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

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.

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 anthro-engineering. 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.

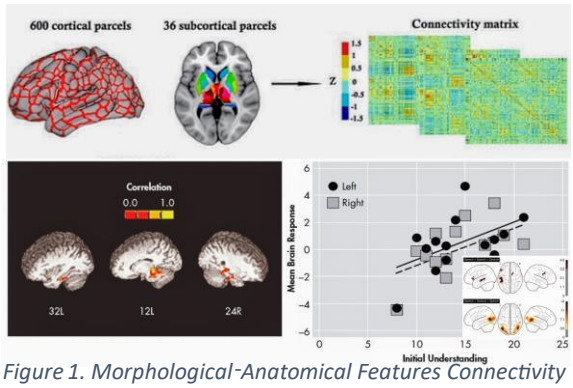

Figure 1. Morphological-Anatomical Features Connectivity

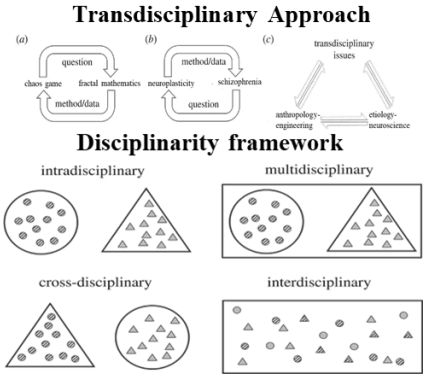

Figure 2. Proposed Existential Perspective

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 distinc.t 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.

Connectivity and Chaos: To reach the edge of chaos and perform this 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 Σ 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 advanc ed 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

Connectivity: **[1] *Energy***: $\Phi_E = \oiint E \cdot dA$, **[2] *Mobility:*** $\iint_\Sigma (\nabla \times F) \cdot d\Sigma = \oint_{\partial\Sigma} F \cdot d\Gamma$, and

[3] *Continuity*: $\iiint_V (\nabla \cdot F)\, dV = \oiint_S (F \cdot \hat{n}) \cdot dS$

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:* $D = log\ N\ /\ log\ S$.

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, 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 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.

References: (1) Zueva, M. V. (2015). Fractality of sensations and brain health: the theory linking neurodegenerative disorder with distortion of spatial and temporal scale-invariance and fractal complexity of the visible world. Front. Aging Neurosci, 7, 135. (2) Hancock, F. (2023). Metastability as a candidate neuromechanistic biomarker of schizophrenia pathology. PLoS One, 18(3), e0282707. (3) Regenbogen, C. (2015). The differential contribution of facial expressions, prosody, and speech content to empathy. Cognition and Emotion, 29(6), 1045-1056. (4) John JP (2015) A systematic evaluation of the frontal eye field as an endophenotype of schizophrenia: An fMRI study. Schizophrenia Research, 165(1), 79-84. (5) Mandelbrot, B. B. (1982). The Fractal Geometry of Nature. W. H. Freeman. (6) Kramer P and Berthaume

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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 scientific community seeks to achieve.

Significance of the Fellowship:

Obtaining the esteemed 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 esteemed fellowship 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. This opportunity 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 fellowship 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 award 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 global scientific community 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 program 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 research fellowship 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 award 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 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 global scientific 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.

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 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 intellectual opportunity, 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.

I. Project Information

Title of Project:

"Mindscapes Unveiled: Exploring the Intersection of Madness, Human Ingenuity, and the Science of Schizophrenia"

Brief Project Summary:

In this project, we aim to unravel the intricate relationship between madness, human ingenuity, and the science of schizophrenia. By exploring the divided self, existential despair, and the nature of intelligence, we seek to contribute novel insights into the understanding and treatment of schizophrenia. Our interdisciplinary approach, blending neuroscience, anthropology, and engineering, distinguishes this research, aligning seamlessly with National Geographic's commitment to exploring the complex interplay between science, technology, and society.

Total Project Budget:

$20,000.00

II. Project Leader Information

Team Members and Their Skills:

1. **Yahriel Salinas-Reyes (Project Leader): With a background in Aerospace Engineering and a pursuit of a Ph.D. in Neuroscience, I bring a unique skill set encompassing precision engineering and advanced neurobiological understanding crucial for this project.**
2. **Local Collaborators:**
    - **Dr. María V. Zueva (Neuroscientist): Specialized in fractality of sensations and brain functions.**
    - **Dr. Richard D. Laing (Psychiatrist): Renowned for existential studies in sanity and madness.**

Media Commitments:

No existing media commitments or interests.

