

PSYCHEDELIC BIOMEDICALIZATION
MAINSTREAMING A SCIENTIFIC REVOLUTION

by

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A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Sociology

Summer 2023

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ACKNOWLEDGMENTS

I am supremely grateful to everyone who has supported my research since I first developed an interest in sociology, the social dimensions of “drugs”, and psychedelics. This project would not have been possible without the several people who have encouraged me to follow my interests and provided invaluable feedback on my work at various stages. Thank you to Asia Friedman whose openness, patience, and close reading of my work has been vital to my development as a sociologist and the cultivation of the ideas that went into this project; Tammy Anderson for supporting and facilitating several experiences that have helped me grow as a researcher; Ann Bell whose feedback and assurance has been extremely motivating from the time I began my graduate studies; and Nancy Campbell for offering insightful feedback that inspires me to continually improve and sharpen my work. I am grateful to have had such an excellent dissertation committee help me see this project through.

Thank you to my friends and colleagues that have been supportive throughout my time in graduate school, including (but not limited to): Atieh Babakhani, Hannah Cortina, Madeline Stenger, Josh Stout, Jascha Wagner, and Megan Demarest. I am also appreciative of the Department of Sociology and Criminal Justice for providing the space, institutional support, and collegial atmosphere to complete this work. Additionally, throughout this research, I have had the pleasure to speak with several researchers who generously spent their time sharing their thoughts, experiences, and research. Thank you to all those who participated.

A special thank you to my partner Chelsea for her support and understanding throughout graduate school and the duration of this project especially. Of course, thank you to my mom for bringing me into this world and for your unwavering support. Finally, thanks to you—the reader—for giving this manuscript your time and Attention.

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ABSTRACT

Psychedelic drugs have again become the subject of numerous scientific and scholarly investigations with much attention given to their viability as treatments for an array of mental health conditions. This dissertation explores the emergence of psychedelic science as a scientific movement and how this movement has been shaped by contemporary biomedicine. Within this framework, I critically interrogate the idea that psychedelic science constitutes a paradigm shift in mental health treatment and delve into the knowledge produced in this budding field with specific attention to explanatory mechanisms for psychedelics therapeutic effects, such as neuroplasticity. I draw on in-depth interviews with 56 psychedelic researchers from across the United States, participant observation of psychedelic conferences and virtual events, popular media and the academic literature on psychedelics. I describe the formation of the movement, the qualities of psychedelic-assisted psychotherapy that contribute to the premise that psychedelic science is a paradigm shift, and the diverse array of contributors to the movement. I outline the ways in which psychedelic science has been shaped by processes of biomedicalization, as well as how these processes have influenced scientific production in the field. Specifically, I focus on how biomedicine has influenced mechanistic explanations for psychedelics with a particular emphasis on their purported neuroplastic effects in the brain. I show how such neuroreductionism in psychedelic science has been identified as an issue among several researchers I spoke to and is entangled with financial commitments and

incentives to garner support for research. The issues associated with the influence of biomedicine on psychedelics science have contributed to conflict within the field over theoretical issues pertaining to the therapeutic relevance of psychedelics subjective effects, as well as how the movement should progress in the face of financial interests and attempts to conform psychedelic therapies to the logic of pharmaceutical treatment. I conclude by making a theoretical case for the relevance of the subjective point of view and social-environmental phenomena in shaping psychedelics therapeutic effects. I argue that the psychedelic science movement can retain its revolutionary character by recentering the “person” when attempting administer psychedelics and evaluate therapeutic effects. This will require a recognition of the fundamental interrelationship between the social-environment, subjective experience, and the neurobiological effects of psychedelic drugs and a commitment to rigorous, ethical, and equitable research practices.

Chapter 1

A REVOLUTIONARY PROMISE

When a discipline is in crisis, attempts are made to change or supplement its theses within the terms of its basic framework a procedure one might call 'Ptolemization' (since when data poured in which clashed with Ptolemy's earth-centred astronomy, his partisans introduced additional complications to account for the anomalies). But the true 'Copernican' revolution takes place when, instead of just adding complications and changing minor premises, the basic framework itself undergoes a transformation. So, when we are dealing with a self-professed 'scientific revolution', the question to ask is always: is this truly a Copernican revolution, or merely a Ptolemization of the old paradigm?

(Slavoj Žižek 2008:iix)

Introduction

Less than two months into President Joe Biden's term, the White House unveiled a comprehensive plan to address the nation's "unprecedented" mental health crisis.¹ Citing widespread anxiety and depression, worsening youth mental health, racial

¹ <https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/01/fact-sheet-president-biden-to-announce-strategy-to-address-our-national-mental-health-crisis-as-part-of-unity-agenda-in-his-first-state-of-the-union/>

inequalities in access to mental health treatment, and the unclear impact of digital technology on mental health, the plan seeks to fortify mental healthcare systems to match the breadth of the crisis, expand access to mental health services, support research to better understand mental health issues and develop new treatments, and create “healthy environments” conducive to mental health. On the heels of this announcement, the American Psychiatric Association (APA) issued its own statement in support of the plan—particularly the portions that support training for clinicians and improvements to service delivery. The chief executive officer and medical director of the APA, Saul Levin, was optimistic that this plan could “help psychiatrists and our partners and communities heal our nation.” But is psychiatry up to the task?

As the nation’s mental health crisis has apparently worsened, psychiatry itself has displayed characteristics of a field in crisis (Rose 2016a). In the face of scientific skepticism and a dearth of public trust (Bender 2007; Gallup Inc 2023), psychiatry has attempted to solidify its status as a legitimate medical specialty on the basis of a (neuro)scientific approach to treating illnesses and diseases of the brain (Insel and Quirion 2005; Kendler 2019). Yet, psychiatry’s diagnostic practices, explanations, and treatments for mental health issues, which have been conceived largely in terms of the brain, have failed to deliver according to philosophers, social scientists, and even psychiatrists (Fuchs 2011a; Kirmayer and Gold 2011; Moncrieff 2008b; Pilgrim 2007; Rose 2016a). Fundamental questions pertaining to psychiatric nosology (the classification) and etiology (the origins) of mental disorders abound (Pilgrim 2007, 2014). Critics maintain that labels such as “depression” do not offer much insight into

prognosis nor are they clearly distinguishable from other forms of mental distress in the way we should expect from medical diagnoses (Pilgrim 2014). Moreover, neuroscientific research has still yet to identify any clinically useful biomarkers for any mental health disorder, and there is little evidence that the *Diagnostic and Statistical Manual* has improved after five iterations (Kirmayer and Gold 2011; Pilgrim 2014; Ramos 2022; Rose 2016a).

Psychiatry's most prominent (neuro)biological explanations, such as the serotonin theory of depression, have been refuted, abandoned, or in the best case unproven (Moncrieff et al. 2022; Rose 2016a). Yet, the pharmaceutical treatments that in many cases *informed* rather than followed the construction of neurobiological explanations for mental disorders are widely prescribed despite questionable efficacy and undesirable effects (Ang, Horowitz, and Moncrieff 2022; Martin 2006; Moncrieff 2008a, 2009, 2014; Rose 2003). Meanwhile, despite the growth of knowledge about the brain, the development of new pharmaceutical treatments that improve upon the efficacy of 20th century drugs has notably stalled (Hyman 2012; Miller 2010; O'Brien et al. 2014; Scannell et al. 2012). Overall, knowledge about the brain has ultimately done little to improve psychiatry (Choudhury, Nagel, and Slaby 2009; Fuchs 2011a; Hart 2017; Kirmayer and Gold 2011; Pilgrim 2014; Ramos 2022; Rose 2016a), let alone curb the incidence of ailments such as depression, anxiety, and addiction.

Owing to all of this, the field of psychiatry has consistently been under fire because the profession has not demonstrated an ability to adequately explain *or* solve the problems it claims authority over—an ability which is core to its claim to

professional authority in the first place (Friedson 1970). The inability to explain phenomena or solve problems is essential to the occurrence of scientific and political crises. As Thomas Kuhn (2012 [1962]:93) has previously suggested in his pivotal work on scientific progress, “in both political and scientific development the sense of malfunction that can lead to crisis is prerequisite to revolution.” In other words, crises present an opportunity for competing explanations and practical innovations in technology, policy, and social organization that can revolutionize our worldview and how we do things at the scale of individuals and societies. Due to Kuhn’s (2012) influence, these revolutions are popularly known as “paradigm shifts”. The object of this dissertation is to explore a revolutionary movement that has been touted as a possible paradigm shift and summarily gained currency as a viable remedy to the current crisis in psychiatry—namely, the psychedelic science movement. This is not a comprehensive history of psychedelic science or psychedelic psychiatry, although certain genealogical themes will be addressed. Others in the field have done much work on the historical front already (Giffort 2020; Hartogsohn 2020; Langlitz 2013). Instead, I explore what supposedly makes this movement revolutionary, how it has achieved scientific, medical, and public legitimacy, as well as whether it can retain its revolutionary potential to change how we view and treat mental health.

As may already be apparent in the summary of psychiatry’s crisis, Kuhn’s analogy between political and scientific revolutions is based on an artificial distinction between science and politics. Of course, science does not exist apart from society and is not untouched by politics (Jasanoff 2004). Science and its products cannot be

separated from the influence of culture, politics, power, and social structure. Drugs are among the most politicized issues of science (Reasons 1974), aside from obvious cases where science and technology are applied for the purposes of military, law-enforcement, or surveillance. Thus, the analysis I present in the following pages deals with sociopolitical issues as much as it deals with science and medicine. For instance, one piece of psychiatry's crisis of legitimacy not previously mentioned stems from the financial conflicts of interest within the field, which have been associated with the construction of the DSM (Cosgrove and Krimsky 2012; Pilecki, Clegg, and McKay 2011), clinical drug trials (Perlis et al. 2005), the promotion of off-label prescribing of pharmaceutical drugs (Kesselheim et al. 2012; Kesselheim, Mello, and Studdert 2011), and campaigns to create public awareness for specific ailments (Conrad and Leiter 2004; Moncrieff 2009).

In general, these relationships are part of a process of consolidating medical authority over the definition and treatment of behaviors labelled "illnesses" referred to as *medicalization* (Clarke et al. 2009; Conrad 2005; Zola 1972). Since the time when medicalization theory was originally adopted as a response to the growth of pharmaceutical development, the field of medicine has undergone several changes owing to advancements in science and technology, especially in the neurosciences and genetics, which have been lumped under the banner of *biomedicalization* (Clarke et al. 2009). In turn, I apply the lens of biomedicalization to understand how the cultural acceptance of psychedelics and the production of knowledge in psychedelic science intersects with political-economic, cultural, and broader trends in biomedical science

that have contributed to the shift from medicine to biomedicine. Before delving further into psychedelic biomedicalization and its relation to my aims, however, it is necessary to be clear about how I am conceptualizing my object of study, psychedelic science, as a scientific movement.

Psychedelic Science as a Scientific and Intellectual Movement

There are two conventions typically encountered when reading introductory remarks about psychedelics and what is sometimes referred to as the “psychedelic renaissance”. First, the term “psychedelic” was coined by Humphrey Osmond, who first introduced the term in 1956 in a letter written to Aldous Huxley. Osmond used the term to evoke the “mind-manifesting” character of experiences with these substances. In general, the “classic psychedelics” include naturally occurring and synthetic substances such as lysergic acid diethylamide (LSD), dimethyltryptamine (DMT), psilocybin, mescaline, psilocybin containing mushrooms, peyote, San Pedro, and ayahuasca. For convenience’s sake, substances such as MDMA (i.e. ecstasy or molly), ketamine, ibogaine, and iboga are often lumped into the general category of psychedelics, although their chemical structure, pharmacological, and phenomenological characteristics do not neatly group together with the rest of the substances. I mostly refer to classic psychedelics throughout this dissertation when discussing specific pharmacological, phenomenological, or social-psychological topics. I make an effort to specify relevant substances where appropriate. However, when making broader claims about psychedelic science, it can be assumed that it

includes research and social action pertaining to the wider notions of psychedelics that include substances such as MDMA, ibogaine, and ketamine due to the way the scientific research and researchers have grouped them together under the banner of “psychedelic science.”

The second convention usually encountered in introductory remarks about psychedelics is an ode to the fact that many of these substances have a history of human use going back thousands of years (Carod-Artal 2015; El-Seedi et al. 2005; Grinspoon and Bakalar 1983; Miller 2014). This reference to the historical legacy of psychedelic use can be seen, in part, as a gesture at the absurdity of United States prohibition, as well as an attempt to legitimize inquiry into a generally stigmatized class of “drugs”. Indeed, prohibition of psychedelics is currently on its heels and there are signs that public perception of psychedelics is becoming more accepting. Lawmakers across the nation have taken action to deprioritize law enforcement of and reduce penalties for possession of psychedelics, to facilitate medical research on psychedelics through policy changes and scientific working groups, and, in Oregon and Colorado, to establish institutional supports to facilitate legal access to psychedelics (Jefferies 2022; Psychedelic Alpha 2023). At the time of writing, there are 18 states with active legislation to decriminalize psychedelics or facilitate research and clinical trial participation. The culture also appears to be more accepting, as public figures, including athletes, actors, and foreign royalty, have openly discussed their psychedelic use (Guerrasio 2021; Kliegman 2022; Smith 2023). Survey studies also suggest more Americans are using psychedelics (Killion et al. 2021; Livne et al. 2022;

Yockey and King 2021; Yockey, Vidourek, and King 2020). These changes can in large part be explained by the impact of psychedelic research.

Since the 1990s researchers have been working to (re)establish the study of psychedelics and their potential therapeutic applications as a legitimate field of inquiry (Giffort 2020; Langlitz 2013). The field can be generally described as interdisciplinary with contributions from anthropology, psychology, neuroscience, philosophy, and religious studies among others. Still, much of the research contributing to this effort has focused on exploring the potential role psychedelics have to play in addressing conditions medicine has not been effective in treating. For example, preliminary evidence indicates that psychedelics may be effective in treating depression (Agin-Liebes and Davis 2021; Doss et al. 2021a; Griffiths et al. 2016), post-traumatic stress (Cavarra et al. 2022; Mithoefer et al. 2019), substance use disorder (Bogenschutz et al. 2022; Bogenschutz and Johnson 2016; Johnson, Garcia-Romeu, and Griffiths 2017), obsessive-compulsive disorder (Ehrmann, Allen, and Moreno 2021), and anxiety (Gasser, Kirchner, and Passie 2015; Griffiths et al. 2016). Beyond this, psychedelics have either been proposed or are actively being investigated for traumatic brain injury (Khan et al. 2021), Parkinson's disease (Saeger and Olson 2022), Alzheimer's disease (Garcia-Romeu et al. 2021), headache disorders (Schindler 2022), eating disorders (Gukasyan et al. 2022), and criminal behaviors (Hendricks et al. 2018; Jones and Nock 2022; for critical review see Neitzke-Spruill 2022)—to name a few. Several population studies indicate that even naturalistic psychedelic use is not associated with mental health issues (Krebs and Johansen 2013) and may have protective effects

against problems like opioid abuse, suicidal behavior, and mental distress (Hendricks et al. 2015; Johansen and Krebs 2015; Pisano et al. 2017). The broad applicability, encouraging results from early trials, and signs of support from regulatory agencies and legislators have led many to suggest that the rapid expansion of psychedelic science constitutes a “paradigm shift” in psychiatry or even medicine generally (Nichols, Johnson, and Nichols 2017; Pilecki et al. 2021; Schenberg 2018; Tupper et al. 2015).

In line with such suggestions, I have chosen to conceptualize this emerging field of research as a scientific movement. Scientific/intellectual movements (SIMs) refer to programs of research characterized by contentious, and therefore political, knowledge practices geared toward enacting advancements in scientific knowledge through collective action and distribution of ideas (Frickel and Gross 2005). By invoking SIM theory to study the psychedelic science movement, I am making an explicit link to an approach to the sociology of scientific knowledge that was invigorated by Kuhn’s work on revolutionary movements in science. However, SIM theory goes beyond Kuhn’s suggestion that scientific knowledge progresses through competition between groups of scientists with differing worldviews to conceive of scientific change using insights from social movements theory (Frickel and Gross 2005). SIMs display many parallels to other types of social movements, and the concept of SIMs itself is explicitly built upon social-movements theory. Indeed, Frickel and Gross (2005:206) aim to move beyond a treatment of SIMs and social movements as “analogous” and instead treat common features of social movements

such as “grievances, opportunity structures, micromobilization contexts, and collective action framing” as fundamental to scientific movements as well. In line with and building upon social movement theory more generally, SIM theory is specifically attuned to questions relating to the conditions under which scientific movements attract a following, gain acceptance and esteem, and succeed in achieving some level of stability. Along these lines, part of my aim here is to demonstrate how psychedelic science loosely fits the criteria of a SIM, as well as explore how the field has developed in pursuit of routinization and stability.

