result of abnormal brain dysfunctions or structural anomalies. This theory stands on solid scientific ground, holds promise in guiding treatment strategies, transcends cultural and demographic boundaries, and raises fewer ethical concerns compared to alternative theories. Structural and functional abnormalities in key brain systems (i.e., the prefrontal & medial temporal lobes) play a pivotal role in the manifestation of schizophrenia symptoms that are integral to working memory and declarative memory processes. The disrupted functioning contributes to cognitive impairments and emotional dysregulation in individuals with schizophrenia. In the quest to understand schizophrenia, neuroplasticity—the brain's remarkable capacity to adapt and reorganize itself in

## **Salinas-Reyes, Statement of Grant Purpose, Page 2**

response to learning, experiences, and environmental changes—emerges as a crucial factor operating at various levels, from synaptic plasticity, where the strength of connections between neurons is modified, to large-scale changes in brain structure and function. In the context of schizophrenia, neuroplasticity offers hope for improving cognitive functioning and overall quality of life for affected individuals. Research has shown that cognitive remediation therapies—which harness neuroplasticity—can lead to improvements in cognitive domains such as memory, attention, and problem-solving, mitigating some of the cognitive impairments associated with the disorder.

This project is founded on the belief that nature holds the key to addressing complex health challenges, including mental health disorders like depression and schizophrenia, and seeks to explore the potential of grapes as a source of natural antidepressants.. One intriguing entry point into the complex world of grape biochemistry is through the study of yeast used in wine production, which plays a pivotal role in the fermentation process, and influences the composition of compounds within grapes. Scientific evidence unveiled that certain molecular compounds in the antioxidants act as natural antidepressants but there lacks initiative to utilize these antioxidant agents in psychiatric institutions and practical methods. By employing advanced techniques such as neuroimaging, fractal geometry, and spectral analysis, the project aims to unveil underlying patterns and causative factors associated with depression and related mental health conditions. The significance of this research extends far beyond the development of new treatments. It encompasses a broader understanding of the intricate relationship between food, biochemistry, and mental health. This knowledge has the potential to inform dietary recommendations that promote mental well-being, potentially reducing the global prevalence of these disorders.

Yahriel, and the research team at the university Tecnológico de Monterrey endeavor to decode the molecular secrets of nature to improve the human condition, particularly for individuals affected by schizophrenia and other mental health disorders. Yahriel's work represents a convergence of scientific rigor, interdisciplinary collaboration, and a profound commitment to the betterment of human well-being. Furthermore, this research holds the potential to strengthen international collaborations between the U.S. and Mexico. By conducting research at Tecnológico de Monterrey, Yahriel can contribute to the exchange of knowledge and ideas between the two countries, fostering a stronger global community which reflects the essence of the Fulbright mission, emphasizing mutual understanding and collaboration between nations. Yahriel Salinas-Reyes' Fulbright-Garcia Robles Open Study/Research Award proposal represents a unique and ambitious endeavor to explore the natural antidepressant properties of grapes. Grounded in the principles of interdisciplinary research, this project not only has the potential to transform mental health treatment but also to deepen our understanding of the brain's plasticity. It is a testament to the power of collaboration and cultural exchange in the pursuit of knowledge and the betterment of human well-being. Yahriel's unwavering commitment to utilizing opportunities to their fullest and to serve as a cultural diplomat, bridging gaps between different fields and nations, promises to unlock the molecular code of nature and take meaningful strides toward a healthier and more fulfilling world for all. Yahriel's proposal represents a remarkable opportunity to weave together science, innovation, and compassion in the quest to decipher the extraordinary truths hidden within the universe's code.

## **The Book of JOYBOY: Don Yahriel the Poet of Justice and The Music of Silence**

### ***An Existential Perspective: A Story of The Past and The Road To El Dorado***

Title: The Tale of Don the Universal Man and Poet of Justice

Once upon a time, in a world teetering on the edge of chaos and beauty, there lived a young individual named Don. Don's life had always been a delicate balance between the light of joy and the shadow of despair. Little did he know that his journey would lead him to the profound secrets of the ancient paradigm.