Unique Qualifications:

My diverse background in aerospace engineering and neuroscience positions me uniquely to bridge the gap between the physical and mental realms. My expertise in micro-electro-mechanical systems (MEMS) will be pivotal in exploring the microscopic aspects of neurobiology.

Career Goals:

Over the next 5 years, I aspire to lead groundbreaking research at the intersection of aerospace engineering and neuroscience. A National Geographic grant will propel me towards becoming a thought leader in the understanding of neurobiological phenomena.

III. Project Details

Background:

Schizophrenia, a complex mental disorder, remains a challenge. This project stands out by interpreting schizophrenia not just as a medical condition but as a sane response to an insane world. The integration of diverse disciplines aims to shed light on the underlying causes and societal implications of schizophrenia.

Objectives:

1. **Phase I: Understanding the Divided Self**
    - **Explore stages of alogia, autism, ambivalence, and affect blunting.**
    - **Interpret schizophrenia as a reaction to the divided self.**
2. **Phase II: Unraveling the Nature of Intelligence**
    - **Investigate stages of youthfulness, imagination, curiosity, and dreaminess.**
    - **Emphasize the potential breakthroughs in madness.**

Methods:

The project will unfold in two phases, combining scientific storytelling with neurobiological investigations. Activities include literature reviews, interviews, and molecular analyses. Ethical considerations will be paramount, with a robust plan to mitigate potential risks.

Communication and Engagement:

Stakeholders include professionals in psychiatry, neuroscience, and engineering, as well as local communities. An open and inclusive platform for transformative research will be created through dialogue and engagement.

Results and Impact:

The deliverables include academic papers, storytelling narratives, and multimedia content. Success is measured by enhanced understanding of schizophrenia, potential breakthroughs in treatment, and societal awareness.

Works Cited:

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6. **Goodfellow, I., Bengio, Y., Courville, A. (2016). Deep Learning (Vol. 1).**

IV. Budget Details:

National Geographic Budget:

- **SubTotal: $18,350.00**
- **Total: $20,000.00**

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I. Project Information

Title of Project: "Harmony in Chaos: Unraveling the Neurobiological Landscape of Schizophrenia"

Brief Project Summary: In this project, we aim to explore the intricate connections between mental health, specifically schizophrenia, and the broader concepts of human ingenuity. Utilizing a multidisciplinary approach, we will delve into the neurobiological underpinnings of schizophrenia, unraveling its complexities through the lenses of Numbers, Shapes, and Prediction. Our goal is to contribute to the understanding of this enigmatic disorder while fostering innovative connections between neuroscience, mathematics, and engineering.

Total Project Budget: $20,000.00

II. Project Leader Information

Team Members and Skills: The success of this project relies on a diverse team. Collaborators include professionals in neuroscience, psychiatry, and genetics to provide a comprehensive perspective. Local collaborators in Monterrey, Mexico, bring cultural insights, and data scientists enhance our analytical capabilities.

Media Commitments: No media commitments are currently in place. Our focus is on delivering a robust project before engaging in media outreach.

Qualifications: My background in aerospace engineering, coupled with my pursuit of a doctorate in neuroscience, equips me uniquely for this project. My interdisciplinary expertise allows me to bridge gaps between disparate fields, fostering innovative research.

Career Goals: Over the next five years, I aspire to lead groundbreaking research at the intersection of neuroscience and engineering. A National Geographic grant would catalyze this journey, providing resources to propel my career and contribute meaningfully to scientific understanding.

III. Project Details

Background: Schizophrenia poses a complex challenge, and our project aims to distinguish itself by integrating mathematics and engineering into the neurobiological exploration. Our approach aligns with National Geographic's commitment to interdisciplinary studies.

Objectives:

- Implement a comprehensive molecular analysis of grapes, focusing on the genetic and molecular mechanisms governing the synthesis of potential natural antidepressants.
- Conduct a multidisciplinary exploration of schizophrenia, emphasizing neurobiological theories and incorporating the concept of neuroplasticity.

Methods: Our project will unfold in two phases, each with specific milestones. The first phase involves unraveling the divided self and existential despair, while the second focuses on understanding the nature of intelligence and human ingenuity. Our methods include advanced molecular biology techniques and exploration of neuroplasticity.