Of course, as with other SIMs, there exists both an internal and external orientation in psychedelic science. Actors work to achieve status and recognition within the field to earn the opportunity to help shape its direction, as well as leverage status and prestige to help the field progress in its pursuit of broader legitimacy. Thus, my exploration of the field will cover competition within the movement over definitions of the movement’s identity. I assume that science and SIMs are fundamentally political enterprises that cannot be separated from the influence of culture, politics, power, and social structure. The scientific knowledge-practices of SIMs are embedded within social, political, cultural context contexts that shape and are shaped by the movement through their interactions.

In other words, SIMs are engaged in a *co-productive* relationship with the conditions under which they emerge (Jasanoff 2004). In short, the idea of coproduction acknowledges the mutual constitution of “natural” and social orders as science shapes and is shaped by other fields of cultural production, including

institutions of the state. With this in mind, Jasanoff (2004:21) maintains that with the lens of co-production, “there cannot be a proper history of scientific things independent of power and culture.” As a result, my exploration of how the psychedelic science movement has progressed will interrogate *how* culture and politics have influenced the movement’s progression. This entails inquiry into how cultural and politics have shaped the movement overall, as well as how they have more directly affected the production of knowledge. This dual focus is necessary, since investigating “science as an historical and social enterprise also demands that analysts be curious about its findings” (Shapin 1995:298).

Knowledge forwarded by SIMs can be highly contentious/politicized due to the potential to radically alter social practices (Frickel and Gross 2005). According to Frickel and Gross, a SIM’s success is linked to the ability to frame its ideas in language that appeals to broad audiences. Along the lines, integration of a SIM’s knowledge practices into the dominant paradigm may be sought both by actors within the movement, as well as those who may view the movement’s ideas in a threatening light. As Kuhn (2012:78) suggested, the institutionalized responses to emerging competitive paradigms is to “devise numerous articulations and *ad hoc* modifications of their theory in order to eliminate any apparent conflict.” The shock of challenging ideas forwarded by an SIM can be absorbed through minor changes to the hegemonic paradigm. SIMs may also strategically conform to prevailing knowledge practices. Scientific movements and the knowledge they produce may take the shape of familiar scientific, political, or economic trends in an attempt to gain acceptance and the

necessary resources for stabilization (Frickel and Gross 2005). However, this bargain may compromise the potential for SIMs to achieve the radical changes they have pursued. As the radical implications of knowledge practices are lessened and the disruptive identity is forced to reorient towards ordinary scientific practice, the potential for an SIM to instigate change may be lessened.

To better understand whether psychedelic science stands to revolutionize mental health treatment, psychiatry, medicine generally, or society at large, this study explores the psychedelics science by exploring how psychedelic researchers' conceive of their work in relation to the broader movement of psychedelic research. Using interviews with scholars from an array of disciplines, I explore psychedelic researchers' perspectives on the significance of psychedelic science, how they engage in psychedelic research and the importance of their work, and their thoughts about cornerstone issues in the field such as the importance of psychedelics' psychoactive effects, for example. I also use researchers' viewpoints as a starting point to dig into the science itself and uncover how the psychedelic science movement both challenges and leverages prevailing notions of mental health. Specifically, I apply biomedicalization as a conceptual framework to characterize the broader political, economic, and scientific trends with which the movement has navigated in its pursuit of a psychedelic revolution.

Biomedicalization, the Brain, and Psychedelic Science

Constructionist at its core, medicalization scholarship began as an effort to describe the social processes by which the medical field, as an institution of social control, grew its jurisdiction (Conrad 2005). Historically, the concept of medicalization originated as critical response to the growth of psychiatry, the growing use of pharmaceutical drugs stemming from the “psychopharmacological revolution”, and the general expansion of the medical field’s authority and influence in social life (e.g. Zola 1972). Conrad (2005) points to three main factors contributing to medicalization emphasized by these early studies: 1) the professional authority of medicine and expansion of medical jurisdiction to an increasing number of ailments; 2) the contribution of activist movements to the medicalization of particular ailments; and 3) professional, organizational actions that facilitate medicalization. In its most basic sense, medicalization concerns the (re)definition of individual and social problems in specialized medical language and the use medical interventions or techniques to deal with those problems. This ongoing process is manifest in the historical construction of several of the mental health issues used as illustrations of psychiatry’s shortcomings in the opening paragraphs of this dissertation. For example, depression (Moncrieff 2007), attention-deficit hyperactivity disorder (Conrad 2005; Moncrieff and Timimi 2011), addiction (Campbell 2007, 2012; Conrad and Mackie 2011; Hammersley and Reid 2002; Vrecko 2016), and post traumatic stress (Condiotte 2021; Lovrod 2011; Summerfield 2001) have all been the subjects of considerable social efforts to construct these conditions as medical illnesses.

Beginning the in the 1980s, several changes to the field of medicine mark what Clark et al. (2003) describe as a movement from medicalization, based primarily on the establishment of professional authority, to biomedicalization, which encompasses five key processes contributing the emergence of contemporary biomedicine. Specifically, biomedicalization entails: 1) (bio)political-economic processes focused on *health* in addition to illness, death and dying; 2) changes in the production and distribution of biomedical knowledge, among these being decentralized access to biomedical knowledge and the origination of novel interventions in consumer movements; 3) the increasing relevance of and dependence upon science and technology, such as neuroimaging technology ; 4) growth in focus on issues relating to health, enhancement, risk, and surveillance; and 5) a transformative orientation toward the human body using new technoscientific tools and methods (Clarke et al. 2003). While Conrad has critiqued this conceptualization as overly general in its attempt to be comprehensive (Conrad 2005), biomedicalization theory has several advantages for understanding the general influence of technological and scientific advancements on contemporary medicine, as well as for making sense of the psychedelic science movement and the production of knowledge about psychedelics.

First, although it has become fairly commonplace to refer to the “medicalization of psychedelics”, I have found this suggestion to be an imprecise usage of the concept. Psychedelics or even psychedelic use are not problems being redefined as a medical issue requiring medical intervention in an analogous process to depression or addiction. While psychedelics *are* being redefined to fall within the

purview of medical experts, this is not because these substances and the people who use them have been identified as a problem for medicine to solve. Rather, psychedelics are being adopted as treatments for several problems that have been medicalized in the first place. In light of this, I find biomedicalization much more conducive to making sense of the scientific and medical interest in psychedelics because, in line with the growing importance of technoscientific innovations in biomedicine, psychedelics are being used as tools or technologies for changing the body. Conceived in this way, biomedicalization is useful for analyzing the SIM emerging around the production of knowledge about and implementation of these technologies and specifically how knowledge about psychedelics is being shaped by the five key processes of biomedicalization just described.

Another advantage of biomedicalization theory is the shift in focus from basic treatment of conditions to a technoscientific transformation bodies to alleviate illness and optimize health, which is rooted in Foucault's concepts of biopolitics and biopower (Clarke et al. 2003, 2009). Originating from Foucault's (1990) *The History of Sexuality*, biopolitics concerns control over both the individual via management or "disciplining" of the body and the population or group via epidemiological surveys, regulations, and other interventions aimed at optimizing public health. While these interrelated modes of *biopower* have been central to a variety social institutions and practices (Foucault 1990), the growth of the biomedical sector has meant that these forms of control have become increasingly conceived in medical terms. At the same time, since the mid-20th century several developments in technology and the sciences

have contributed to an epistemic shift from the traditional “clinical” gaze to the “molecular” gaze of contemporary biomedicine aided by new technologies for observing the body. Most notably for my present aims of understanding psychedelic biomedicalization, the formation of neuroscience beginning in the 1960s helped constitute the brain as a medium for biopower owing to the field’s advent of what Abi-Rached and Rose (2010) call a “neuromolecular gaze”—a perspective which effectively reduces “mind” to the material processes occurring at the level of neurobiology. Taken together, the rise in neuroscientific approaches to the human mind and knowledge about the brain’s malleability has corresponded to a relative “step-change” in our ability—or the perception of our ability—to modify and intervene in human biology (Pitts-Taylor 2010; Rose 2007; Rose and Abi-Rached 2013). Put simply, the idea that because we can *know* about the fundamental (molecular) constituents of human (neuro)biology we can also act to manipulate them is directly implicated in the transformative orientation characteristic of biomedicalization. This idea has directly influenced several technoscientific endeavors (i.e. the Human Genome Project), and I suggest that the psychedelic science movement is becoming another one.

As previously mentioned, biomedicalization is specifically attuned to the intersection of science, medicine and biopolitical issues (Clarke et al. 2003). Because biomedical innovations are deeply entangled with broader political, economic, and power dynamics, the processes of biomedicalization are not uniformly applied, accepted, or available. In other words, biomedicalization is not uniform, and its

impacts may not extend evenly across social groups. The processes and resulting products of biomedicalization are often unevenly distributed—what is known as stratified biomedicalization. Stratified biomedicalization often exacerbates existing disparities in health, since novel medical techniques are oftentimes experimental, expensive, and as such may be inaccessible to those who are lacking even basic health care (Clarke et al. 2003).

While the influence of biomedicalization is far-reaching, biomedical developments are not always accepted and may be the subject of countertrends or movements resisting the creep of biomedicine. For instance, despite the considerable advancements in knowledge about the brain, the idea that conscious experience originates solely from neurochemical “events” in the brain has become a source of contention for many in the human sciences (Farah 2007; Pitts-Taylor 2016; Rose and Abi-Rached 2013). The grounding of consciousness in material process of the human body has presented a challenge for disciplines oriented around sociocultural phenomena, leading to a variety of critiques of neuroscience or attempts to revise, refute, or reinterpret existing theories in light of neuroscientific findings (Brekhus and Ignatow 2019; Cerulo 2010; Lizardo et al. 2019; Pitts-Taylor 2012, 2014) Much of the agitation about neuroscientific research stems from the perceived absence of social and cultural phenomena from popular and scientific accounts of human life (Pitts-Taylor 2012). New technologies for manipulating the material underpinnings of human consciousness and embodiment have additionally raised “neuroethical” concerns that an increasingly mechanistic view of the “human” may threaten the

sanctity of life (Farah 2007; Kompridis 2009; Rabinow 1999; Rose 2009), as well as present a new domain for the manifestation of inequalities (Pitts-Taylor 2019; Rabinow 1999). Biomedicalization helps make sense of how brain has turned into a political battleground over the validity of certain forms of knowledge and how best to handle social problems—referred to as biopolitics, neuropolitics, or more generally the “politics of life” (Rose 2009).

As the psychedelic science movement has received public and institutional legitimacy through neuroscientific research (Giffort 2020; Langlitz 2013), the biomedicalization of the field has increasingly constituted psychedelics as neurotechnologies to treat mental health disorders and improve health, which has attracted considerable attention investment to the field. In turn, the field has similarly become a domain for neuropolitical skirmishes that center on the types of knowledge are relevant and the distorting influence of outside investments. A psychedelic bioethics has begun to emerge around the practical issues of psychedelic medicines (Anderson, Danforth, and Grob 2020; Jacobs, Yaden, and Earp 2023; Langlitz et al. 2021; Smith and Sisti 2021), and critical scholars have raised flags about the influence of capital investment in the field (Devenot, Conner, and Doyle 2022; Pace and Devenot 2021; Plesa and Petranker 2022; Tvorun-Dunn 2022). Additionally, the progress of the psychedelic science movement has brought core scientific disputes to light, as the study and implementation of psychedelics is adapted to the standards, regulations, and imperatives of biomedicine. Along these lines, using biomedicalization theory as a conceptual framework, I explore the influence of

culture, politics, and economics of contemporary biomedicine on the production of knowledge in the psychedelic science movement, as well as how this influence has contributed to conflicts over the movement's identity and direction.

By viewing psychedelic science as a SIM and exploring how its practices have been influenced by biomedicalization, my primary aim is to answer the following question. How does the psychedelic science movement challenge existing biomedical knowledge? Relatedly, I seek to understand whether the psychedelic science movement can retain its apparently revolutionary character in the face of pressures to adapt to mainstream knowledge by attending to internal conflicts that have emerged in the course of the movement's progression. In doing so, I hope to extend the literature on SIMs, as well as biomedicalization. Beyond this, my secondary aim is to make a theoretical contribution to psychedelic science itself by leveraging sociological understandings of cognition and drug effects. Throughout my analysis, I also take a "critical neuroscience" approach to the psychedelic science movement, which is useful for countering neurocentric approaches to psychedelics and reaffirming the importance of sociocultural phenomena (Choudhury, Nagel, & Slaby 2009; Devenot 2011; Langlitz 2011). Specifically, I attempt to answer the question: how do psychedelics advance a more holistic understanding of the relationship between brain, mind, and society? By answering this question, I hope to begin bridging the social scientific/humanistic and medical-scientific factions of psychedelic research by advancing a *biocultural* understanding of set and setting. I bring together theories of embodied cognition (e.g. Gallagher 2018; Fuchs 2020; Varela, Thompson, & Rosch

1991) and “set and setting” in order to theorize the involvement of phenomena occurring at multiple levels of analysis (i.e. social, cognitive, and biological) in mechanisms of psychedelic-assisted change.

In the next section, I describe my data sources, as well as how I will be using the data I have collected. I also outline the basic characteristics of my sample of psychedelic researchers. As someone who has researched psychedelics and is engaged in the field of psychedelic science, I also make remarks about how this perspective has influenced my aims for this dissertation, as well as supplemented my observations and analysis.

Data, Methods, and My Participation in Psychedelic Science

To investigate the psychedelic science movement, I have drawn on several forms of data gathered with the intent of drawing the fullest picture of the field I possibly could. My primary method of data collection was semi-structured interviews with researchers who have published research on psychedelics in the past or who are currently actively engaged in psychedelic research. I recruited researchers from different disciplines within the broader field of “psychedelic science”, including researchers with backgrounds in neuroscience, medicine/psychiatry, psychology, social work, counseling, anthropology, and religious studies. I intentionally sampled researchers from a diverse range of disciplinary backgrounds and specialties to serve as a “panel of informants” in the psychedelic science movement (Weiss 1994). Moreover, I sampled scholars who are at various points in their career development. For instance, I

sought out those who have been central players in the foundation of psychedelic research centers, as well as psychedelic science “veterans” who are hold-outs from the “first wave” of psychedelic research that occurred in the 20th century. At the other end of the spectrum, I reached out to those who are in the early stages of their careers (i.e. professors, post-doctoral researchers, and graduate students). Sampling researchers at various points in their careers provides access to the perspectives of those who helped the field grow, as well as to understand what newcomers and trainees see as making psychedelic research a worthwhile pursuit. Moreover, talking to researchers from diverse disciplinary backgrounds provides insight into the breadth of the movement and the significance of its interdisciplinary nature.

I identified participants in two ways. First, through my interaction with and participation in the field of “psychedelic studies”, I have made connections with researchers within the field including one who served as a key informant to begin a snowball sample. I met this key informant after they had read a paper I had written about “set and setting” and reached out via email to connect. After a few conversations, they agreed to be my first participant and pass along my recruitment materials to other colleagues in psychedelic groups they worked with. Second, I looked to the editorial boards of drugs journals, non-profit research organizations, faculty affiliated with drug research centers at universities in the United States, and authors that I identified through literature searches. I limited this search to those actively engaged in research projects or who are members of organizations geared toward the study of psychedelics. The overwhelming majority of my participants

(N=51) were identified through this search process rather than the snowball sample. In total, I conducted interviews with 56 psychedelic researchers from July 2021 to February 2022. Interviews ranged from 35 to 105 minutes. This project was determined to be exempt from federal human subjects protection policy by the University of Delaware's Institutional Review Board (see Appendix A). Participants' identities and information remained confidential throughout data collection and reporting through the use of pseudonyms except where participants indicated that they wish to be quoted by name.

Table 1 provides a basic demographic breakdown of my sample. Most of the researchers I interviewed held professorships (N=37), while a smaller number held post-doctoral positions (N=13) or were in graduate school (N=6). Participants were from a wide range of disciplines with diverse specialties. However, these specialties and disciplines clustered in four broader groupings. The largest group of researchers belong to the social sciences and humanities (N=18)—a group comprised of research psychologists, transpersonal psychologists, anthropologists, religious studies scholars, and scholars in other humanities. A second cluster, biomedical researchers (N=17) included scholars who focus on neuroscience, pharmacology, medicinal chemistry, molecular biology or related subfields. Clinical psychologists were the third largest group (N=11), and psychiatrists and medical professionals with other specialties were the smallest group.