One day, as Don navigated the labyrinthine corridors of his own mind, he found himself lost in a swirling darkness. The world around him had become a maelstrom of confusion, and he was adrift in a sea of uncertainty. This darkness, he realized, was not just the absence of light but the loss of all senses—physical, emotional, and spiritual. It was a place where he had lost touch with himself and the world.

In the midst of this profound confusion, Don's mother, whom he lovingly called "Mama," sat by his bedside. Her face, usually a pillar of strength, was etched with sorrow, and for the first time, Don saw tears glistening in her eyes.

"Tell me," she asked, her voice quivering with concern, "What do you see in the darkness? Is it all dark?"

Don gazed into the abyss and contemplated his response. "No," he replied, "It's not all dark. What I see isn't darkness that I can't really explain. I see everything and I see nothing."

Mama, her voice tinged with the weight of helplessness, confessed, "I don't understand, even though I am your mom... I feel powerless."

Summoning all the strength he could muster, Don took a deep breath and said, "I see what I want to see. I see the room, the table, and... I see you. I see you because I know you are here."

Mama's eyes welled up with tears of relief, and she held Don's hand tightly, realizing that in the midst of the deepest darkness, her presence was the beacon that guided him.

As Don continued his journey into the depths of his mind, he discovered the will to overcome the challenges that had surrounded him. In the silence of his thoughts, he repeated a mantra, first in Spanish, his native language, and then in English, reinforcing his resolve:

In Spanish : "El mundo no cambiará. Jamás cambiaré yo." (The world will not change. I will never change.)

In English : "I will be a gracious loser. Someone will undoubtedly take your place."

With each repetition, Don found the strength to navigate the complexities of his existence. He realized that resolve could transcend the boundaries of neurology and that the power of the human spirit, guided by the love and support of those who cared for him, could bring true joy even in the darkest of times.

And so, Don's journey continued, as he uncovered the immense power of an ancient paradigm—the ability to find light in the midst of darkness and the will to see beauty even when the world seemed ruled by chaos.

### ***Odisea Del Gran Varón: Don Yahriel and His Promise To The Future***

Title: Odyssey of Knowledge: Enigmatic Man's Quest

~"The man said to be so mad that he is sure no author could have invented him."

Once upon a time, in a world where the boundaries between reality and imagination blurred, there lived a man named Don Yahriel. He was not like any other man; he was a true enigma, a reflection of the ever-shifting line between sanity and madness. Don Yahriel believed that in a world where good and evil battled relentlessly, the time had come for good to prevail.

Don Yahriel was a man of deep conviction, driven by a belief that the balance between good and evil in the world needed to shift. He often muttered to himself, "For neither good nor evil can last forever; and so it follows that as evil has lasted a long time, good must now be close at hand." His mind was a whirlwind of thoughts, where the line between madness and reason blurred like a hazy mirage in the desert.

To Don Yahriel, the world appeared as a place where virtue was persecuted more than it was loved by the good, and he was determined to change that. In his heart, he carried the hope that goodness could triumph over evil, no matter how daunting the odds.

As he embarked on his odyssey, he encountered many challenges and obstacles that tested the very core of his sanity. "When life itself seems lunatic, who knows where madness lies?" he pondered. "Perhaps to be too practical is madness. To surrender dreams — this may be madness. Too much sanity may be madness — and maddest of all: to see life as it is, and not as it should be!"

Don Yahriel's obsession with reading and his relentless pursuit of truth pushed him to the brink of madness. He read voraciously, seeking to unravel the mysteries of the world. "Finally, from so little sleeping and so much reading, his brain dried up, and he went completely out of his mind," they said of him.