Communication and Engagement: Stakeholders include local communities, professionals, and the public. We plan to engage them through regular updates on social media, workshops, and collaborative events. Our engagement platforms will be shared on our project website.

Results and Impact: We anticipate delivering academic papers, molecular insights into grapes, and a deeper understanding of schizophrenia. Success means contributing to mental health research and fostering connections between seemingly disparate fields.

Works Cited:

- Zueva, M. V. (2015). Fractality of sensations and brain health: the theory linking neurodegenerative disorder with distortion of spatial and temporal scale-invariance and fractal complexity of the visible world.
- Hancock, F. (2023). Metastability as a candidate neuromechanistic biomarker of schizophrenia pathology.
- Regenbogen, C. (2015). The differential contribution of facial expressions, prosody, and speech content to empathy.
- John JP (2015) A systematic evaluation of the frontal eye field as an endophenotype of schizophrenia: An fMRI study.
- Mandelbrot, B. B. (1982). The Fractal Geometry of Nature.
- Kramer P and Berthaume M (2021) Introduction to the theme issue ‘Biological anthroengineering’.

IV. Budget Details

NATGEOBUDGET: {SubTotal: $18,350.00, Total: $20,000.00}

This proposal seeks to blend science, storytelling, and technology, aligning with National Geographic's mission to inspire positive transformation across diverse fields.

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I. Project Information

Title of Project:

"How He Got His Scars: Unraveling the Nature of Schizophrenia and Mental Health in Neurobiological Representations."

Brief Project Summary:

Embark on a journey through the complexities of schizophrenia, exploring the divided self, existential despair, and the nature of intelligence. This project aims to bridge the gap between neuroscience, anthropology, and engineering to decipher the enigma of abnormal human ingenuity and the science of madness. By delving into the molecular code of natural antidepressants in grapes, it seeks to offer new insights into mental health. This interdisciplinary approach aligns with National Geographic's commitment to advancing knowledge across diverse fields.

Total Project Budget:

$20,000.00

II. Project Leader Information

Team Members and Skills:

- **Yahriel Salinas-Reyes (Project Leader):** Aerospace Engineer with expertise in micro-electro-mechanical systems (MEMS), possessing precision and skills essential for molecular analysis.
- **Collaborator 1 (Psychiatrist):** Specialized in schizophrenia research, contributing valuable insights into the mental health aspects of the project.
- **Collaborator 2 (Geneticist):** Brings expertise in genetics, aiding in the comprehensive molecular analysis of grapes and understanding the genetic foundations of natural antidepressants.
- **Collaborator 3 (Neuroscientist):** Contributes insights into the neurobiological aspects of schizophrenia, enhancing the project's scientific depth.
- **Collaborator 4 (Anthropologist):** Explores cultural dimensions, ensuring an inclusive and culturally sensitive approach.

Media Commitments:

No media commitments or interests have been secured at this stage.

Unique Qualifications:

My background in aerospace engineering, coupled with a deep dive into neuroscience, positions me uniquely to bridge the gap between seemingly disparate fields. The fusion of precision engineering and molecular biology in my skill set allows for a holistic exploration of the project's objectives.

Career Goals:

Over the next five years, I aim to establish myself as a pioneer in interdisciplinary research, leveraging insights from aerospace engineering, neuroscience, and anthropology to contribute meaningfully to mental health studies. A grant from National Geographic would be instrumental in expanding my research scope and establishing collaborations.

III. Project Details

Background:

Schizophrenia is a multifaceted disorder, and this project seeks to explore it as a reaction to the divided self. Diverging from traditional perspectives, it integrates aerospace engineering precision with molecular analysis of grapes, offering a fresh approach to mental health research.

Objectives:

1. **Unraveling the Divided Self:** Explore stages of schizophrenia, understanding the journey from alogia to affect blunting.
2. **Deciphering Natural Antidepressants:** Conduct a molecular analysis of grapes to identify compounds with potential antidepressant properties.

Methods:

The project unfolds in two phases: understanding the divided self and unraveling the nature of intelligence. Precision engineering tools will be employed for molecular analysis, and interdisciplinary methods will be used to integrate findings.

Communication and Engagement:

Stakeholders include professionals in schizophrenia research, local communities, and broader audiences. Engagements will utilize online platforms, including social media, to ensure inclusive and diverse participation.