Table 1 Characteristics of a sample of Psychedelic Researchers

	Professors	Post-doctoral scholars	Graduate Students	Total
Biomedical Sciences	10	6	1	17
Clinical Psychology	6	4	1	11
Psychiatry and Other Medical Specialties	9	1	0	10
Social Sciences and Humanities	12	2	4	18
Total	37	13	6	56

Interviews loosely followed a guide (Appendix B) that included questions about participants' background and how they got involved with psychedelic research, questions about their specific research focus and unique considerations associated with studying psychedelics, questions about prominent topics in the field, as well as questions about the social implications of psychedelic research. During interviews, I tailored questions about research practices to the participant's specific background and specialty. For instance, if speaking to a neuroscientist, I asked more specific questions about neuroimaging, the translational relevance of animal models, or how they perceive the brain's role in psychedelics therapeutic mechanisms. When speaking to clinical psychologists who administered psychedelics in the context of clinical trials, I asked more specific questions about how they prepare participants for their psychedelic sessions, dosing sessions, and integration following the acute experience.

Interviews were conducted using Zoom video conferencing software. Transcripts were generated using Zoom's automatic transcription software, cleaned, and thematically coded using NVivo12 (Braun and Clarke 2021; Hsieh and Shannon 2005). I used indirect and direct coding strategies over two rounds, beginning with indirect or open coding and followed by coding that was directed or theoretically driven. Participants provided written informed consent, which included indicating whether they would like to be identified in the analysis. If they chose to remain identifiable, when presenting data quotes I include their name, affiliation, and other relevant information when applicable. In all other cases, I use pseudonyms and only report disciplinary background to preserve confidentiality. Since the field is still relatively small despite its growth, I am forced in some cases to use non-specific disciplinary references like "humanities" or "social sciences" to preserve confidentiality.

In addition to interview data, I collected several other forms of information to capture trends and new developments in the movement. I engaged as a participant observer in webinars, workshops, and psychedelic conferences to gain more insight into the concerns of the field and its trajectory, as well as to access to gain access to the perspectives of researchers I otherwise could not recruit for interviews. Specifically, I attended two conferences in person: Horizons Perspectives on Psychedelics in 2021 and Psychedemia in 2022. Additionally, I tuned into several webinars and online talks related to psychedelics, such as Introducing POPLAR: The Future of Psychedelics Law and Regulation in 2021, the National Institutes of Health

webinar titled *Psychedelics as Therapeutics: Gaps, Challenges and Opportunities*, Horizons Northwest 2022, and Porta Sophia's *Indigenous Knowledge & Patent Law Roundtable*. In total, I attended or tuned into 7 psychedelic events from October 2021 to August 2022.

For these events, I jotted field notes during presentations. If events were hosted online or offered digital recordings, I accessed these transcripts and coded them along with my interviews. When reporting quotes from these events, I explain the context in which the quote was delivered. I have also been steeped in the scientific literature to attempt to keep pace with currents in the field, although the rapid growth of the field has made this challenging. Where relevant I also draw on popular media and public broadcasts about psychedelic science to provide a sense of how scientists and media jointly portray the movement.

Throughout the analysis, I use the data from the interviews and other sources to illustrate key trends in the contributions of various disciplines, trends in the knowledge practices of psychedelic science, as well as the manifestation of various (conflicting) styles of thought within the movements (Fleck 2012; Zerubavel 1999). My analysis is carried out in the spirit of Burawoy's "extended case method." The extended case method works to "extend" the observer to the participant, "extend" observations over time and space, "extend" out from local processes to social force, and finally to "extend" theory. In this way, I use data quotes to move between theorized phenomena pertaining to SIMs and biomedicalization, the practices of researchers I interviewed, and the experiences of psychedelic participants, ultimately

seeking to develop arguments that extend theory pertaining to biomedicalization, SIMs, the social implications of neuroscience, and set and setting theory.

In one sense, the interview quotes I provide are researchers' constructions of their scientific selves, the field they work in, their scientific and philosophic commitments, interpretations of existing research, as well as their views about "psychedelic science" in general. While this interview data amounts to socially constructed narratives, these narratives reflect the social reality of psychedelic science, the knowledge it has produced about psychedelics, as well as how researchers and other social actors think and behave in light of said knowledge. In turn, I use these data as illustrations of broader trends to draw attention to specific issues and perspectives that exist within the field. I do not take researchers' claims as statements of fact, but I do leverage these data both to interrogate prominent issues associated with psychedelic science and serve as examples of biomedicalization.

As mentioned previously, I apply a critical neuroscience approach to the psychedelic science movement, which examines both the science of psychedelics and the social conditions shaping its formation, in an attempt to engage in reflexive critique of the field. I generally follow the view of reflexivity put forth by Bourdieu, which maintains that through reflexivity, "it is not the individual unconscious of the researcher but the epistemological unconscious of his discipline that must be unearthed" (Bourdieu and Wacquant 1992:41). This means subjecting to critical analysis the various modes of objectification that constitute the social scientific gaze. Moreover, in this view, the project of reflexivity is conducted through the public

debate and discourse within the scientific field (Bourdieu and Wacquant 1992:40-41). As it pertains to the interdisciplinary field psychedelic studies, I maintain that it is up to those who may be at the peripheries (i.e. not involved in the direct administration of psychedelics) to initiate these debates and dialogues in order to ensure that the relevant issues are addressed. In turn, since I am a sociologist who also studies psychedelics, I aim to contribute to these reflexive dialogues through my research and publications.

As a sociologist, much of my prior research on the topic of drugs concerns the influence of sociocultural phenomena on drug experience. I have found the concepts “set and setting”, which originated in the psychedelic science of the 1960s, to be particularly useful for framing this work. Set and setting essentially refer to the extra-pharmacological phenomena that contribute to drug experiences and provide researchers with conceptual tools to represent a wide range of phenomena that shape subjective experiences with drugs in specific sociocultural contexts. Set refers to the internal conditions of the individual user, including acute and long-term qualities such as: mood, attitudes, personal history, personality, expectations, motivations for using, and beliefs about themselves and the use of drugs (Leary, Metzner, and Alpert 1967). Setting refers to the physical and sociocultural environment in which the drugs are being taken. These concepts have in large part guided my research and been the focus of my contributions to psychedelic science.

Over the course of my research, I have become increasingly dissatisfied by the prevalence of neuroreductionist approaches to drugs and mental health problems. Even in areas of drugs and mental health research that purport to value biopsychosocial

approaches, the “social” is frequently an afterthought (Pilgrim 2002). Thus, as the psychedelic science movement has been increasingly overcome by neuroscientific approaches to psychedelics, a major component of the scientific understanding that has made the movement “revolutionary” has been largely relegated to the social scientific discourse about psychedelics. Specifically, psychedelics’ effects on the brain have been prioritized at the expense of consideration of the role of subjective experiences of psychedelics, the meaning individuals attribute to it, and social-environmental context. Along these lines, I hope that by contributing to the field’s reflexivity, as well as by forwarding a biocultural approach to set and setting, I can help the psychedelic science movement avoid the pitfalls of neurocentric approaches to drugs and the brain so it can deliver on its revolutionary promise.

Roadmap for the Dissertation

The following chapters cover several topics related to the developments of the psychedelic science movement. Chapter 2 *Mainstreaming Psychedelics: The Legitimation of Biomedical Potential* explores the development of the psychedelic science movement. I use SIM theory as a lens to understand how the movement was formed in pursuit of legal approval to investigate psychedelics as medicines with the goal of overturning legal restrictions prohibiting their use and barring scientific research. I further explore how this movement purports to be a paradigm shift by drawing on researchers accounts of what makes psychedelic research important. Subsequently, the interdisciplinary nature of the movement is addressed. I outline

some of the relevant disciplines and foreshadow how the unique perspectives and aim of gaining approval of psychedelics for medical use has given rise to tensions within the psychedelic movement. The chapter concludes with a bird's eye view look at how the psychedelic science movement has been influenced by the five key processes associated with biomedicalization. I provide examples in the psychedelic movement, some of which are brought into focus in subsequent analyses in later chapters.

Chapter 3 *Agents of Plasticity* provides the first deep dive into how biomedicalization has shaped the science of psychedelics. Specifically, I outline how the transformative orientation of biomedicine and the technoscientific tools for observing molecular processes of life are manifest in neuroscientific investigations of psychedelics' therapeutic mechanisms. I focus on how psychedelics are being recast as neuro-technologies capable of instigating (neuroplastic) changes in the brain. Furthermore, I draw out how privileging of the brain in mechanistic discussions is representative of neuroreductionist tendencies within the field. Finally, I show how neuroreductionism in psychedelic science is entangled with the (bio)economic processes that generate "hype" around biomedical innovations.

In chapter 4 *The Neuropolitics of Psychedelic Transformation*, tensions within the movement are explored in greater detail. Specific attention is paid to disputes about the relevance of psychedelics subjective psychoactive effects, as well as the influence that financial interests have had on the movement. For both issues, I draw on participants' accounts to illustrate how the psychedelic science movement has been influenced by biomedicalizing processes, which have become a significant source of

conflict over the identity of the movement. Additionally, building on the understanding of psychedelic-facilitated plasticity developed in Chapter 3, I use these conflicts as a case to shed light on a debate about the theoretical and political significance of neuroplasticity by exploring the case psychedelic microdosing.

Following these chapters, which primarily draw on my participants accounts, Chapter 5 *Embodying Psychedelic Plasticity* makes a theoretical intervention to alleviate the tension between knowledge about psychedelics neuroplastic affects and the role played by the subjective experience in producing positive effects. I am to begin bridging the social scientific/humanistic and medical-scientific factions of psychedelic research by advancing a biocultural understanding of set and setting. Specifically, I argue that accurately describing and effectively implementing psychedelic therapies requires grappling with questions concerning the nature of the synergistic relationships between culture, cognition, and the brain because, as set and setting theory suggests, psychedelics intervene on, and the experience of psychedelics is shaped by, each of these processes. Specifically, To this end, I bring together theories of embodied cognition and “set and setting” in order to theorize the involvement of phenomena occurring at multiple levels of analysis (i.e. social, cognitive, and biological) in mechanisms of psychedelic-assisted change.

I conclude with a discussion on the revolutionary potential of the psychedelic science movement. Based on the preceding analyses, I describe the integrations problem(s) facing the movement stemming from biomedicalizing influences that have begun to shape the field. Furthermore, I argue that to realize a paradigm shift in how

mental health is viewed and treated, the field will need to work to minimize neuroreductionism in favor of an approach that emphasizes and understanding of individuals in context.

Chapter 2

MAINSTREAMING PSYCHEDELICS: THE LEGITIMATION OF BIOMEDICAL POTENTIAL

The purpose of the techniques which have man as their object, the so-called human techniques, is to assist him in this mutation, to help him find the quickest way to calm his fears, and reshape his heart and his brain.”

(Jacques Ellul 1964:334)

Introduction

In the summer of 2022, the APA put out several official policy statements on mental health issues in the United States one of which concerned the “use of psychedelic and empathogenic agents for mental health conditions” (Alpert et al. 2022). The statement relayed a technical and accurate description of the emerging interest in psychedelics, including empathogenic substances such as MDMA. By the time of the APA’s statement, the psychedelic science movement was more than 30 years in the making and had already made significant progress in its pursuit of scientific, institutional, and public legitimacy. The field underwent a “watershed” year in 2018, as the FDA had granted breakthrough therapy status to psilocybin—the psychoactive component of magic mushrooms—in step with the growing public interests, advancements in science, and accumulation of promising results from early clinical trials exploring psilocybin-assisted psychotherapy (Aday, Davoli, and Bloesch 2019). In the year following, the field saw the establishment of the first psychedelic research centers in the United States and the United Kingdom, significant investment from donors and

pharmaceutical companies, as well as continued deregulation and FDA support for psychedelic research (Aday, Bloesch, and Davoli 2020). In this delayed response to the building excitement surrounding psychedelic research, the APA's statement firmly expressed that, "there is currently inadequate scientific evidence for endorsing the use of psychedelics to treat any psychiatric disorder except within the context of approved investigational studies."

From a sociology of scientific knowledge perspective, a (reasonably cynical) observer might interpret this as an attempt reaffirm the APA's authority on mental health treatments in the face of a scientific/intellectual movement (SIM) offering a new model of treatment that challenges the status-quo in psychiatry. The statement *does* provide an indifferent show of support for further research that displays "the same scientific integrity and regulatory standards applied to other promising therapies in medicine." However, if psychiatric medications are taken as the ideal example, then we could expect psychedelic science going forward to be rife with the biases associated with pharmaceutical drug promotion, such as selective reporting of positive results, misleading reports of negative results, financial conflicts of interests, and studies ghost-written by pharmaceutical companies (Lexchin 2012). Nevertheless, it is unclear whether the APA's endorsement is necessary for the success of the psychedelic science movement. Already in the same year of the APA's statement, the National Institutes of Health (NIH) held a workshop to explore the "gaps, challenges, and opportunities" associated with the clinical use of psychedelics, which gathered

researchers (and their pre-recorded presentations) from around the world to discuss the state of the science and future directions.

When I tuned into the NIH Workshop on Psychedelics as therapeutics, the tone was reserved but generally optimistic. Psychedelics were finally receiving institutional recognition, which would translate into the first instance of federal funding for the therapeutic uses of psychedelics in nearly 50 years (Sayal 2022). The National Institutes of Mental Health had ended all funding of psychedelics research in 1974 citing a lack of clinical utility (Giffort 2020). After several presentations on basic science, clinical trials, and the ethical and social implications of psychedelics, the NIH director, Nora Volkow, voiced support for continued investigations. She was also encouraged by the existing data, saying “we cannot ignore the signals. It may not be sufficient to say that [psychedelics] are effective, but it is sufficient to say we cannot ignore them!” Although federal approval of any psychedelic is still yet to be achieved, this degree of legitimation by the (bio)medical establishment suggests that the psychedelic science movement has been relatively successful in rehabilitating the image of these drugs and demonstrating their potential utility as medical tools. At the same time, psychedelic science is often framed in the scientific and public discourse as a radical departure from prevailing knowledge about mental health (Mullard 2021; Schenberg 2018).

The aim of this chapter is to chart the psychedelic science movement, how it departs from prevailing biomedical knowledge, as well as begin to illustrate how the field has been shaped by processes of biomedicalization in pursuit of mainstream

acceptance. I begin with a brief discussion of the history of psychedelic science. I continue with a recent history of the contemporary movement that sets up my analysis of the expansion of the psychedelic science movement. I move on to a discussion of how psychedelics challenge prevailing knowledge about mental health and drug treatment by drawing on participants accounts of psychedelics' transdiagnostic efficacy, rapid onset of effects, and experiential nature. I go on to discuss how the psychedelic science movement has developed into an interdisciplinary field, which has created tension within the field. I conclude by outlining how certain features of the movements reflect key processes of biomedicalization based on general observations and participation in the field, which provide the basis for analyses in subsequent chapters.

Synthesizing the Psychedelic Science Movement

Traces of fear and stigma surrounding psychedelic use can be found in the historical record dating back to the Spaniards' first description of peyote use in the 16th century (Masters and Houston 1967). Western scientific interest in psychedelics is more recent and mostly stems from colonial contact with indigenous peoples who use psychedelic plants in diverse religious practices, with the exceptions of LSD and MDMA. By the late 19th century, peyote cactus used in indigenous religious rituals became an object of scientific interest. The active ingredient mescaline was isolated in 1896 by Arthur Heffter and synthesized by Ernst Späth in 1919 (Dinis-Oliveira, Pereira, and Da Silva 2019). Soon after its synthesis, mescaline became one of the first "psychotomimetic"

drugs. Viewing the psychoactive effects as a drug-replication of psychosis, various enclaves of psychiatrists used mescaline, and later LSD, to experimentally induce psychotic states in order to apparently gain insight into the conditions they were tasked with treating (Hartogsohn 2020; Langlitz 2011a). Lysergic acid diethylamide (LSD) was first synthesized by Swiss chemist Albert Hofmann in 1938 and “discovered” in 1943 after he was serendipitously alerted to the substance’s psychoactive properties. Hofmann would also play a key role in the history of psilocybin as a scientific object. Richard Evan Schultes, a Harvard anthropologist, documented indigenous use of psilocybin-containing mushrooms soon after in 1930. However, it was not until R. Gordon Wasson popularized the Mazatec’s mushroom rituals in a 1957 issue of *Life* magazine that psilocybin mushrooms became “magic” in the Western consciousness (Hartogsohn 2020:100). Wasson passed along samples of the mushroom *psilocybe Mexicana* to Albert Hoffman who isolated their active components psilocin and psilocybin, as well as developed procedures for lab synthesis in 1958 (Miller 2014:51).