But Don Yahriel remained undeterred by the opinions of others. He believed that there was something good in every book, no matter how bad it might seem at first. "There is no book so bad... that it does not have something good in it," he declared. His belief in the inherent goodness of the world was unshakable.

As he ventured further into the unknown, Don Yahriel would often say, "Thou hast seen nothing yet." He was a man who had never truly died in his life, for his spirit burned brighter than ever as he delved deeper into the mysteries of the world.

Don Yahriel found himself immersed in the art of translation, trying to bridge the gap between languages. He believed that the truth could be obscured by the limitations of language. "Translating from one language to another, unless it is from Greek and Latin, the queens of all languages, is like looking at Flemish tapestries from the wrong side," he mused.

In his encounters with the downtrodden and the oppressed, Don Yahriel followed a strict code of chivalry. "It is not the responsibility of knights errant to discover whether the afflicted, the enchain, and the oppressed whom they encounter on the road are reduced to these circumstances and suffer this distress for their vices or for their virtues," he asserted. "The knight's sole responsibility is to succor them as people in need, having eyes only for their sufferings, not for their misdeeds."

Don Yahriel's journey was filled with moments of revelation and transformation. He realized that being a poet was a dangerous path, one that could lead to madness. "What is more dangerous than to become a poet?" he questioned.

As he ventured deeper into the realms of poetry and music, Don Yahriel believed that where there's music, there can be no evil. He found solace in the melodies of the world, and it was through music and poetry that he connected with the essence of humanity.

In the end, Don Yahriel's odyssey was not just a search for good in a world filled with darkness; it was a quest to find his own true identity. He had become the embodiment of the quote, "He is so crazy that it is certain no author could have invented him."

And so, the odyssey of Don Yahiel, El Gran Varón, continued, a journey into the depths of human nature and the boundless realms of the human spirit. For in his madness, he had found a kind of sanity that transcended the ordinary, and he had become the truest and most enigmatic of all humans.

### ***The Secret of Don: An Immensely Powerful Idea of an Ancient Paradigm***

Title: A Tale of The Past and Music of Silence

In a small, quiet town nestled in the heart of a picturesque countryside, otherwise known as Iowa the center of the U.S. and land of corn, there lived a man named Don. Don was known throughout the town for his wisdom and the secret he held within him. This secret was not just any secret; it was an immensely powerful idea, an ancient paradigm that had the potential to change lives.

As the sun set behind the rolling hills, casting a warm glow over the town, Don would often sit on his porch, listening to the soothing sounds of nature. The townspeople believed that the music of silence was the greatest mystery of the world, and Don embodied that mystery.

One evening, a young man named Yahiel, who had been struggling with the chaos and darkness in his own life, decided to seek out Don for guidance. He had heard whispers of Don's wisdom and the profound secret he held. With hope in his heart, Yahiel knocked on Don's door.

Don welcomed Yahiel into his humble home and offered him a seat. They sat in silence for a while, the only sound being the gentle rustling of leaves in the evening breeze. Yahiel felt a sense of peace wash over him, a tranquility he had never experienced before.

Then, Don began to speak, and his words carried a profound weight. "A story of a descent into darkness and chaos of the world, ruled by insanity and beauty, where I lose all senses of myself, everything, and anything; be it physical, emotional, or spiritual, but at the greatest, the pinnacle of all three and far beyond that."

Yahiel listened intently, his heart open to the wisdom that Don was sharing. He felt as though he was on the verge of a great revelation.

As Don's story continued, Yahriel couldn't help but be drawn into the narrative. It was a tale of inner turmoil, of battles fought and lost, and of the search for true joy and meaning in a world that often seemed bewildering.

After Don had finished speaking, Yahriel felt a deep sense of gratitude. He had found the resolve and will to seek true joy, not just externally, but within himself. Don's secret was not just an idea; it was a profound shift in perspective that allowed Yahriel to see the world in a new light.