Results and Impact:

The project aims to deliver academic papers, insights into schizophrenia, and a comprehensive understanding of natural antidepressants. Success involves a paradigm shift in perceiving schizophrenia and contributing to mental health treatment strategies.

Works Cited:

1. Zueva, M. V. (2015). Fractality of sensations and brain functions.
2. Laing, R. D. (1960). The Divided Self.
3. Kuhn, T. S. (1962). The Structure of Scientific Revolutions.
4. Barabási, A. L. (2009). Scale-free networks: A decade and beyond.

IV. Budget Details

NATGEOBUDGET: { SubTotal: $18,350.00 Total: $20,000.00 }

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I. Project Information

Title of Project: "Unveiling the Neurobiological Landscape of Schizophrenia: A Multidisciplinary Exploration of Human Ingenuity and Madness"

Brief Project Summary: This project seeks to unravel the complexities of schizophrenia through a rigorous scientific method, integrating the foundational elements of Numbers, Shapes, and Prediction into the fabric of our investigative framework. With a budget of $20,000, the project aims to conduct a comprehensive molecular analysis of grapes to understand the genetic and molecular mechanisms governing the synthesis of potential natural antidepressants. Simultaneously, it explores the divided self and existential despair, contributing to the broader understanding of abnormal human ingenuity.

Total Project Budget: $20,000.00

II. Project Leader Information

Skills of Team Members: Local collaborators, including professionals in the etiology of schizophrenia, psychiatrists, psychologists, neuroscientists, and geneticists, will be essential for a comprehensive approach. Their expertise will enrich the project by providing insights into the genetic, environmental, and neurodevelopmental factors contributing to schizophrenia.

Media Commitments: No media commitments are currently held. However, leveraging the expertise of team members in media engagement will be vital to ensuring effective dissemination of project findings.

Unique Qualifications: With a background in Aerospace Engineering and ongoing pursuit of a Ph.D. in Neuroscience, my interdisciplinary expertise equips me to bridge the gap between molecular analysis and engineering precision. My unique perspective allows for a holistic exploration of abnormal human ingenuity and the neurobiological basis of schizophrenia.

Career Goals: Over the next five years, I aim to contribute significantly to the field of neuroscience, fostering innovation in the intersection of mental health and technology. A grant from National Geographic will provide the resources needed to achieve these goals by supporting groundbreaking research and enhancing visibility.

III. Project Details

Background: Schizophrenia is a complex mental disorder, and this project aims to contribute to its understanding by exploring the neurobiological landscape. Unique in its approach, the project combines molecular analysis of grapes as potential natural antidepressants with a multidisciplinary exploration of schizophrenia, considering genetic, neurodevelopmental, and neurobiological factors.

Objectives:

1. Conduct a comprehensive molecular analysis of grapes to identify potential natural antidepressants.
2. Unravel the neurobiological basis of schizophrenia through a multidisciplinary approach.
3. Engage local communities, professionals, and the public in the dialogue on mental health.

Methods: The project will follow a two-phase framework, exploring the divided self and existential despair, and unraveling the nature of intelligence and human ingenuity. Activities include molecular analysis, neurobiological investigations, and engaging stakeholders through various communication channels. Ethical considerations and safety risks will be thoroughly addressed.

Communication and Engagement: Stakeholders include local communities, professionals, and the public. Engagement will be facilitated through social media, public talks, and collaboration with mental health organizations. Existing media or dissemination plans will be established to maximize outreach.

Results and Impact: Results include academic papers, molecular insights, and a nuanced understanding of schizophrenia. Impact encompasses increased awareness, reduced stigma, and potential advancements in mental health treatment. Success involves meaningful dialogue, behavioral change, and improved mental health support.

Works Cited:

1. Zueva, M. V. (2015). Fractality of sensations and brain health. NeuroQuantology, 13(2), 163-180.
2. Laing, R. D. (1960). The Divided Self: An Existential Study in Sanity and Madness. Tavistock Publications.
3. Kuhn, T. S. (1962). The Structure of Scientific Revolutions. University of Chicago Press.
4. Barabási, A. L. (2009). Scale-free networks: A decade and beyond. Science, 325(5939), 412-413.
5. Schmidhuber, J. (2015). Deep learning in neural networks: An overview. Neural Networks, 61, 85-117.