Between 1950, when psychiatry first began taking an interest in psychotomimetic or hallucinogenic drugs, and 1974, when NIMH pulled the plug on federally funded psychedelic research, interest in psychedelics boomed with thousands of scientific articles exploring the biochemical, pharmacological, and psychological effects of the drugs (Aday, Bloesch, and Davoli 2019; Dyck 2005; Passie et al. 2008). Sometimes referred to as the “first wave” of psychedelic science (ignoring the early 20th century interest), this era of research produced several insights about the effects,

applications, and cultural significance of psychedelic substances. Partially supported through funding from the Central Intelligence Agency (CIA), which had an interest in weaponizing the drugs as “truth serums”, psychotomimetic research flourished (Hartogsohn 2020; Langlitz 2013:29).

In stark contrast to the psychotomimetic perspective, there emerged two additional therapeutic models of psychedelic administration in psychiatry during the surge of scientific interest in psychedelics that occurred between 1950 and 1974. First, the psycholytic approach uses low to medium doses of psychedelics to facilitate psychoanalytic processes of self-understanding (Grinspoon and Doblin 2001; Stafford and Golightly 1967:103–4). Next, the psychedelic model focuses on administering relatively high doses of a psychedelic to potentiate a peak experience. The psychedelic dosing occurs in between therapy sessions focused on preparing for the psychedelic experience and subsequently integrating the experience into everyday life. The latter model would be adopted by Timothy Leary who, beyond his few contributions to the science and popularization of the notion of “set and setting”, played a significant role in stoking fear in middle-class America with his unapologetic endorsement of the psychedelic experience (Giffort 2020; Hartogsohn 2017; Langlitz 2013).

Renouncing science in favor of spirituality and politics, what Langlitz refers to as *political neurotheology* (Langlitz 2011b, 2013), Leary helped popularize the use of psychedelics as part of a concerted effort to manufacture a social movement based on psychedelic consciousness expansion (Elcock 2013; Leary 1983). Though he was by no means solely responsible for the eventual criminalization of psychedelics, his

“break” from scientific norms, promotion of individual freedom to use psychedelics, and deliberate antagonization of those who preferred that psychedelics remain under medical control prompted backlash from state and medical authorities. As outlined by Bunce (1979:229), “ultimately psychiatric and other medical professionals mounted a campaign to re-establish their own exclusive authority to determine access to these drugs...Medical interests turned to the political arena to secure laws that would ensure access only for physicians, announcing that the drugs produced madness, insanity, and psychosis.” While medical professionals made explicit attempts to stake claim over the use of psychedelics to alter consciousness, scientific and medical use of psychedelics was stunted after the passage of the Controlled Substances Act of 1970 (CSA; Giffort 2020). Regulatory barriers made studying psychedelics impractical in most cases and deterred most human research until the 1990s, although research in the United States continued throughout prohibition primarily in animal models (Langlitz 2013).

The seeds of scientific movements are sown by grievances held by intellectuals who take corrective action by mobilizing to produce plausibly alternative knowledge (Frickel and Gross 2005). The contemporary psychedelic science movement emerged, in part, based on grievances associated with prohibition. One of core organizations responsible for collecting and distributing funds, sponsoring research, providing training and mentorship, and facilitating micro-mobilization contexts was founded in response to the Drug Enforcement Agency’s (DEA) move to criminalize MDMA. The Multidisciplinary Association for Psychedelic Studies (MAPS) was founded as a non-

profit pharmaceutical company in 1986 with the initial purpose of exploring MDMA's clinical applications (Emerson et al. 2014). Rick Doblin, the organization's founder, maintains that this was part of an explicit strategy to use Food and Drug Administration (FDA) processes to legalize MDMA for therapeutic use (Emerson et al. 2014; Langlitz 2013). Yet, a movement focused on reforming drug knowledge and demonstrating the practical value of psychedelics requires, above all, access to drugs in the first place. Four studies that are commonly cited as important "landmark" or "seminal" investigations (Aday, Davoli, et al. 2019) that paved the way for the psychedelic science movement all received their drugs from one chemist.

By the time I spoke with this chemist, David Nichols, an emeritus professor of pharmacology at Purdue University and founder of the non-profit Heffter Research Institute, the psychedelic science movement had been experiencing a period of rapid growth. My conversation with Nichols was long, and we covered many aspects of his life and work. As he reflected on his career and the movement, he told me one story about a panel he sat on for a conference in Zurich that serves as a good example of the resource dependence of SIMs. When it was his turn to speak on the panel, he took the opportunity to make his taken-for-granted contributions known.

Rick Doblin started MAPS and I made two kilograms of MDMA for him. It cost \$4,000. He couldn't afford to buy it anywhere else. He's told me now for the Phase 3 clinical trial. He spent \$400,000 on one kilogram. If I hadn't made that MDMA for him, MAPS would not have gone anywhere. He couldn't find anybody who would make it, and I made it. I said that started MAPS. MAPS wouldn't be nowhere. They'd

still be sending out newsletters without being able to use the substance. And...Rick Strassman, look at all the publicity he got. DMT: The Spirit Molecule—the movie and the book—and this whole meme about it being endogenous hallucinogen and everything. I said, I made the DMT because nobody else would make it... I made the psilocybin for Roland Griffiths' 2006 study and also for all his preclinical studies. And I started the Heffter Institute. So, if I hadn't been alive, probably none of you would be here...

In part, Nichols' role in facilitating psychedelic experiments that would jump-start the psychedelic science movement illustrates how SIMs depend heavily on scientific actors who have access to specific structural resources. As Langlitz (2013:41) has mentioned, Nichols was one of the few scientists at the time who both had an interest in psychedelics and the necessary DEA Schedule 1 permit that allowed him to synthesize the drugs.

Drugs synthesized by Nichols supported many of the early studies that helped establish the social conditions necessary for psychedelic science to make progress as a coordinated movement in the 21st century. His drugs fueled four significant studies that helped propel the psychedelic science movement in its early days, including: the Strassman DMT study (Strassman et al. 1994), MAPS' Phase 1 clinical trial of MDMA (Grob et al. 1995), a clinical trial of psilocybin for obsessive-compulsive disorder (OCD) (Moreno et al. 1997), and Griffiths and colleagues' (2006) study of psilocybin-induced mystical experiences. As Nichols suggested, Strassman received plenty of publicity for his groundbreaking DMT study, which was the first example of

psychedelics being administered to humans since the 1970s. In 2010, a documentary was made to commemorate the study and advocate for psychedelic research called *DMT: The Spirit Molecule*.

Eleven years later in 2021, Strassman told me that as “things have opened up with the commercialization of psychedelics” he has been in “great-demand” and has consulted with several psychedelic pharmaceutical start-up companies. In recounting his original study, he maintained that he had two aims guiding his investigation. First, he wanted to understand the biological basis for spiritual experiences and whether psychedelics were inherently spiritual. His second aim was to demonstrate that human subjects research with psychedelics was once again possible: “just prove that you could do studies with these drugs in humans again, to work out a system with the government to allow one to give humans psychedelics...”. While he was successful in achieving both of his aims, he also alluded to how the lack of support structures and collaborators made continuation of the research difficult.

We were so far ahead of the curve. Nobody knew what the hell we were doing out there, and it was impossible to recruit your colleagues. Nobody knew what I was doing. If they did, they were too busy, or they didn't really have their heart in it. So I answered my burning implicit question. I solved the explicit puzzle and then just said, “Well, I've done my part. Let's see if the rest of the world can catch up.” You know 10 years later, there's the John Hopkins paper about mystical experiences, but up until then it was pretty quiet. I wasn't sure if I would live to see the day that anybody actually takes advantage of the work that we did back then.

Strassman's reflection on his original study is suggestive of how SIMs thrive on collective action. Despite his success in administering DMT to humans and finding evidence that psychedelics like DMT amplify existing contents of consciousness (rather than being inherently spiritual), the lack of a collegial network made the work unsustainable. The lack of support can be partially tied to the stigma still attached to psychedelic drugs at the time, and the difficulty in gaining approval for the study in the first place. FDA approval of the study reportedly depended at least in part on the decision of a new director, as well as recommendations by the FDA and National Institute on Drug Abuse (NIDA) to permit more psychedelic research following efforts by MAPS to pursue a Phase 1 study of MDMA (Nichols 2014). In turn, this illustrates how the movement hinged on certain structural conditions to obtain resources, in this case legal approval, to actually carry out the movement's foundational experiments. Thus, despite Nichols' significant contributions, the DEA's Schedule I restrictions placed on psychedelics make it clear that the success of the psychedelic science movement, like any other SIM, has depended in part on structural conditions that provide resources (i.e. legal approvals to conduct research).

In any case, actors in the movement have done much to actively create the conditions to facilitate the production of knowledge about psychedelics despite legal barriers. For instance, in addition to supplying the drugs for the first psychedelic study of the psychedelic movement, Nichols provided the drugs and some funding to support several early investigations into psilocybin through the non-profit research

organization he established—The Heffter Institute. Both the Heffter Institute and MAPS would function as key mobilization structures for the development of the psychedelic science movement. The Heffter Institute has primarily concentrated its contributions on psilocybin research, whereas MAPS focuses on MDMA. Both have filled important roles for the psychedelic science movement by taking on fundraising efforts and sponsoring research and offering grants for new projects. From a structural standpoint, these organizations have been essential to the early success of the movement. However, the field has now progressed far beyond proving the concept that psychedelic research in humans can be done to establishing a wider infrastructure to support the movement's stabilization.

With each successful study, the psychedelic science movement began to accrue legitimacy in the eyes of the public and the scientific and medical establishment. In addition to clinical trials, editorials, literature reviews, meta-analyses of 20th century psychedelic research, investigations of naturalistic psychedelic use, and neuroscientific studies all supported a rationale that psychedelic use could confer mental health benefits on users and should be further explored with clinical trials (e.g. Carhart-Harris et al. 2012; Griffiths et al. 2008; Griffiths and Grob 2010; Grinspoon and Doblin 2001; Grob 2002; Johansen and Krebs 2015; Krebs and Johansen 2013; Sessa 2008; Vollenweider and Kometer 2010). However, a few experiments and scientific publications are not enough to sustainably grow and develop a movement into a plausible alternative system of knowledge on their own. SIMs also need mobilization structures that facilitate the movement's aims with resources for the

production and dissemination of knowledge, as well as contexts for micromobilization (Frickel and Gross 2005). The field has responded in kind with the establishment of two dedicated journals, *Journal of Psychedelic Studies* and *Psychedelic Medicine*, that provide dedicated outlets for psychedelic research beyond the typically favored outlets or the *Journal of Psychoactive Drugs*, which was established as a psychedelic-focused journal in the 1970s.

While publication outlets are one example of a useful mobilization structure, they are not enough to sustain the expansion of the SIM, especially as the prestige afforded to new journals is considerably lower than generalist outlets or prominent journals belonging to larger and more well-established fields of study. As a SIM gains prestige, or even hype, newcomers will be seeking ways to enter the field and a growing SIM will aim to recruit bright students to help increase research production. However, funding limitations in an emerging field can magnify competition as prospective candidates compete for a small number of grants or positions that become highly sought after. This is especially the case as early distribution of funds may be directed to high prestige departments before the SIM reaches a point where resources are plentiful enough to support several independent research programs.

I spoke to one researcher named Alan K. Davis, a clinical psychologist and assistant professor of social work at Ohio State University, who established a mobilization structure aimed at supporting students interested in psychedelic research. After accepting a post-doctoral fellowship at Johns Hopkins University to conduct

psychedelic research with Roland Griffiths, Davis took it upon himself start an organization to facilitate psychedelic research.

One piece of [my] narrative that is really important is Source Research Foundation.

The reason that's important to me is because, when I got that fellowship at Hopkins. I felt really mixed about it because I had it in my sights for so long, and I had no idea how it was going to happen or whether it worked out and it did work out for me. But for the one that it worked out for, I personally know 50 that it didn't work. And so, I spent months trying to figure out how I was going to take that power and move that power through me into something that I could manifest into an offering to this community. The way that I did that was I created Source Research Foundation ...the mission of that foundation initially—it's expanded somewhat at this point—but our primary mission is to provide research grants to students who want to do psychedelic research. That's our primary mission because our broader goal for the organization is to create trajectories for students to have some type of connection to the psychedelic science field, in whatever discipline and path that that looks like for them.

Davis' account provides a great illustration of the uncertainty and competitiveness associated with securing a position in an emerging SIM. As a way to remedy that scarcity, he founded a non-profit organization to provide funding and “trajectories” for aspiring researchers. Beyond this, Davis also contributed to the growing number of academic research centers, groups, and programs that focus on psychedelics by co-founding Ohio State University's Center for Psychedelic Research and Drug Education.

The CPRDE is one of twenty-one research centers, groups, or programs housed at universities across the United States. Table 2 presents a list of psychedelic research organizations established since 2018. As previously mentioned, the Johns Hopkins Center for Psychedelics and Consciousness Research (CPCR) was the first research center dedicated to psychedelics in the United States (Aday, Davoli, et al. 2019). Soon after, several others followed suit—all with differing attention to psychedelics, neuroscience, interdisciplinarity, medicine, or other foci in their official titles. These organizations are significant because they serve dual functions as mobilization structures that can serve to facilitate the accrual and distribution of resources for the advancement of the movement, as well as providing the legitimacy of institutional endorsements. Moreover, these organizations function as micromobilization contexts for the researchers that participate in them.

Micromobilization contexts refer to spaces where, “representatives of the movement and potential recruits can come into sustained contact with one another” (Frickel and Gross 2005:219). Research centers provide an ideal example of a micromobilization context because researchers are able to congregate and coordinate collective action toward the production of knowledge. The division of labor in these organizations can serve to improve research productivity. Furthermore, educating the future scholars in the field is necessary for SIMs to sustainably grow and stabilize as

Table 2 List of Psychedelic Research Centers and Programs Established in the U.S. Since 2018

<p>Baylor College of Medicine Program on Psychedelics, Bioethics, and Health Policy</p> <p>California Institute of Integral Studies Center for Psychedelic Therapies and Research*</p> <p>Duke University Center for Integrated Psychedelic Science</p> <p>Emory University Center for Psychedelics and Spirituality</p> <p>Johns Hopkins Center for Psychedelic & Consciousness Research</p> <p>Massachusetts General Hospital Center for Neuroscience and Psychedelics</p> <p>Mt. Sinai School of Medicine Center for Psychedelic Psychotherapy and Trauma Research*</p> <p>Naropa University Center for Psychedelic Studies*</p> <p>New York University Langone Center for Psychedelic Medicine*</p> <p>Ohio State University Center for Psychedelic Drug Research and Education</p> <p>Stanford University Psychedelic Science Group</p> <p>University of California-Berkley Center for the Science of Psychedelics*</p> <p>University of California-Davis Institute for Psychedelics and Neurotherapeutics</p> <p>University of California-San Diego Psychedelics and Health Research Initiative</p> <p>University of California–San Francisco Neuroscape</p> <p>University of California-San Francisco Translational Psychedelic Research Program</p> <p>University of Michigan Medical School, Michigan Psychedelic Center</p> <p>University of Texas-Austin Center for Psychedelic Research and Therapy</p> <p>University of Wisconsin Transdisciplinary Center for Research on Psychoactive Substances*</p> <p>Washington University School of Medicine Dept. of Psychiatry Program in Psychedelics Research</p> <p>Yale University Program for Psychedelic Science</p>
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*Center offers training or education pertaining to psychedelic research or therapy

an scientific or intellectual field. While some have previously recommended focusing on education in relevant fields like neuroscience, psychology, and pharmacology without an emphasis on psychedelics, (Garcia-Romeu 2014; Sewell 2010), the

movement has begun to shift towards preparing future professionals for the movement's success. For instance, four of the centers listed in Table 2 offer some sort of education or certification program. These are in addition to several other training programs offered by MAPS and other psychedelic organizations.