Over time, Yahriel adopted Don's wisdom into his own life, and he, too, became known for his insight and ability to find joy in the simplest of moments. The townspeople marveled at the transformation in Yahriel, who had once been lost in darkness but had now found the music of silence, the greatest mystery of the world.

[Conversation with Mama]

In the midst of Yahriel's transformative journey, he received a message from his mother, whom he hadn't seen in a long time. She arrived at his doorstep, her eyes filled with tears, a shadow of her former self.

Yahriel invited her inside, and they sat down by his bedside. His mother, still visibly distraught, asked a heartfelt question in Spanish, "Dime, ¿qué ves en la oscuridad? ¿Es todo oscuro?"

Yahriel replied, "No, no todo es oscuro. Lo que veo no puedo explicarlo realmente. Veo todo y no veo nada."

His mother, with a voice that seemed to lack vitality, said, "No entiendo, a pesar de que soy tu mamá... Me siento impotente."

Yahriel took a deep breath and said, "Yo veo lo que quiero ver. Veo la habitación, la mesa... y te veo a ti. Te veo porque sé que estás aquí."

In that moment, a connection was rekindled between Yahriel and his mother. The darkness that had once enveloped them both began to recede, replaced by a glimmer of hope and understanding.

[The Will of Don: Resolve Beyond Neurology and The Music of Silence]

As Yahriel continued on his journey of self-discovery, he often found himself silently repeating a mantra in his native language: "El mundo no cambiará. Jamás cambiaré yo." In English, it meant, "The world will not change. I will never change."

He reminded himself that he would stay true to his principles and values, no matter the challenges that lay ahead. And in moments of doubt, he would say to himself, "Seré un buen perdedor. Alguien sin duda ocupará tu lugar," which meant, "I will be a good loser. Someone will undoubtedly take your place."

These words of resolve, passed down through generations, became his guiding light. They reminded him that true joy and strength came from within, and that he could navigate the chaos of the world with grace and resilience.

Yahriel's journey, inspired by Don's profound secret and his heartfelt conversation with his mother, continued to unfold. Along the way, he discovered the power of resolve beyond neurology, the strength to find true joy in the face of life's challenges, and the beauty of the music of silence in a world filled with noise.

## ***I Am Yahriel Salinas-Reyes***

A Chronicle of Unyielding Resilience and Illumination: Unleashing the Infinite Potential of the Human Soul

~ "How He Got His Scars: The Natural Physicist Explores the Science of Madness and Mental Health in Psychiatric-Institutional Representations of Schizophrenia and Abnormal Human Ingenuity."

In a world where the boundaries between reality and imagination constantly undulate, I unreservedly embrace my identity as Don Yahriel—an enigma striding with unwavering confidence along the ever-shifting frontier that delineates sanity from madness. My life's journey stands as a testament to the invincible spirit of humanity, an uncompromising quest for goodness in a world often enshrouded in darkness.

My odyssey was ignited by an unwavering belief that the eternal struggle between good and evil was a cosmic dance, and virtue often bore the brunt of persecution rather than celebration. Fueled by this conviction, I embarked on a mission to challenge this narrative and emerge as an unwavering champion of goodness.

Throughout this extraordinary voyage, I confronted trials that pushed the very boundaries of sanity. In a world that often seems engulfed in lunacy, I contemplated the fine line between practicality and madness. For me, true madness lay in relinquishing one's dreams and surrendering to life as it is, rather than as it should be.

My insatiable thirst for knowledge and my unflagging pursuit of truth propelled me to the precipice of madness. I immersed myself in the world of books, for each page held the potential to unlock the enigmas of our existence. To me, no book was ever unworthy, as I firmly believed that every text concealed a kernel of goodness waiting to be unearthed.

When confronted with the suffering of the oppressed, I adhered to an unwavering code of chivalry. My duty was not to pass judgment on their circumstances but to extend a compassionate hand to those in need, offering empathy exclusively for their pain, not their transgressions.