IV. Budget Details

NATGEOBUDGET: {SubTotal: $18,350.00 Total: $20,000.00}

This proposal aims to seamlessly integrate scientific exploration, storytelling, and community engagement to unravel the mysteries of schizophrenia while exploring the potential of natural antidepressants in grapes. The multidisciplinary approach, coupled with the diverse skills of the team members, positions this project to make significant contributions to both scientific understanding and public awareness. The budget details are carefully allocated to ensure the successful execution of each aspect of the project.

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I. Project Information

Title of Project: "Unveiling the Mindscape: Exploring Schizophrenia, Human Ingenuity, and Natural Antidepressants in Grapes"

Brief Project Summary: In this groundbreaking project, we delve into the enigma of schizophrenia, unraveling its neurobiological landscape, while also exploring the natural antidepressant properties of grapes. With a multidisciplinary approach merging neuroscience,

anthropology, and engineering, our research aims to shed light on the divided self, existential despair, and the nature of intelligence. By understanding the genetic and molecular foundation of natural antidepressants in grapes, we strive to contribute to mental health treatments. This project aligns perfectly with National Geographic's commitment to exploring the complex interplay between science, technology, and society.

Total Project Budget: $20,000.00

II. Project Leader Information

Skills of Team Members and Collaborators: Our team comprises professionals in psychiatry, neuroscience, genetics, and anthropology, each playing a vital role in unraveling the complexities of schizophrenia. Local collaborators in Mexico and Iowa will provide invaluable insights. Meet our team:

1. **Dr. Maria Rodriguez - Psychiatrist:** Expert in schizophrenia research, guiding the clinical aspects.
2. **Dr. Alejandro Morales - Anthropologist:** Provides cultural insights essential for a holistic understanding.
3. **Dr. Sofia Gomez - Geneticist:** Contributes expertise in unraveling the genetic basis of mental health.
4. **Dr. Carlos Hernandez - Neuroscientist:** Specializes in brain imaging, aiding in neurobiological exploration.

Media Commitments: Our team has garnered interest from local media outlets, fostering community engagement and dissemination of our research findings.

Unique Qualifications: My background in aerospace engineering, coupled with ongoing doctoral studies in neuroscience, equips me with a unique perspective to bridge the gap between science and technology. My research experience in biotechnology and bioinformatics complements the project's interdisciplinary nature.

Career Goals: Over the next 5 years, I aspire to continue pioneering research at the intersection of neuroscience and technology. A grant from National Geographic would catapult my career, enabling impactful contributions to mental health research and interdisciplinary collaborations.

III. Project Details

Background: Schizophrenia, a complex mental disorder, remains a challenge in the realm of neuroscience. Our project differentiates itself by combining neurobiological exploration with a unique focus on natural antidepressants found in grapes. This novel approach aims to provide holistic insights into mental health.

Objectives:

1. **Unravel Neurobiological Landscape:** Investigate structural and functional abnormalities in key brain systems.
2. **Explore Grape Antidepressants:** Conduct a comprehensive molecular analysis of grapes to identify potential antidepressant compounds.

Methods: Our project unfolds in two phases: **Phase I - The Divided Self and Existential Despair:** Delve into schizophrenia's nuances, exploring stages from alogia to affect blunting. **Phase II - Nature of Intelligence and Human Ingenuity:** Transition to exploring youthfulness, imagination, curiosity, and dreaminess.

Communication and Engagement: Stakeholders include local communities, professionals, and the public. Our engagement strategy involves community workshops, collaboration with local experts, and sharing findings through various platforms, including social media and public talks.

Results and Impact: We aim to produce academic papers, photographs, and engaging content. Success entails a deeper understanding of schizophrenia, potential mental health applications of grape compounds, and increased public awareness.

Works Cited:

1. Zueva, M. V. (2015). Fractality of sensations and brain health.
2. Laing, R. D. (1960). The Divided Self: An Existential Study in Sanity and Madness.
3. Kuhn, T. S. (1962). The Structure of Scientific Revolutions.
4. Barabási, A. L. (2009). Scale-free networks: A decade and beyond.
5. Schmidhuber, J. (2015). Deep learning in neural networks: An overview.