Aside from these research centers, conferences commonly serve as micromobilization contexts for facilitating recruitment, coordination, and dissemination of research. Several psychedelic conferences are held periodically, such as the MAPS-sponsored Psychedelic Science conferences, Horizons, Psychedemia, as well as several other industry sponsored events that have emerged since 2018. The internet has also become an important space for digital micromobilization and recruitment. For example, MAPS has a designated resources section on its website where it features access to digital research archives, lists of relevant academic programs, and several editorials aimed at socializing students interested in a career in studying psychedelics (Garcia-Romeu 2014; Sewell 2010). In 2011, MAPS announced the start of a digital micromobilization space for students interested in psychedelic research to network and stay abreast on psychedelic related positions of interest (Devenot 2011).

Finally, a prominent example of the psychedelic science movement's progression as a SIM can be found in the establishment of psychedelic therapist training programs. Most models of psychedelic-assisted psychotherapy employed in contemporary clinical trials have included two therapists who sit with participants throughout the duration of their psychedelic experience. In some cases, these

therapists may also facilitate preparatory sessions or integration sessions. Several psychedelic organizations including MAPS and 3 university research centers now offer training programs. While these programs have been established to avoid a potential lack of qualified therapists upon FDA approval of MDMA or Psilocybin, there is still no consensus about the details of what training should look like (Phelps 2017; Phelps and Henry 2021).

The history of the psychedelic science movement suggests it formed in response to legal restrictions on psychedelic research in the 20th century. With this context, the structural development of the field was oriented towards what early leaders viewed as the most expedient route toward removing these restrictions to allow further research into psychedelics and with the hope of eventually facilitating legal access to psychedelics. The resulting pursuit of medical approval posed the question of how psychedelics and psychedelic-assisted therapy could fit within medicine given the drugs' countercultural and religious associations and reputation as recreational drugs. The following section takes a closer look at how the knowledge of this movement challenges existing understandings of mental health.

What is a “paradigm shift”?

In setting out to understand how the psychedelic science movement challenges prevailing knowledge, I explicitly kept the Kuhnian idea of a scientific paradigm in mind. A scientific paradigm refers to a model of the world that guides the scientific practices of researchers who subscribe this model (Kuhn 2012). Science depends on

these models, worldviews, or “paradigms”, as the problems it focuses on solving problems are defined in terms of the paradigmatic model or worldview. Thus, rather than a linear progression through the basic accumulation of knowledge, Kuhn (2012) suggests that scientific progress occurs through major breaks or shifts from the prevailing worldview to an alternative paradigm that is incommensurable with current understandings.

One of my primary aims for this project was to critically interrogate the notion that psychedelic science represents a paradigm shift, as researchers and pundits have claimed (Nichols et al. 2017; Schenberg 2018; Tupper et al. 2015). When I asked researchers about their thoughts about this idea, I received a lot of interesting responses. Some rejected the notion entirely. Some were hesitant to endorse such a strong sounding and premature claim—after all, the FDA still has yet to approve any psychedelics for therapeutic uses. Some, however, were happy to endorse that the psychedelic science movement in fact is a paradigm shift given its considerable departure from the psychiatric status quo.

When I asked Rick Strassman—the principal investigator on the DMT study that helped reopen the door to psychedelic research in humans in the United States—what he thought about the notion that the psychedelic movement represents a paradigm shift, he asked me to clarify my usage of the term but then quickly rejected it.

You don't want to become evangelical, or you know, like a zealot or messianic. It's hard to point to a new paradigm while it's happening. It's almost like somebody saying

“I’m really humble” or “I’m enlightened” or “I’m woke”. Even if you say that kind of stuff, that means you're not.

Instead of bringing up any of the particulars of philosophy, method, or utility, Strassman was critical of the self-awareness of an explicit movement to overturn a paradigm. Part of his critique stemmed from a caution about messianism—a common concern in the field that emphatic endorsement of psychedelics will lead another Timothy Leary to tarnish the legitimacy gained by the movement (Giffort 2020; Kious, Schwartz, and Lewis 2022). However, he also seemed to draw directly on Kuhn (2012) in referring to the difficulty of drawing attention to our social circumstances as we are living through them.

Luckily, it may not be necessary to fully step out of the limited perspective to compare the psychedelic model being proposed with existing knowledge about mental health and drugs generally. One of the main ways that the psychedelic model of mental health treatment differs from conventional psychiatry is that the psychedelic model appears to display transdiagnostic efficacy (Nayak and Johnson 2021). Compared to the disease-centered model of psychiatry that conceives of each psychiatric disorder as having a specific drug treatment corresponding to the neurotransmitter system assumed to be responsible for its occurrence, psychedelics are thought to cut across diagnostic categories. Jared, a post-doctoral psychologist, put it nicely.

You know something that people have kind of been building into for a long time now, which is a lot of mental disorders have a lot in common at the core of them. Many

times they're focused on rumination and being overly fixated on certain thoughts or behaviors and having essentially one's attentional scope overly focused on one thing, whether that's addiction with tobacco or alcohol or overly fixated on one's mood or ruminating depression or really fixated on one's death. What excited me is that I think that a lot of times people's potential scope narrow, narrow, narrow, and it can be really get stuck in those patterns and psychedelics are a way of kind of resetting that at least transiently. Opening up that scope of attention and allowing new connections to be made. Robin Carhart-Harris put a paper out recently saying that can be like a fork in the road you know chance to start a new path. I think that that's something that can apply to a lot of different disorders, you know getting that ability for fresh start.

Pinpointing the common symptom of rumination, Jared suggests that psychedelics are able to help people get unstuck from narrow thought patterns. Here Jared also touches on the notion that psychedelics provide patients with an *opportunity* to change by suggesting the experience can give people a chance to “start a new path”. Finally, he alludes to the concept of neuroplasticity by suggesting that psychedelics can allow new connections to be made.

Another postdoctoral scholar I spoke with was reticent to claim that psychedelics represent a paradigm shift. Nevertheless, Stanley did suggest that psychedelics might be acting on a common cause of several disorders.

I'm not saying it's going to take over Western medicine, but it can certainly complement what we have available for people. To me it's another treatment option...just the fact that it can help with a number of different disorders to me says again we might be getting to more of the root causes of problems.

Despite his reasonable skepticism, Stanley still maintains that psychedelics may be getting to common “root” causes, since they show efficacy for several disorders with overlapping symptoms. In his view, psychedelics may not *take over* medicine, but they do seem to work differently than existing treatments in the medical lineup.

In addition to their apparent transdiagnostic efficacy, several researchers I spoke to noted how quickly psychedelics seem to work. A neuroscientist I spoke with named Serena admitted that psychedelics’ uniqueness in this regard is a big reason why she studies them in the first place.

The most fascinating thing about psychedelics is their rapid action. For example with SSRIs, which is another serotonergic drug that helps major depressive disorder, we don't see such rapid action. With psilocybin, we're talking about one dose being effective as long as one month. That's huge! That really hasn't been seen before. And, given that these drugs are coming from the same receptor family—not exactly the same receptor—is just fascinating to understand what might be happening in the background. So to me it's the rapid action really the one dose therapeutic potential the antidepressant potential is what fascinates me, and that's really why I'm here at the end of the day.

Serena’s interest in psychedelics stems from their rapid acting antidepressant effects. Although they act on the same general receptor type, she notes the dramatically different speed of psychedelics’ effect compared to SSRIs. Yet, while Serena highlights the rapid onset of effects, a clinical psychologist named Meg focuses on how these effects come from the fact that psychedelics subjectively slow us down.

When I asked her how psychedelics are different from existing mental health treatments, she said:

Because the medicine works. It brings us closer to the root of what's affecting us, to the why, you know? So many other treatments, whether it's cognitive behavioral therapy or psychotropics, are helping us kind of continue our daily grind despite the depression or anxiety... I feel like [psychedelic] medicines reset us back to nature's pace, and nature's pace often contradicts our Western pace. It may not just be something that helps us continue on our grind more seamlessly. It could be disruptive to the grind because maybe the grind is not actually good for us. Honestly, I think if these drugs are taken seriously, it will require a big overhaul to the way we do Western life. I think it would actually potentially save our planet and our species, like our whole world.

Meg's comparison of psychedelics to other forms of psychiatric treatments including psychotropic medication and CBT interventions again suggested that psychedelics get to the root of mental health issues. To Meg, this represents a significant difference from the psychiatric approaches that simply help manage symptoms so people can return to their daily "grinds". Furthermore, in contrast to Stanley's more conservative interpretation, Meg suggests that the implications of psychedelics would require an "overhaul to the way we do Western life", if taken seriously.

Meg was not alone in her feeling that psychedelic science has the potential to have a world-wide impact. Mallory, a postdoctoral neuroscientist, emphasized the need for a new approach to mental health in light of the crisis in psychiatric drug development. I asked why psychedelic science should be taken seriously and she said:

Because it could transform psychiatry, as we know it. Psychiatric drugs that we have right now are not very effective. Psychiatry in general is going down. Psychiatric drug development is facing crisis. They haven't we haven't invented a new mechanistically novel psychiatric drug in over 30 years. since SSRIs is in the 90s. We're desperate for new ideas and patients are desperate. More and more people are becoming afflicted by mental health conditions like depression and anxiety. There's just more and more people needing help, and there are so many people in which current treatments are completely inadequate. So psychedelic research should be taken seriously because we have this really good strong data that these drugs work. But we don't know enough about these drugs to convince the rest of the world and convince you know the FDA that these drugs should be approved, so we need really good researchers and really strong research able to find that evidence so that it will transform the world. I mean it will be able to help thousands and millions of people that are suffering from mental health conditions every single day.

In Mallory's view, the state of psychiatry and the lag in drug development suggests that psychedelic science has the chance to transform psychiatry, which is in dire need of new ideas to meet the growing need for effective mental health treatment. Mallory does mention the need for more research on psychedelics to adequately convince regulatory agencies and the broader public of psychedelics' utility. Specifically she suggests that much more research is needed to understand the potential risks associated with psychedelics and which patient populations are good candidates to receive psychedelic treatments. If the research can catch up, she projects that

psychedelic medicines could one day transform the world by helping the millions of people impacted by mental health issues.

When asked about what is unique about psychedelics as a therapeutic intervention, a psychiatry resident named Jameson reiterated the rapid onset of antidepressant effects. Yet, the major shift he points out with psychedelics has more to do with the psychedelic-assisted psychotherapy model.

I think the hype and the promise is, unlike conventional psychiatric drugs which are given on an ongoing basis, psychedelics are given only a couple of times and appear to have at least the potential to have long term benefits. So that's that in and of itself is quite a big shift and a major advance. Now, why is that possible? ... maybe we've found drugs that are really great at inducing neuroplasticity, for instance, so that's a novel contribution that would be something different than the mechanism... what I like to talk about is that that I think also represents the major shift is that it's really pairing psychopharmacology and psychotherapy in a novel way that hasn't been done so where we're going to understand the neurobiology of these drugs and then you know so be able to with the same sort of intervention both bring about helpful neurobiological changes, but hopefully also psychological.

Here Jameson draws us into the neurobiology of psychedelics with his suggestion that psychedelics facilitate neuroplasticity. This neurobiological effect is not the mechanism per se. Rather, it helps facilitate the mechanism, which he suggests is the pairing of these neurobiological effects with psychotherapy. He goes on to contrast this with existing models of treatment.

It'll help shift away from just the pure psychopharm 15-minute med-check, you know "okay here, we'll just sprinkle some antidepressants" and you go about doing your life as is and hope that it gets better.... With psychedelic therapy I think we're trying to get at some of the underlying issues that drive the symptoms... Whether it's MDMA, you're addressing the traumas which produce the symptoms, or even with Psilocybin trauma work often happens, or with depression, really getting at the depressive thought patterns and behaviors that drive this person's depression. So at least the way I approach, it is that it's we're not just taking a symptom-based approach we're really trying to address some of the more root issues for a given individual.

Here again, Jameson gestures at the curative logic associated with psychedelic-assisted psychotherapy which aims to get at the root issues underlying an individual's experience. Here, the contrast is more explicitly drawn with the psychopharmacology model that gives the patient's experience very little attention and "sprinkles" antidepressants on patients after brief check-ups. Instead, psychedelic-assisted psychotherapy helps patients work through the roots of mental health issues experientially.

As I will later show, the experiential component of this model has become the subject of debate. This debate primarily stems from the ascendance of neuroplasticity as an explanatory mechanism for psychedelics' therapeutic properties. The brain-focus in psychedelic science, which has actually helped it gain legitimacy, gives Strassman's concerns about claiming the movement to be a paradigm shift elevated significance. Maybe the claiming that psychedelic science is a significant paradigm shift are

premature. Maybe the paradigm shifting narrative is just something a revolutionary SIM uses to justify the various concessions made in pursuit of legitimacy. The next section begins to poke at some of the “concessions” or influences on the psychedelic science movement that have helped it reform the image of psychedelics as biomedical tools for reshaping the mind and brain.

Tensions of an Interdisciplinary Movement

Listening to the speakers at the NIH Workshop on Psychedelics as Therapeutics in 2022, you would not generally get the sense that psychedelics had been in use for thousands of years prior. Nor would you surmise that anyone is interested in psychedelics outside of molecular biology, neuroscience, psychopharmacology, or psychiatry. Only one social scientist presented during the three-day virtual event. One talk from a psychiatrist, Elias Dakwar, stood out the most. Gesturing at the folly of recurrent proof-of-safety and efficacy studies, Dakwar asked, “How many experiments do we need to keep doing?” Or, on the question of whether the psychedelic science movement might represent a new paradigm, he questioned ultimately whether the current approach qualifies.

So, a lot has been made about how these medications will represent a new paradigm. The therapeutic role of non-ordinary experiences and subjective experience more generally are being re-examined. There's a lot of emphasis that they are not epiphenomenal or not pathological but is this really a new paradigm? ... Trans diagnostic efficacy suggests trans diagnostic etiology. We know as scientists, that there are shared neural mechanisms behind many of the psychiatric disorders we are

looking at. And indigenous traditions practitioners have been saying this for decades, if not centuries, and approaching these compounds from that perspective. So by focusing on self-important "paradigm shifting" medicalization that continues to privilege neural mechanisms and existing systems of care, are we excluding from the conversation spiritual teachers, indigenous groups, underground practitioners and therapists? Are we resisting a broader paradigm shift?

The questions Dakwar raised throughout his talk variously encouraged researchers and spectators to question our own assumptions about the progress of the psychedelic science movement. Pointedly wondering about how psychedelics fit into existing models of investigation, he directly challenged the logic of randomized controlled clinical trials and the biases enshrined in knowledge around mental health. Ultimately, Dakwar's questioning encourages viewers to consider whether the medicalization of psychedelic science is simply dulling the revolutionary potential of the movement as a whole, and simultaneously sheds light on the movement's internal tensions.

The psychedelic science movement's internal tensions are fundamentally philosophic in nature and stem largely from the interdisciplinary makeup of the field. Anthropology, philosophy, religious studies, and literary studies all contribute to the psychedelic science movement. Given its colonial history, anthropology has had the most clear and direct impact on the scientific understanding of psychedelics, since anthropologists' fieldwork with indigenous groups is what initially brought these substances to the attention of Western scientists in the first place (Furst 1972; Miller 2014). Moreover, anthropology has been able to consistently study psychedelics, while

the studies involving the administration of psychedelics have waxed and waned with policy changes. Michael J. Winkelman, an anthropologist at Arizona State, told me that anthropology is the discipline responsible for keeping psychedelic research alive when he joined me for a video call from Brazil.

Well, I mean I was studying psychedelics for years before there was a “renaissance”. Back in that time you know... people like Terence McKenna are running around talking about the importance of psilocybin. So to me anthropology is where you know the psychedelic community kind of stayed alive, at least within the academic frameworks, and you know sort of resisted the governmental prohibitions, because we didn't do experiments. We didn't have to use controlled substances in laboratory settings... I think it still has applications and one of the applications, I think, is that anthropology is sort of the window into traditional knowledge.

Because the government regulations had no real impact on the capacity to conduct anthropological field work, Winkelman contends that anthropology essentially carried the torch for the psychedelic science movement in the face of government regulations. According to Winkelman, anthropology’s contemporary relevance is tied to its capacity to serve as a “window into traditional knowledge.” However, many are not satisfied with the voyeuristic stance to indigenous knowledge. Rather than simply observe and incorporate certain useful aspects of indigenous knowledge, anthropologist Evgenia Fotiou (2019) argues that realizing a psychedelic paradigm shift requires “decolonizing” psychedelic science and drawing on indigenous knowledge in order to problematize

Another anthropologist, Brad, seemed to disagree with the idea that awareness of indigenous practices is the only thing anthropology can offer the movement. Instead, in line with a couple of the other anthropologists I spoke to, Brad emphasized the anthropological sensitivity to context as the biggest asset they bring to psychedelic science.