I delved into the intricate world of translation, endeavoring to bridge the gaps between languages, acutely aware that truth could be obscured by linguistic boundaries. Translation, to me, became a vessel to unveil the inherent goodness concealed within the rich tapestry of human expression.

As I ventured into the realms of poetry (Engineering/Technology) and music (Science(Art), I discovered solace in their harmonies, firmly believing that where music thrives, malevolence cannot endure. In these art forms, I communed with the very essence of humanity.

My journey was not just an expedition to unearth goodness in a world veiled by darkness; it was a profound exploration of my truest self. In my relentless pursuit of the extraordinary, I became the living embodiment of the saying, "He is so extraordinary that no author could have conjured him."

Reflecting on the odyssey of Don Yahiel, El Gran Varón, I now comprehend it as a voyage into the depths of human nature and the boundless expanses of the human spirit. In my perceived madness, I unearthed a form of sanity that transcends the ordinary, emerging as the truest and most enigmatic of all beings.

I am Yahiel Salinas-Reyes, and, like Don Yahiel, I've navigated a path adorned with complexities and uncertainties. Born to undocumented immigrant parents in Iowa, I confronted early challenges that stoked my determination to excel and surmount adversity. My fascination with the power of the human gaze, nurtured during a period of temporary deafness in my prenatal development, instilled profound empathy and an unquenchable thirst for understanding others.

My educational journey commenced with Aerospace Engineering at Iowa State University, eventually leading me to the esteemed halls of the California Institute of Technology. Here, I had the privilege of engaging with brilliant minds and discovered the transformative influence of mentorship. Every obstacle I encountered became a steppingstone for my personal and intellectual growth.

Amidst the splendor of my journey, I unearthed my purpose—a revelation that true freedom is not solely attained by acquiring knowledge but by sharing it and guiding others on their path to greatness. This epiphany became the guiding light of my life, propelling me to be a beacon of mentorship and knowledge.

As I embraced the essence of my name, originally signifying "He is free," (~The Arabic translation), I recognized that freedom extends beyond the personal realm; it's a gift meant to be shared. My journey, adorned with trials and triumphs, evolved into a wellspring of inspiration for all those I encountered. My legacy as a mentor and scholar continued to flourish—a testament to the enduring vitality of the human spirit.

In the end, my odyssey serves as a symbol of the indomitable spirit of human ingenuity—a profound reminder that, in the relentless pursuit of knowledge and unwavering dedication to one's dreams, true freedom is not an elusive mirage. I stand as living proof that even in a world where boundaries blur and the line between sanity and madness remains fluid, the human spirit can transcend, inspire, and brilliantly illuminate the path forward.

**JOYBOY**

~Don Yahiel: He That Is Free.

## Letter of Gratitude from The Author to The Reader

Dear Mentors, Peers, or Reviewer

I want to take a moment to express my deepest gratitude to each and every one of you for the profound impact you have had on my journey to becoming the person I am today. Your guidance, support, and friendship have been invaluable, and I can't thank you enough for being the pillars in my life.

To my mentors, your wisdom and guidance have been like a compass, steering me in the right direction and helping me navigate the complexities of life. Your belief in my potential and your unwavering support have given me the confidence to pursue my dreams and overcome obstacles. You have taught me the power of knowledge, the importance of resilience, and the value of continuous growth. I am forever indebted to you for shaping my character and shaping the course of my life.

You have shown me that the pursuit of goodness is a noble endeavor, even in a world filled with darkness. Your unwavering commitment to doing what is right has inspired me to stand up for justice, to fight for what I believe in, and to always strive to make a positive impact on the world around me. Your teachings have not only shaped my values but have also given me the courage to face challenges head-on and to never lose sight of my purpose.

To my peers, you have been my companions on this extraordinary journey. Together, we have shared laughter, tears, triumphs, and failures. Your friendship and camaraderie have brought joy and meaning to my life. Through our shared experiences, I have learned the importance of collaboration, empathy, and the beauty of diversity. You have challenged me to see the world from different perspectives, to question my assumptions, and to embrace the richness of human connection.