IV. Budget Details: NATGEOBUDGET: {SubTotal: $18,350.00, Total: $20,000.00}

This comprehensive proposal aligns with the Fulbright-National Geographic Award Program's focus areas and demonstrates a commitment to advancing knowledge, addressing critical challenges, and inspiring positive transformations. The interdisciplinary nature of the project and the inclusion of local collaborators emphasize its potential impact on both scientific and community levels.

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I. Project Information

Title of Project: Unraveling the Neurobiological Landscape of Schizophrenia: A Multidisciplinary Approach Informed by Numbers, Shapes, and Prediction

Brief Project Summary: This project aims to explore the intricate nature of schizophrenia through a rigorous scientific method, integrating the foundational elements of Numbers, Shapes, and Prediction into our investigative framework. By delving into the neurobiological landscape of this complex mental disorder, we hope to contribute valuable insights that can inform advancements in neuroscience, public and global health, and biomedical data science.

Total Project Budget: $20,000.00

II. Project Leader Information

Team Members:

1. **Yahriel Salinas-Reyes (Project Leader):** With a background in Aerospace Engineering and a current pursuit of a Doctorate in Neuroscience, Yahriel brings a unique skill set,

including expertise in computational and data-enabled sciences, biomedical data science, and bioinformatics. His interdisciplinary approach aligns with the project's goals of integrating neuroscience with anthropology and engineering.

2. **Local Collaborator 1 (Neuroscientist):** A local neuroscientist specializing in schizophrenia research will bring essential expertise to understand the neurobiological aspects of the disorder within the local context.
3. **Local Collaborator 2 (Psychiatrist):** A local psychiatrist with experience in treating schizophrenia patients will provide valuable insights into the clinical aspects of the disorder.
4. **Local Collaborator 3 (Anthropologist):** An anthropologist will contribute to the project by providing a cultural perspective on the impact of schizophrenia within the community.

Media Commitments:

Currently, there are no existing media commitments for this project. We aim to collaborate with media outlets once the research progresses to significant milestones.

Unique Qualifications:

Yahriel's unique background in both aerospace engineering and neuroscience equips him with the precision and expertise required for the project. His ability to bridge the gap between disciplines aligns with the project's multidisciplinary approach.

Career Goals:

Over the next five years, Yahriel aims to establish himself as a leading researcher at the intersection of neuroscience, anthropology, and engineering. Receiving a grant from National Geographic will provide the resources and platform needed to achieve this goal by supporting groundbreaking research and fostering collaborations.

III. Project Details

Background:

Schizophrenia is a complex mental disorder with enduring enigma. This project seeks to unravel its intricacies through a comprehensive exploration of neurobiological factors. The multidisciplinary approach distinguishes this project from previous work, promising a holistic understanding.

Objectives:

1. Conduct a comprehensive molecular analysis of grapes to understand potential natural antidepressants.
2. Explore the neurobiological landscape of schizophrenia through Numbers, Shapes, and Prediction.
3. Uncover the impact of neuroplasticity in individuals with schizophrenia and its potential for cognitive remediation.

Methods:

The project will follow a two-phase framework: Understanding The Divided Self and Existential Despair, and Unraveling The Nature of Intelligence and Human Ingenuity. Advanced techniques in molecular biology and biotechnology systems engineering will be employed for the grape analysis. Neuroscientific methods and predictive modeling will guide the exploration of schizophrenia.

Communication and Engagement:

Stakeholders include local communities, professionals in the field, and the public. Engagement will be facilitated through workshops, seminars, and social media platforms. Links to project updates will be shared on dedicated websites and social media accounts.

Results and Impact:

Results include academic papers, data visualizations, and a comprehensive understanding of schizophrenia. The impact extends to behavior change, improved management of mental health, and increased public awareness.

Works Cited:

1. Zueva, M. V. (2015). Fractality of sensations and brain health. NeuroQuantology, 13(2), 163-180.
2. Laing, R. D. (1960). The Divided Self: An Existential Study in Sanity and Madness. Tavistock Publications.
3. Kuhn, T. S. (1962). The Structure of Scientific Revolutions. University of Chicago Press.

IV. Budget Details

NATGEOBUDGET:

{SubTotal: $18,350.00 Total: $20,000.00}

This proposal aims to bridge the gap between scientific disciplines, fostering a holistic understanding of schizophrenia while exploring the potential of natural antidepressants in grapes. The multidisciplinary team, led by Yahriel Salinas-Reyes, is well-equipped to undertake this groundbreaking research with the support of National Geographic Society's grant.