I mean I think when people who are not anthropologists think of what anthropology does they think anthropology is the study of the “other” and the native. And well the anthropologist can help us because they can bring in the indigenous perspective and things like that or explain it, and that to some extent is part of it, but I think you know, a greater value of anthropologists is reminding everyone involved that they are culturally situated, not just the indigenous people and getting people to look at how their experiences in the way that they represent psychedelics are, in fact, you know, culturally, you know, part of a kind of cultural discourse that even the kind of notions of healing and hearing as individual are themselves rooted in a particular set of assumptions.

Instead of casting a colonial gaze onto indigenous peoples who use psychedelic plants, Brad suggests that anthropologists’ greatest role is to remind researchers in the field that we are all already embedded in cultural contexts that shade our worldviews. Contrary to many people’s presumed a-cultural status, anthropologists can help people recognize and possibly reflect on taken-for-granted assumptions informing our observations.

Indeed, the sort of field-level reflexivity that Brad describes could be seen as one of the biggest advantages stemming from the interdisciplinary character of

psychedelic science. Caden, a professor engaged in pharmacological research involving humans and mice, expressed some excitement about the potential advancements that could be made through interdisciplinary research.

A lot of the focus of psychedelic research as of late, has been clinically focused in terms of going after specific psychiatric indications. But there is a lot of work to be done, and potentially a huge amount of value to be had, by not separating that out from other areas of investigation. Mechanistic investigation is you know kind of one step removed from that, but then, when you get to mechanistic investigation at the level of “is set and setting actually part of mechanism?” you get sort of another level removed from that. Then you can go back and back and so I think we have a huge amount to learn, not just from you know biomedical researchers, but from historians, ethicists, people who are looking at the cultural on who humanistic dimensions of psychedelic use, so I'm very excited to see where that leads.

Pointing out how the field's focus has primarily been on clinical investigations, Caden suggests that there may be something to gain from considering other more “humanistic dimensions” of psychedelics. While partially carving out a distinct space for “mechanistic investigations” that have little to do with the human elements, he acknowledges that this becomes complicated when considering the role of set and setting. Despite the complications of considering seemingly distinct levels of analysis, Caden maintains that there may be a “huge amount of value” in trying to reconcile such distinctions and trying to bring together diverse areas of inquiry.

Yet, as much as anthropology, sociology, philosophy, and any other humanistic or interpretive discipline has to offer the movement, the topics they address

and the knowledge they produce are not always viewed as relevant to psychedelic science compared to disciplines like neuroscience, which has perhaps been the most influential discipline in the psychedelic science movement (Giffort 2020; Langlitz 2013). One neuroscientist I talked to, Marshall, explained how he thinks neuroscience is a fundamental component of psychedelic science.

Well, I think [neuroscience is] central of course... I think that a lot of the lot of the philosophical questions are really interesting but likely unanswerable with lab research. But you know the practical questions—Can psychedelics actually improve people's lives? Can they be used as medicines?—those questions, I think can be practically studied and in a rigorous and quantitative way using sort of traditional neuroscientific methods. This is really clinical neuroscience and clinical research methods. But in terms of generating hypotheses as to as to where to look for the potential changes in the brain that occur. How do you design a study to understand how psychedelics are able to ameliorate symptoms of depression and substance use disorder? What are some alternative strategies or adjuncts to psychedelics that can improve those outcomes? All those things sort of require you know basic neuroscience research as a foundation to you know to drive that part of the field home.

Marshall concedes that certain philosophical questions must be relegated to the armchair. However, he maintains that neuroscience is where the psychedelic science movement answers the practical questions about whether psychedelics can be turned into biomedical tools. Specifically, he thinks to “drive the field home” that the movement needs clinical neuroscience.

Some of the researchers I interviewed who study the “humanistic dimensions of psychedelic science expressed some concerns about the devaluation of disciplinary perspectives other than the biomedical ones assumed to be at the center of the field. Morgan Shipley, a religious studies scholar at Michigan State University, told me that he was worried about bifurcation of the field.

I am concerned that, while I do see work coming out from a variety of sources and voices that continue to position the study of psychedelics in relation to culture and religion and spirituality, that the Renaissance, in the “scientification” of it all... might get two different discourses—the scientific discourse, that again is specifically just about like therapeutic value unto itself, and then discourses around kind of specific cultural and religious uses.

Shipley’s concern that a narrow focus on psychedelics’ therapeutic value will ultimately lead to segregation of two distinct approaches to researching psychedelics. He pins this on the “scientification” of the field. While one side of the field is focused primarily on technical questions pertaining to the administration of psychedelics in medical contexts, those who study “religious and cultural” phenomena pertaining to psychedelics will be forced to establish their own discourses.

Concern that non-medical perspectives will get lost in the shuffle is fairly common in the field. Neşe Devenot (2011), a medical humanities scholar and bioethicist, previously declared “psychedelic studies” as an interdisciplinary field in response to a perceived imbalance in favor of medicine and to some extent anthropology. Devenot (2013) slated psychedelic studies to be a field that truly

transcends typical disciplinary boundaries and attends to philosophical, theoretical, cultural, and scientific issues related to psychedelics. The field has been somewhat successful in its pursuit of interdisciplinarity. Psychedelic conferences, such as Horizons: Perspectives on Psychedelics, Psychedemia, and Psychedelic Science, feature a blend of basic science, clinical studies, social science, and philosophy, among other perspectives. Yet, whether the interdisciplinary discourse at conferences or in academic journals is having a meaningful impact on the science or whether distinct and competing approaches to understanding psychedelics are occurring alongside one another is still open to question.

I spoke to one PhD candidate named Alyssa who suggested that much more interdisciplinary work is required for the movement to deliver on its revolutionary promise. When we got on the topic, she was skeptical about the idea that psychedelic science represents a paradigm shift.

Well, I think that's the whole selling point is this is a new paradigm. That's the trope that's being thrown around. "This is a breakthrough" and "This is going to change everything" and blah blah blah. I think that one of the good things is that there is that you know it's not they're not approving MDMA. They're approving MDMA-assisted therapy, so kind of bringing psychiatry back into more talk-based approaches, which I think is potentially a good thing. But I think there's a whole lot of transdisciplinary work to do, outside of the sciences in order to create that paradigm. I don't think it's just going to happen. I think if it's really going to be a new paradigm, a transformative new part of medicine, we have to figure out ways to make it ethical.

Alyssa emphasized the need for transdisciplinary work to really usher in a paradigm shift. Although bringing in a more talk-based approach to psychiatry is a positive sign, she ultimately suggests that psychedelic science will not “change everything” unless the field draws on perspectives from multiple fields in order to ensure that psychedelic medicine is ethical. In another conversation, Alyssa reiterated the need for humanistic perspectives but acknowledged that they are often “deprioritized” and do not receive the same level of resources to do research compared to basic science studies or clinical trials.

As the movement has grown in size and popularity, there has been an increased focus on achieving legitimation. The aims of foundational actors in the field have focused on attaining legitimation by pursuing FDA approval for the use of psychedelics in the treatment of specific (often medicalized) disorders. This has focused on a model that diverges considerably from existing treatment models in psychiatry since the drugs being administered are conceived as adjuncts to therapy, rapid acting, and helping individuals address the deeper roots of their mental health issues as opposed to treating symptoms. While the movement has progressed toward stabilization as a legitimate area of inquiry and FDA approval of MDMA and psilocybin, the interdisciplinary nature of the psychedelic movement has led to growth of psychedelic studies and an accompanying concern about the marginalization of perspectives other than the prevailing scientific-medical approach to understanding these drugs, which may ultimately be necessary for psychedelic science to instigate a paradigm shift. As the movement becomes hyper-focused on achieving legitimation,

the potential for the qualities of the psychedelic science movement that makes it compelling are at increased risk of becoming watered down by the influence of the existing paradigm. To further demonstrate this, the next section introduces some of the ways the field has been shaped by biomedicalization, which are elaborated on further in subsequent chapters.

Biomedicalizing Psychedelic Science

The psychedelic science movement displays several characteristics that are indicative of biomedicalizing influences. As previously mentioned, I have chosen to use biomedicalization as a lens because it is helpful for understanding how movement or the field of psychedelic science itself has been shaped by biomedicalization. In contrast to the basic suggestion that psychedelics are being medicalized, biomedicalization helps sensitize us to the fact that psychedelics are being adopted as technologies for treating medicalized conditions. Moreover, biomedicalization provides good insight into the pre-existing paradigm that the psychedelic science movement is purportedly challenging.

Biomedicalization, as defined by Clarke et al. (2003, 2009), entails five key processes, which I have used to help identify and frame emergent changes in psychedelic science. I refer to the manifestation of these processes in psychedelic science or the influence of these processes on the movement as *psychedelic biomedicalization*. Table 3 lists each process and examples of their influence on psychedelic science. It is a non-exhaustive list and intended to illustrate how the field

Table 3 *General Features of Psychedelic Biomedicalization*

<u><i>Overarching Features</i></u>
<ol style="list-style-type: none"> 1. Transformative orientation toward of brain, mind, medicine, and society 2. Expansion through clinical trial investigation of psychedelics, technoscientific methods, development of new analogues to test, psychedelic knowledge, and establishing new infrastructure to sustain the field of psychedelic science
<u><i>Technoscientization of Biomedicine</i></u>
<ol style="list-style-type: none"> 1. Predominance of neuroscientific knowledge 2. Legitimation of biomedical potential using neuroimaging and animal models² 3. Neuromolecularization of psychedelic therapeutic mechanisms³
<u><i>Transformation of Bodies and Identities</i></u>
<ol style="list-style-type: none"> 1. Reframing of psychedelics as neuro-technologies capable of transforming the brain 2. Drug-assisted psychotherapeutic transformation of meaning⁴, belief⁵, self⁶, and identity⁷ 3. Proposals for precision medicines capable of targeting specific neural networks⁸ 4. Psychedelics rewiring the brain⁹
<u><i>Focus on Health and Enhancement</i></u>
<ol style="list-style-type: none"> 1. Psychedelics for health and enhancement – microdosing for creativity, productivity, cognitive functioning, and general well-being 2. Diseases conceptualized at the level of genes and molecules

has begun to take shape in the image of biomedicine. I have identified the examples for each process characteristic of biomedicalization throughout my research, through my interviews, and by participating in psychedelic science³ myself. Where necessary, I have provided relevant references or web-addresses. In addition to the five key processes, the table begins with two overarching themes of psychedelic biomedicalization—the transformative orientation and the biomedical expansion of the field. The transformative orientation of biomedicine is manifest in psychedelic

² (Langlitz 2013)

³ (Aleksandrova and Phillips 2021; Jaster, de la Fuente Revenga, and González-Maeso 2022; Kwan et al. 2022a; Ly et al. 2018; Nichols and Nichols 2022; Ornelas et al. 2022)

⁴ (Fischman 2019; Griffiths et al. 2008; Hartogsohn 2018)

⁵ (Lyons and Carhart-Harris 2018; Nour, Evans, and Carhart-Harris 2017)

⁶ (Girn and Christoff 2018; Lebedev et al. 2015; Millièrè 2017; Nour and Carhart-Harris 2017)

⁷ (Devenot, Seale-Feldman, et al. 2022; Noorani et al. 2018)

⁸ (Olson 2018)

⁹ (van Elk and Yaden 2022; Sayal 2022; M. Smith 2022; Sullivan et al. 2022)

Table 3 Continued

<u><i>Bioeconomy Built on Technoscientific Knowledge</i></u>
1. Psychedelics as “promissory capital”
2. Privatization of psychedelic research – Compass, atai Life Sciences, Delix Therapeutics, Cybin, MindMed ¹⁰
3. Biomedical investment firms – Vertical Venture Partners, re.Mind, PsyMed Ventures, Palo Santo, Presight Capital, Dolby Family Ventures, RA Capital, Artis Ventures ¹¹
4. Increased privatization and commodification of research results as proprietary knowledge – patent issues/disputes ¹²
5. Biomedical Stratification — disparities in racial/ethnic representation in clinical trials ¹³
6. Concerns about cost, insurance coverage, and potential for psychedelics to become boutique treatments ¹⁴
<u><i>Transformations of Information, and the Production and Distribution of Knowledges</i></u>
1. Distribution of knowledge through digital media – MAPS Podcast, The Psychedelic Podcast, Plus Three Podcast, The Drug Science Podcast, Psychedelics Today; Scientists’ guest appearances on large audience podcasts
2. Media geared toward distributing knowledge about the proper use of psychedelics – The Third Wave
3. Internet forums to learn about and troubleshoot psychedelic use practices – BlueLight.org, theshroomery.org, Reddit.com
4. Right to try movement – righttotrypsilocybin.com ¹⁵
5. Citizen science on psychedelic microdosing and psilocybin for headache disorders ¹⁶
6. Co-optation/Integration of indigenous and “underground” knowledge ¹⁷

sciences in several ways, as psychedelics are generally posed as tools for transforming users’ minds and brains the field is also oriented towards the transformation of psychiatric medicine and in some cases society at large by making psychedelics part of mainstream culture. Additionally, the expansion of psychedelic science has been

¹⁰ <https://compasspathways.com/>, <https://atai.life/>, <https://www.delixtherapeutics.com/investors/>, <https://cybin.com/>, <https://mindmed.co/>

¹¹ <https://vvp.vc/>, <https://remind.vc/>, <https://psymed.ventures/#focus>, <https://www.palosanto.vc/>, <https://presight.vc/>, <http://www.dolbyventures.com/>, <https://www.racap.com/>, <https://www.av.co/>

¹² (Hausfeld 2020; Hausfeld and Nickles 2021; Love 2021a, 2021b, 2022; Wilson 2022)

¹³ (Michaels et al. 2018; Thrul and Garcia-Romeu 2021)

¹⁴ (Marseille, Bertozzi, and Kahn 2022; Plesa and Petranker 2022; Wexler and Sisti 2022)

¹⁵ (Guzman 2022);

¹⁶ (Fadiman and Korb 2019; Kempner and Bailey 2019; Szigeti et al. 2021)

¹⁷ (Devenot, Conner, and Doyle 2022; Gerber et al. 2021; Labate and Cavnar 2018)

generally predicated on techniques for legitimating, distributing, and producing new knowledge that are common in biomedicine, such as randomized controlled trials or the use of technoscientific methods. The remainder of this chapter introduces the processes of psychedelic biomedicalization and describe the significance of these examples. Certain elements of these processes are explored further in relation to themes from my interview data in subsequent chapters.

Technoscientization of Biomedicine

The technoscientization of psychedelic science is most apparent in the influence that neuroscience has had on the field. The central role of neuroscience to the psychedelic science movement has been established in earlier investigations of the field (Giffort 2020; Langlitz 2013). Neuroscientific knowledge is often perceived highly authoritative (Joyce 2005, 2008) and the use of neuroscientific techniques has significantly aided the psychedelic movement's pursuit of scientific and public legitimation. Techniques for producing knowledge about psychedelics effect the brain are dependent on 20th century technoscientific innovations for measuring neurobiological phenomena in humans, as well as neurochemical and neuromolecular phenomena in animals. The use of techniques such as neuroimaging and animal models in psychedelic sciences has generally contributed to the neuromolecularization of discussions about psychedelics therapeutic mechanisms and produced several competing models (e.g. see van Elk and Yaden 2022; Inserra, De Gregorio, and Gobbi 2021; Olson 2021a, 2022). The influence of such techniques and the relationship to the next biomedicalizing process are explored in further detail in the following chapter.

Transformation of Bodies and Identities

Several trends in psychedelic science can be taken as examples of the transformative orientation of biomedicine (Clarke et al. 2003, 2009). The transformative orientation is built upon technoscientific advancements that make the fine grain elements of human life susceptible to scientific observation, which in turn, has influenced the perception that the fundamental constituents (i.e. genes, synapses, neurons) of biology are amenable to manipulation. As the molecular components and processes of the body are made visible, the pursuit of technoscientific innovation in medicine has been aimed at developing methods for intervening on the human body at these micro-levels (Clarke et al. 2003, 2009; Rose 2007). Psychedelics are being reframed as tools for such interventions. Specifically, through neuroscientific investigation of psychedelics, these substances are being recast as neurotechnologies that are capable of transforming the brain.