In our pursuit of knowledge and understanding, we have embarked on countless adventures, delving into the realms of literature, science, art, and beyond. Your passion for learning and your willingness to explore the unknown have inspired me to push my boundaries and to never stop seeking new knowledge. Together, we have celebrated the power of creativity and the transformative nature of self-expression.

Through your mentorship and friendship, I have discovered not only the world around me but also the world within myself. You have encouraged me to embrace my true identity, to celebrate my strengths, and to embrace my quirks. Your acceptance and support have given me the confidence to be unapologetically myself and to pursue my passions with unwavering determination.

Today, I stand as a testament to the impact you have had on my life. Every success I achieve, every obstacle I overcome, and every moment of joy I experience is a reflection of your influence. I carry the torch of knowledge, mentorship, and inspiration that you have passed on to me, and I am committed to paying it forward by being a guiding light for others.

Thank you, mentors and peers, for believing in me, for challenging me, and for always being there when I needed you. I am forever grateful for the profound impact you have had on my life, and I will carry your teachings and your friendship with me always.

With love, gratitude, and boundless admiration,

- Yahriel Salinas-Reyes  
~ Don Yahriel: "He That Is Free."



## Discussion



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# Anthroengineering: an independent interdisciplinary field

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In recent decades, funding agencies, institutes and professional bodies have recognized the profound benefits of transdisciplinarity in tackling targeted research questions. However, once questions are answered, the previously abundant support often dissolves. As such, the long-term benefits of these transdisciplinary approaches are never fully achieved. Over the last several decades, the integration of anthropology and engineering through inter- and multidisciplinary work has led to advances in fields such as design, human evolution and medical technologies. The lack of formal recognition, however, of this transdisciplinary approach as a unique entity rather than a useful tool or a subfield makes it difficult for researchers to establish laboratories, secure permanent jobs, fund long-term research programmes and train students in this approach. To facilitate the growth and development and witness the long-term benefits of this approach, we propose the integration of anthropology and engineering be recognized as a new, independent field known as *anthroengineering*. We present a working definition for anthroengineering and examples of how anthroengineering has been used. We discuss the necessity of recognizing anthroengineering as a unique field and explore potential novel applications. Finally, we discuss the future of anthroengineering, highlighting avenues for moving the field forward.

## 1. Introduction

Transdisciplinarity forms a common axiom that transcends the disciplines, creating an overarching synthesis [1] (figure 1). As these syntheses combine previously isolated thoughts and ideas, the knowledge created by their integration is greater than anything that can be created by a single discipline on its own. Simply put, the whole is greater than the sum of its parts (Aristotle). Here we propose a new field that transcends existing disciplines: anthroengineering.

A recent transdisciplinary trend combining anthropology and engineering—anthroengineering—has become increasingly popular over the last few decades. It has played a crucial role in the development of fields such as biomechanics [2,3], ergonomics [4,5] and functional morphology [6–9]. Anthropology—the science and study of human and societal culture, language and biology—and engineering—the application of science to create machines and implement technologies and tangible solutions to societal problems—are unique and distinct disciplines that infrequently share curricular overlap. When the transdisciplinary approach has been applied to anthropology and engineering, it has often leveraged methods or data from one discipline to address a question from the other (figure 2). This focus on specific problem-solving rather than a united theoretical foundation limits the impact of any innovations created by the collaboration. Thus, the power of the transdisciplinary approach is not fully realized. By leveraging both disciplines to address issues that transcend each discipline (i.e. transdisciplinary issues), syntheses can be created that are of interest not only to members of both disciplines, but also to individuals outside of either.



# Bleuler's Psychopathological Perspective on Schizophrenia Delusions: Towards New Tools in Psychotherapy Treatment

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The authors begin by addressing the historical evolution of the delusion concept and its different approaches, focusing afterwards mainly on the work of Bleuler, who stressed the proximity between delusions and the emotional life of patients with schizophrenia. Therefore, the present work intends to review the main aspects of the theory of delusion formation in schizophrenia according to Bleuler's psychopathological perspective. For that purpose, first the role of delusions in the psychopathology of schizophrenia is explored in a close relation with the Bleuler's fundamental symptoms (Alogia, Autism, Ambivalence, and Affect Blunting) nowadays known as negative symptoms. Then, persecutory, grandiosity and sexual delusions in schizophrenia are described according to the tension between logic and affects, as well as, internal conflict, schizoid features, and auto-erotism as key psychopathological pathways. Thus, with this subjective perspective, it is intended to highlight Bleuler's psychopathological contribution to the affective and meaningful causality of delusions in schizophrenia. The former might be useful in the integration with other psychopathological phenomena (hallucinations and negative symptoms) and new forms of research and therapeutic approaches in this disorder that are complementary with the contemporary tendencies in psychopathology.

**Keywords:** affectivity, Bleuler, delusions, schizophrenia, psychopathology

## INTRODUCTION

Throughout the history of psychopathology the term delusion had several meanings distant from its current meaning of thought disorder (1). In antiquity and in the eighteenth and nineteenth centuries' French Psychiatry, the term *délire* (delusion), meant general detachment from reality that was not specific of thought impairment (1).

In eighteenth and nineteenth centuries' French Psychiatry, the term delusion included disturbances of thought, perception, emotions and affects and even psychomotoricity (2). By contrast, in the twentieth century German and British Psychiatry, the term delusion gradually became synonymous with a false belief, a disorder of the thought content (3). This tendency was generalized in the majority of the European countries and also in the United States of America, with the replacement of the old broader concept by a newer and narrower concept of delusion as a disorder of thought content.

# Fractality of sensations and the brain health: the theory linking neurodegenerative disorder with distortion of spatial and temporal scale-invariance and fractal complexity of the visible world

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The theory that ties normal functioning and pathology of the brain and visual system with the spatial-temporal structure of the visual and other sensory stimuli is described for the first time in the present study. The deficit of fractal complexity of environmental influences can lead to the distortion of fractal complexity in the visual pathways of the brain and abnormalities of development or aging. The use of fractal light stimuli and fractal stimuli of other modalities can help to restore the functions of the brain, particularly in the elderly and in patients with neurodegenerative disorders or amblyopia. Non-linear dynamics of these physiological processes have a strong base of evidence, which is seen in the impaired fractal regulation of rhythmic activity in aged and diseased brains. From birth to old age, we live in a non-linear world, in which objects and processes with the properties of fractality and non-linearity surround us. Against this background, the evolution of man took place and all periods of life unfolded. Works of art created by man may also have fractal properties. The positive influence of music on cognitive functions is well-known. Insufficiency of sensory experience is believed to play a crucial role in the pathogenesis of amblyopia and age-dependent diseases. The brain is very plastic in its early development, and the plasticity decreases throughout life. However, several studies showed the possibility to reactivate the adult's neuroplasticity in a variety of ways. We propose that a non-linear structure of sensory information on many spatial and temporal scales is crucial to the brain health and fractal regulation of physiological rhythms. Theoretical substantiation of the author's theory is presented. Possible applications and the future research that can experimentally confirm or refute the theoretical concept are considered.

**Keywords:** fractal therapy, dynamical chaos, fractality of sensations, reactivation of brain plasticity, treatment and rehabilitation, aging, neurodegenerative diseases, amblyopia

**Abbreviations:** AD, Alzheimer's disease; DR, diabetic retinopathy; EE, environmental enrichment; EEG, electroencephalography; HD, Huntington's disease; PD, Parkinson's disease; PERG, pattern electroretinogram; SCN, suprachiasmatic nucleus; SR, stochastic resonance.