The suggestion that psychedelics are capable of transforming the brain is ultimately tied to evidence that psychedelics generate neuroplasticity, which refers to capacity to alter neural connectivity through the generation of new neurons, formation of new connections between neurons, or alteration of existing connections (Malabou 2008; Pitts-Taylor 2010; Wexler 2011). Psychedelics' potential to modify neural connections has led to the popularization of the idea that psychedelics “rewire the brain” in both scientific and popular discourse (van Elk and Yaden 2022; Sayal 2022; M. Smith 2022; Sullivan et al. 2022). Some have even suggested that psychedelics may serve as the basis for development of new drugs capable of selectively targeting

specific circuits for precision rewiring (Olson 2018; Peters and Olson 2021). Moreover, in addition to neural transformations, psychedelics have been suggested to contribute to transformations in meaning (Fischman 2019; Griffiths et al. 2008; Hartogsohn 2018), belief (Lyons and Carhart-Harris 2018; Nour, Evans, and Carhart-Harris 2017), self (Girn and Christoff 2018; Lebedev et al. 2015; Millière 2017; Nour and Carhart-Harris 2017), and identity (Devenot, Seale-Feldman, et al. 2022; Noorani et al. 2018). The transformative orientation evident in psychedelics' recasting as neurotechnologies capable of transforming the brain and mind of individual users is one of the most salient examples of biomedicalization and is addressed further in the following chapter. It also bears some relation to the next process of biomedicalization, which is a greater focus on the using biomedical techniques for improving health or enhancing human capacities.

Focus on Health and Enhancement

Biomedicalization involves a unique attention to health “risks”, surveillance and management of risk factors, and the use of biomedical techniques to improve health beyond the treatment of disorders (Clarke et al. 2003, 2009). One element of this process that is evident in psychedelic science is the way in which disorders and diseases are conceptualized at the molecular level. The influence of neuroscience is again relevant here, as knowledge about psychedelics therapeutic effects is often geared towards remedying conditions that have been medicalized as “neuropsychiatric disorders” or “brain disorders” (Barrett et al. 2020; Doss et al. 2022; Olson 2018;

Peters and Olson 2021). Beyond the conceptualization of disorders psychedelics are shown to be effective in treating, there is also growing attention to psychedelics' possible benefits for healthy adults.

Much of the attention to psychedelics health effects has been associated with the practice of psychedelic microdosing, which is purported to give users the neurobiological benefits of psychedelics (i.e. neuroplasticity) without the accompanying psychoactive effects (Hutten et al. 2019; Kuypers et al. 2019; Liokaftos 2021; Rosenbaum et al. 2020). Psychedelic microdosing is generally conceived as a form of supplementation for that has the potential to enhance neurological and cognitive functioning by taking doses below the threshold required to experience immediately noticeable alterations to conscious experience. Microdosing is generally thought to provide benefits for general well-being, creativity, productivity, and cognitive performance (Anderson et al. 2019; Bornemann 2020; Hutten et al. 2019; Rosenbaum et al. 2020; Webb, Copes, and Hendricks 2019). However, research into the effects of microdosing is inconclusive at this point.

Bioeconomy Built on Technoscientific Knowledge

The psychedelic science movement has been the center of considerable attention due to the financial prospects associated with bringing a new class of drugs to the market. Several “start-up” companies have been established in anticipation of the FDA approval of psychedelic-assisted psychotherapy with MDMA and psilocybin, with several more focused on researching new drugs to bring to market. Prominent among

these companies are Compass Pathways, atai Life Sciences, Cybin, MindMed, and Delix Therapeutics. Compass and atai Life Sciences have been central to a growing concern about the use of aggressive patenting strategies to establish formulations of common substances, as well as practices associated with psychedelic-assisted psychotherapy as proprietary knowledge. Whereas companies like Delix Therapeutics are focused on developing entirely new drugs that would not be susceptible to the same disputes. In either case, these examples are representative of the increasing privatization and commodification of research (some of which may still draw on university resources), which has become a point of contention within the movement due to concerns about monopolization, appropriation, and distortion of the novel aspects of psychedelics (Devenot, Conner, et al. 2022; Gerber et al. 2021; Hausfeld and Nickles 2021; Love 2021a; Wilson 2022).

In light of the growing privatization and potential for profit off of research innovation and new models of drug delivery, the field has attracted the interest of several investment firms focused on biotechnology that are willing to fund these projects. For instance, re.Mind is an investment fund that focuses on projects that will contribute to “mental and neurological health”, such as brain-computer interfaces, the implementation of psychedelics like DMT, and new drug discovery.¹⁸ Palo Santo is another investment fund with particular focus on psychedelics and claims to be

¹⁸ <https://remind.vc/>

“funding a new paradigm in wellbeing”.¹⁹ It boasts a portfolio of 19 different psychedelic companies that include atai Life Sciences and Delix among others with names apt for psychedelic neurotechnology companies, such as Eleusis, Gilgamesh, Journey Clinical, Neurocare, and Sensorium Therapeutics.²⁰

While the list does not end there, the influx of capital investment into psychedelic science, prior to any legal approval for the therapeutic use of psychedelics, represents another element that is uniquely representative of biomedicalization—promissory capital (Clarke et al. 2009:7–10). Promissory capital refers to how biomedicalization is often predicated on the *potential* of new technologies. As with many other technologies that have claimed to offer a revolutionary capacity to transform the human body, the hype around psychedelics is largely based on the possibility that psychedelics will ultimately be approved by the FDA and rescheduled. Moreover, while preliminary results suggest that psychedelics are effective, several scientific questions remain about the extent of this efficacy, which populations psychedelic-assisted psychotherapy may be relevant for, and the therapeutic mechanisms.

As companies are investing on the possibility that psychedelics will turn out to be the next big thing in psychiatric medicine, several critical scholars are concerned

¹⁹ <https://www.palosanto.vc/>

²⁰ <https://www.palosanto.vc/portfolio>

about the profit motive associated with pharmaceutical development to hinder access to psychedelic therapies (Ambrose and Zabinski 2023; Barber and Dike 2023; Marseille, Bertozzi, and Kahn 2022; Plesa and Petranker 2022). While the potential for profit motives creating disparities in access, oftentimes biomedicalization progresses in such a way as to exacerbate existing disparities in health or create stratification through differences in access to expensive techniques or exclusion from clinical trials. This *stratified biomedicalization* has already manifested in psychedelic science, as scholars have identified and critiqued the lack of representation in clinical trial samples and the need for greater inclusion and consideration of diverse racial and ethnic groups in psychedelic science (Michaels et al. 2018; Neitzke-Spruill 2019b; Williams and Labate 2019).

Transformations of Information, and the Production and Distribution of Knowledges
Finally, the psychedelic science movement has used several changes in the production and dissemination of information in order to generate attention and contribute to legitimization of psychedelics as biomedical tools (Clarke et al. 2003, 2009). For instance, the field has benefited from both traditional and new digital media to distribute knowledge about psychedelic science and rehabilitate the image of psychedelic drugs themselves. The appearance of researchers on popular podcasts and the production of psychedelic specific podcasts has been an important way for the movement to get its message out to the public. Additionally, popular media coverage of psychedelics has been expansive and several documentaries with psychedelics as

their focus have been produced since Strassman's initial DMT study. Beyond the spread of information about science through media, how-to information geared towards users seeking to take psychedelic "trips" or learn how to microdose are now easy to find the internet, as internet forums provide a space for users to congregate and exchange first-hand insights. Moreover, websites like The Third Wave provide a one-stop shop for would-be psychedelic users replete with information about different substances and opportunities to engage with "microdosing coaches" or therapists to facilitate integration of experiences that took place outside of a legally sanctioned clinical trial.

In addition to these changes, psychedelic biomedicalization is also evident in patient movements centered on accessing psychedelics through clinical trials (i.e. the right to try movement), as well as the use of psychedelics in response to the failure of medicine to provide effective treatments. In the latter case, individuals experiencing severe chronic headache disorders have resorted to psilocybin mushroom use to alleviate their symptoms, which has culminated in the production of citizen science on the efficacy of psilocybin as a headache treatment (Bailey and Kempner 2022; Kempner and Bailey 2019). Microdosing psychedelics has been another area where citizen science has taken hold, as individuals microdosing in naturalistic settings (i.e. non-lab settings) follow standard protocols and collect data about their own use as part of a wider experiment (Fadiman 2011; Fadiman and Korb 2019).

Finally, competing systems of knowledge are oftentimes adopted and translated into biomedical terms (Clarke et al. 2003). This co-optation of knowledge is

one way in which biomedical expansion functions to retain authority over a given domain of knowledge. As knowledge about psychedelics uses and effects has grown, scholars have critiqued the trend towards biomedicalization in the field, which has been perceived as the cooptation or appropriation of indigenous or “underground” knowledge about psychedelic use (Devenot, Conner, et al. 2022; Fotiou 2019; Labate and Cavnar 2018). Ultimately, this has made psychedelic biomedicalization a source of contention in the psychedelic science movement, as the field has been increasingly shaped by processes of biomedicalization, which may be seen as a broader cooptation of alternative knowledges.

Conclusion

Throughout this chapter, I have attempted to illustrate the synthesis of the contemporary field of psychedelic science through the lens of scientific/intellectual movements (Frickel and Gross 2005). Laying out a brief history of psychedelic science, I detail how the contemporary origins of the psychedelic science movement are rooted in grievances surrounding the prohibition of psychedelic use and research. Additionally, I show how the movement has benefited from certain structural arrangements, as well as engaged in concerted effort to create the structural conditions necessary for the success of the movement—for example, the establishment of non-profit research organizations, academic research centers, scientific journals, conferences, and other mobilization structures for stabilizing the movement’s knowledge practices.

Next, through the quotes of my interview participants, I should how the psychedelic-assisted psychotherapy model is understood by many researchers in the field to be a radical departure from conventional psychiatric practice. For instance, psychedelics produce a rapid onset of antidepressant effects. Additionally, psychedelics' therapeutic effects appear to operate through transdiagnostic mechanisms meaning they have demonstrated efficacy for several previously medicalized ailments. On this basis, psychedelics are assumed by many to be curative or otherwise influence deeper root issues compared to the symptom management approach common to other psychopharmaceuticals. Last, I started to reveal some of the tensions in the field that stemming from interdisciplinary nature of the field. These tensions are explored further in the subsequent chapters, specifically as it relates to the centrality of neuroscience to the production of psychedelic legitimacy and issues surrounding biomedicalization.

According for Frickel and Gross(2005), a SIM needs use familiar frameworks or formulations to package challenging or alternative knowledge in order to be successful. The centrality of neuroscience for the legitimation of the psychedelic science movement is part of such an effort. Although the field is nominally interdisciplinary and the concepts of set and setting have drawn the interest of scholars in the social sciences and humanities, the influence of neuroscience has helped further biomedicalization in the field. Along these lines, I introduced the notion of psychedelic biomedicalization to address how the field of psychedelic science has been influenced by several biomedicalizing processes. I outlined examples of how

psychedelic biomedicalization has occurred in line with the five key processes: a transformative orientation towards identities and bodies, technoscientization of biomedicine, transformations in the production and distribution of knowledge, economic changes to the biomedical sector, and a focus on health risk and surveillance (Clarke et al. 2003, 2009).

Over the course of the following chapters, I argue that psychedelics are being recast as biomedical tools for correcting individuals' minds and brains and that the biomedicalizing processes responsible for this transformation have fueled tensions within the movement. I suggest that despite the potential for meaningful contributions from diverse disciplines, neuroscience is privileged as part of an implicit strategy for receiving biomedical legitimacy. Specifically, in the following chapter, I investigate in greater detail how psychedelic science displays a transformative orientation towards individuals' minds and brains, which is tied to the technoscientific developments informing neuroscientific knowledge production. This is most notably manifest in discussions pertaining to psychedelics' mechanisms of action. Specifically, psychedelics are being posed as neurotechnologies capable of facilitating neuroplasticity, which can be leveraged for the purposes of therapy or enhancement. I detail how this is indicative of a pervasive neuroreductionist tendency in psychedelic science, as well as how it is entangled with economic trends associated with biomedicalization.

Chapter 3

AGENTS OF PLASTICITY

“Biochemical knowledge will be applied to manage the synaptic patterns which keep people bogged down in repetitious helplessness. Self-managed brain control is in the future deck.”

(Timothy Leary 1983:35)

Introduction

Each drug possesses a unique “social history” (DeGrandpre 2006), a biography as a scientific object (Daston 2000), and even human-like characteristics as it has been personified through marketing and advertising practices (Martin 2006) informing how it is currently evaluated in public discourse. As Derrida reminds us, “drugs” do not appear “in nature” (Israel 1997). Rather, scientific practices produce the boundaries that are constitutive of the category of drugs and even specific classifications. Furthermore, as they are developed and put to use through scientific practices, drugs are transformed into scientific *products* or *technologies*.

Psychedelics have a long history of use in religious rites around the world. Their application as scientific technologies in the United States was forestalled by convergent social forces including a social movement based on the use of psychedelics as consciousness expanding drugs. In turn, psychedelics have been the subject of stigma due to associations with Timothy Leary’s irreverent promotion of the right to change one’s own consciousness, negative perceptions of hippies and the broader

countercultural movement of the 1960s, and the notion that bad trips could make users go insane. In the transformation of psychedelics into scientific technologies, they have taken on specific qualities in light of their social and cultural significance and criminalization. For example, Giffort (2020) has previously shown how psychedelic researchers have engaged in impression management techniques to evoke serious, professional, and even “boring” personas to distance themselves and psychedelics from countercultural associations. Moreover, in pursuit of public and institutional legitimacy, the psychedelic science movement has been structured around the goal of rehabilitating the image of psychedelics and demonstrating their medical utility.

While contemporary psychedelic science plausibly represents a paradigm shift in mental health treatment due to the ways it challenges prevailing modes of mental health treatment, the movement also displays several qualities signaling the influence of biomedicalization. Specifically, technoscientific advancements that make the body and brain increasingly legible at the most fundamental levels of biology and neurobiology have increasingly subjected the human body to the (neuro)molecular gaze of biomedical science (Abi-Rached and Rose 2010; Rose 2007, 2016b). In turn, many mental health conditions and corresponding treatments are increasingly conceptualized in molecular terms—a process known as (neuro)molecularization (Clarke et al. 2009; Rose and Abi-Rached 2013). I argue that knowledge practices in the psychedelic science movement have been shaped by the salience of neuromolecularization, particularly in discussions of therapeutic mechanisms.

Additionally, improved technological capabilities have inspired confidence that because we can measure and visualize components and processes at this neuromolecular level, we can also intervene to control, modify, and transform bodily processes. This transformative orientation is the most fundamental quality of biomedicalization. Since it is still largely unclear (or unsettled) how exactly psychedelics produce a therapeutic response, one of the central scientific questions bringing the field together concerns how psychedelics facilitate transformative change in individuals diagnosed with mental health conditions.

There are several competing explanations and hypotheses for psychedelics' clinical utility that variously focus on neurobiological, cognitive, or social dimensions of psychedelic-assisted change (see van Elk and Yaden 2022). However, brain-based explanations have largely taken precedence. Neuroscience has played a large part in helping launch the psychedelic renaissance into the mainstream (Giffort 2020; Langlitz 2013). Even though psychedelic science is a notably interdisciplinary movement, the central role of neuroscience in the psychedelic renaissance has been well established (Langlitz 2013; Giffort 2020). Through techniques for observing and constructing images of activity in the brain, neuroscience lends public and institutional legitimacy to the study of psychedelics (Giffort 2020:94-98). Receptors, neuronal networks, or brain regions are commonly invoked in discussions of mechanisms underlying long-term subjective change following psychedelic administration.

Given the brain changes observed during and following psychedelic use, *neuroplasticity* has emerged as a popular concept to generally describe how

psychedelics effect the brain and contribute to self-transformation (Banks et al. 2021; Lepow, Morishita, and Yehuda 2021; Nichols and Nichols 2022; Olson 2018). Neuroplasticity has become a popular buzzword gesturing at the brain's capacity for change. Additionally, neuroplasticity generally serves the rhetorical function of implying that we can directly *act* on the brain (Rose and Abi-Rached 2013). In turn, as discussions of psychedelics' mechanisms of action have recently centered around their capacity to facilitate changes to neuronal arrangements, I explore psychedelics as agents of plasticity.

The remainder of this chapter interrogates neuroplasticity as a potential mechanism underlying psychedelic change. First, I briefly describe how neuroplasticity has become one of the foremost mechanistic explanations for psychedelic-assisted therapy's efficacy by exploring the role of animal models in psychedelic research. I address how the neuromolecular level is privileged in discussions about psychedelic therapeutic effects. Next, I suggest that this has manifested as a neuroreductionist approach to psychedelics' effects through the accounts of my participants. Finally, I explore how neuroplasticity is situated as a mechanism of transformative therapeutic change within psychedelic science. I show how this transformative orientation is intertwined with attempts to constitute psychedelics as promissory capital, as researchers and scientists project future applications.

(Neuro)molecularization and the “Discovery” of Psychedelic-Facilitated Plasticity

“In science, just as in art and in life, only that which is true to culture is true to nature.”

Ludwik Fleck (1981[1935]:35)

The notion of psychedelic facilitated neuroplasticity is a byproduct of several processes associated with biomedicalization in the latter half of the 20th century (Clarke et al. 2009). During the 1960s, the formation of neuroscience as a bona fide discipline arose from an interdisciplinary realignment involving several physical and life sciences (Abi-Rached and Rose 2010). Blending the molecular perspectives of disciplines such as physics and chemistry with those of biology, neurology, and psychology, neuroscience cast a neuromolecular gaze on the brain to understand its most basic processes and how these processes relate to consciousness, cognition, perception, and behavior (Abi-Rached and Rose 2010; Rose and Abi-Rached 2013). The epistemic shift from a clinical to a neuromolecular gaze was co-constituted by a several technoscientific developments that enhanced scientific capacity to perceive “fundamental” components of neurobiology, which made the brain increasingly legible at neural, synaptic, and molecular levels (Abi-Rached and Rose 2010). These new techniques for visualizing the body played a considerable role in shaping the notion of neuroplasticity and eventually psychedelic facilitated neuroplasticity.

Prominent among these techniques have been various types of animal models, which were used to produce notable findings such as long-term potentiation (Bliss and Lomo 1973) and critical periods of neurodevelopment linked to sensory experiences

(Hubel and Weisel 1970). The production and application of imaging technologies, such as positron emission tomography (PET), magnetic resonance imaging (MRI), and functional magnetic resonance imaging (fMRI), to visualize activity in living brains made it possible to understand how certain regions and structures were involved in or related to experiences, activities, and conditions (Joyce 2006; Rose 2007:196; Rose and Abi-Rached 2013). The growth of neuroimaging studies during the Decade of the Brain also brought about more knowledge of neuroplasticity with studies showing continued neurodevelopment into young adulthood (e.g. Giedd 2004; Sowell et al. 1999) and experience dependent differences in brain structure (e.g. Maguire et al. 2000; Maguire, Woollett, and Spiers 2006; for review Pitts-Taylor 2016).

Psychedelic science has not escaped this broader cultural shift towards the molecularization of biomedical problems and solutions. The field owes much to the molecular orientation driving animal experimentation and neuroimaging, and the prevalence of neuroplasticity as an explanatory mechanism for psychedelics' therapeutic properties stems directly from their influence. Along with anthropological research on hallucinogens, animal studies were one of the only forms of psychedelic research to persist during the so-called "moratorium" on psychedelic research involving human subjects following the cultural conflict over the drugs in the 1960s (Langlitz 2013). Predominantly within psychotomimetic or "drugs of abuse" frameworks, this animal research aimed at understanding how psychedelics affect the brain helped establish foundational knowledge for the field, such as psychedelics' affinity for the 5HT_{2A} (serotonin) receptor and the role played by the 5HT_{2A} receptor

in generating psychedelics' subjective effects. Beyond animal models, neuroimaging studies have played a significant role in legitimating the revival of psychedelic research (Langlitz 2013).

Throughout my interviews, the prevalence of a neuromolecular style of thought aided by various techniques for observing basic processes in brains was a prominent theme. Many of the researchers I spoke to invoked evidence from rodent models or neuroimaging studies when referring to psychedelic mechanisms. Their responses also indicate how psychedelic science has been shaped by the technoscientization of medicine, since the use of animal models is a core feature of molecularization and is now considered an essential branch of psychedelic science. When I interviewed Gary, a researcher engaged in basic science, he suggested that animal models and neuroimaging are two of the fundamental domains of psychedelic science. According to him and several others, animal models are the best tool to address questions pertaining to the mechanisms underlying psychedelics' therapeutic potential.

So you can sort of think of psychedelic science as this sort of three arm or this three legged stool where you've got the clinical side of things which doesn't tell you anything about mechanism. But, you've got the imaging side of things which are the sexy aspect of it, you know what you show this pretty picture of these brain network connectivity plots and whatnot...but that's kind of like looking at a roadmap from a satellite. You can see where the traffic is going, but it still doesn't tell you what psychedelics are doing in the brain.

It's really purely descriptive at that level. It's not mechanistic other than it will tell you what circuits are potentially being influenced for their connectivity that correlate with the behavioral outcomes... It doesn't tell you what psychedelics are doing in the brain to really produce those changes in network connectivity at the synaptic level and cellular level that really underlies everything. So the animal models come in, where we're able to give several of these drugs to the animal models to see what effect that has on cellular function, on the what's it doing to excitatory neurons, what's it doing to the inhibitory neurons, what is it doing to astrocytes, how is it affecting neurotransmitters synthesis and release—really, the nuts and bolts.

The importance of animal models to the production of knowledge in psychedelic science stems in part from the ready availability of animal subjects through commercial entities that breed and sell rodents to labs, as well as from the potential to run multiple experiments simultaneously or within a short timespan (Langlitz 2013:170). However, even more important than the expedience of animal experimentation is how such research provides the opportunity to make observations otherwise unattainable with human participants.

As Gary went on to suggest, animal models are a vital way to understand how psychedelics interact with and affect the brain at a molecular level because they allow researchers to “look at actual brain tissues and cells” in living and dead animals. I spoke with one PhD candidate, Noah, who conducts basic science with psychedelics, and he similarly remarked how animal models permitted greater resolution of the molecular level using invasive techniques.

With animal work, which is true of animal work in general and any kind of biomolecular studies, you can really probe into some of the deeper brain structures. You can do more invasive techniques to learn more about what's actually happening in the brain when these substances are administered.

Measurements of electrical activity in the brain, changes in neurochemistry, the role of various receptors in producing drug effects, the expression of plasticity related genes, or changes in synaptic density in particular regions of the brain are obtained through a variety of invasive procedures such as drilling screws into skulls, placing additional probes to sample brain fluid, and ultimately “sacrificing” the animal for post-mortem examination of brain tissues.

When I asked about the relevance of animal models for understanding psychedelics’ action in human brains, a postdoctoral neuroscientist named Jason highlighted how animal experimentation, while invasive and sometimes disturbing, can provide potentially valuable knowledge about the neuromolecular mechanisms underlying psychedelics’ effects.

In a rodent model, there are more invasive things that can be done with them come with their own baggage of ethics. But there are... studies conducted that you can kind of understand that [molecular level] a little more. Personally that's why I got out, it was just too scarring to the soul to be honest with you. But then that's kind of where my interest comes in, where I think you can translate [those findings]...So I mean for good or ill, I think having the rodent models does afford some knowledge that you may not get.

Despite the untold animal costs involved in the basic science of psychedelics, researchers who engaged in animal experiments with psychedelics maintained that these models provided valuable knowledge that will contribute to the eventual relief of human suffering by helping to uncover whether psychedelics meaningfully change the underlying biological forms related to mental health conditions, as well as the specific neuromolecular mechanisms involved in healing.

One of the most notable contributions to psychedelic science made with animal research has been research addressing the ways that psychedelics interact with the brain to facilitate various types of neuroplasticity. Since 2018, neuroplasticity has become the foremost explanation for psychedelics' apparently transdiagnostic efficacy and potential as treatments for both a variety of mental health ailments, such as depression, problematic patterns of substance use, and post-traumatic stress, as well as neurodegenerative disorders, chronic-pain, headaches, and brain injury (Banks et al. 2021; Calder and Hasler 2022; Jaster, de la Fuente Revenga, and González-Maeso 2022; Khan et al. 2021; Kozłowska et al. 2022; Lepow et al. 2021; Nardou et al. 2019; Olson 2022; Schindler 2022). The Center for the Neuroscience of Psychedelics at the Massachusetts General Hospital has devoted a unique tab on the homepage of its website to describing the role of neuroplasticity and healing. One recent special issue in the *Journal of Neurochemistry* features eight articles, which all address in some capacity how psychedelics facilitate structural or functional neuroplasticity, synaptogenesis, or how psychedelic-facilitated plasticity is implicated in psychedelics' healing properties. Even the National Institutes of Mental Health published guidelines

for researchers seeking funding to study psychedelic compounds that indicate a prioritization of, among other things, animal research addressing “neuroplastic adaptations in molecular, cellular, and circuit-level processes relevant to mental health.”

One animal study in particular published by researchers from David Olson’s lab at the University of California-Davis is often credited as a turning point for the predominance of neuroplasticity as an explanatory mechanism for psychedelics’ therapeutic potential. This study was the basis for one of the predominant models for explaining psychedelics therapeutic effects—the psychoplastogen model—and prompted the exploration of chemical analogues of psychedelics capable of facilitating neuroplasticity (Olson 2018; Peters and Olson 2021). Compiling the results of a series of experiments administering a variety of psychedelics to neuronal cell cultures and live animals, researchers in Olson’s lab (Ly et al. 2018) found that psychedelics including LSD, DMT, and DOI contribute to dendritic growth, synaptogenesis (the generation of new connections between neurons), and neurogenesis. Since it was not the first study to demonstrate that psychedelics contribute to neuronal growth, Gary was perplexed by the fervor this study caused.

Brian Ross showed. I think back in 2009 that DOI enhanced synaptic dendritic architecture plasticity... another group around the same time, a few years later, was also looking at DOI and showed that it enhanced synaptic density and growth. My own laboratory back in 2015 we were doing Golgi stainings with brains with LSD and showed that LSD enhanced synaptic plasticity in the medial prefrontal cortex. So there

were several investigators, who had found that 5HT2A receptor activation with psychedelics enhances synaptic plasticity. And, for whatever reason, it was David Olson's paper from 2018 that got all the press. So a lot of people mistakenly believe that he “discovered” that psychedelics induce neuroplasticity when that was not the fact. What his paper added to the knowledge was that it was through the mTOR pathway. The other papers have not established that, but he established it.

A number of animal studies centered around psychedelics’ relationship to serotonin (5HT) and the 5HT2A receptor in particular *had* demonstrated that psychedelics’ activation of these receptors was associated with specific neurobiological phenomena denoting neuroplasticity. As early as 1997, researchers at Yale found that the 5HT2A agonist DOI contributes to increased expression of BDNF related genes in the brain’s neocortex (Vaidya et al. 1997). Shortly after the Decade of the Brain when the image of psychedelic research was in reform, Nichols and Sanders-Bush (2002) also showed that LSD influences the expression of two different genes related to synaptic plasticity. In another collaborative study using DOI, Jones et al. (2009) found a relationship between activation of 5HT2A receptors and synaptic plasticity via a specific mechanism involving a protein called Kalirin-7.

Together, these studies exemplify how the discovery of psychedelic induced neuronal growth was supported by the neuromolecular gaze in the form of animal models. Of course, there is direct continuity between the work of Olson and colleagues in the Ly et al. (2018) article and the preceding investigations into the relationship between 5HT2A and neuroplasticity using psychedelics. But this is not enough to

explain why this study made neuroplasticity an unignorable phenomena in psychedelic science. Echoing the ideas of Alfred North Whitehead and Augustus de Morgan, sociologist Robert Merton (1967:13) once suggested that in science, “at any given time, there are approximations to what is soon to develop more fully.” What Olson (2018) developed more fully based on these findings is the notion that neuroplasticity is a fundamental neurobiological effect of psychedelics by lumping them together with other plasticity-inducing substances and labelling them *psychoplastogens*.

Although there were much earlier findings suggesting that psychedelics facilitate neuroplasticity, the significance of plasticity had not fully diffused throughout the psychedelic field, nor had it been widely recognized outside the field prior to the paper published by David Olson’s lab (Ly et al. 2018). In some cases, all that it takes for a scientific concept to gain notoriety over similar preceding formulations is that “an idea be formulated definitively and emphatically enough that it cannot be overlooked by contemporaries” (Merton 1967:16). Olson’s proposal for a new direction in psychedelic science was certainly emphatic enough to attract attention from prominent researchers in the field, biomedicine generally, and the national media sources. Within the psychedelic field, however, the reception has been ambivalent. The findings presented in Ly et al. (Ly et al. 2018) legitimized a widely held assumption about the general neurobiological mechanism associated with psychedelics’ effects. However, the authors also challenged the notion that subjective experiences are central to the healing process with psychedelics by suggesting that there is an urgent need for safer “non-hallucinogenic” psychoplastogens under the

assumption that they will be safer. While this would become the subject of a debate over the relevance of the subjective experience to psychedelics' therapeutic effects, the prospective elimination of the psychedelic experience from the healing process may also be why this received wider interest in biomedicine.

Also important to note is how the move to recast psychedelics as agents of plasticity mirrors many of the key pillars of biomedicalization. In line with the technoscientific orientation intrinsic to processes of biomedicalization, I have so far attempted to show how (neuro)molecularization has permeated psychedelic science through the contributions of the use of animal models, which have played a considerable role in contributing to contemporary notions of psychedelic-facilitated neuroplasticity.

The Problem of Neuroreductionism in Psychedelic Science

“Because neuro-reductionism has powerful effects on our subjectivity, making culture harder for us to see, the need for dissent becomes more acute.” (Martin 2004:207)

In the search for mechanisms to explain clinical effects, psychedelic science displays a noted tendency towards neuroreductionism. Essentially, neuroreductionism refers to the assumption that mental, cognitive, or psychological phenomena can be interpreted as neurobiological processes (Choudhury et al. 2009; Kirmayer and Gold 2011; Martin 2004). Consonant with the growth of neuroscientific knowledge about the brain, which has led some to view psychiatry as “clinically applied neuroscience” (Insel and

Quirion 2005), there has been a general reinterpretation of mental distress that disproportionately emphasizes neurotransmitters, receptors, and neural networks. In turn, treatments for mental distress—reconceived as brain disorders—are thought to target processes occurring at the neurobiological level. Given the predominance of drug treatments, neuroreductionism is often linked to pharmacocentric notions of drug effects, which attribute the effects primarily to the pharmacological characteristics or “molecular essence” (Decorte 2011; DeGrandpre 2006:27). Implicitly, neuroreductionism entails the relative deemphasis of the role of social, cultural or other contextual phenomena to explain the incidence or recovery from mental distress (Choudhury et al. 2009; Kirmayer and Gold 2011). While not ubiquitous due to recognition of the importance of set and setting, neuroreductionism in psychedelic science is evident in the practices, assumptions, and imperatives adopted in the field as it is shaped by processes associated with biomedicalization.

As psychedelic research has centered around demonstrating the drugs’ efficacy as clinical tools for mental health treatment, (neuro)reductive habits of thought have become commonplace within the field, which has a prominent rank of researchers investigating the neurobiological effects of psychedelics in animals and humans. Kirmayer and Gold (2011) outline three types of neuroreductionism that have grown out of neuroscience’s influence on psychiatry, which can also be identified in psychedelic science: 1) methodological reductionism, 2) ontological reductionism, and 3) epistemological reductionism. In showing how these types are manifest in psychedelic science, I aim to introduce a prominent debate within the field about the

relevance of the subjective experience to psychedelics' therapeutic potential, as well as to demonstrate how neuroreductionism informs this debate. Questions about the relevance of the subjective experience of psychedelics to their therapeutic value have emerged as a result of the increasing knowledge about psychedelics' neurobiological—especially their neuroplastic—effects. Specifically, based on evidence from rodent models suggesting that psychedelics' interaction with 5HT2A receptors facilitate neuroplasticity and the potential of developing novel substances capable of instigating neuroplasticity without the subjective experience of psychedelics, Olson (2018, 2021b) has hypothesized that psychedelics' hallmark psychoactive effects are superfluous to their capacity to transform patients' brains. In turn, as I describe how each these types of neuroreductionism are displayed in psychedelic science generally, I also make connections to the debate surrounding the relevance of subjective experience.

First, *methodological reductionism* involves attempts to break complex phenomena into simpler parts or proxies that are more conducive to the available methods and technologies. Animal models are the clearest example of methodological reductionism and the influence of such techniques on psychedelic science is clear. Rodent experiments with psychedelics have contributed to several important findings in the field such as the important role that the 5HT2A receptor plays in producing psychedelic effects, as well as psychedelics' capacity to facilitate neuroplasticity (Jones et al. 2009; Ly et al. 2018; Nardou et al. 2019; Nichols and Sanders-Bush 2002; Shao et al. 2021; Vaidya et al. 1997). Yet, while rodent experiments may allow access

to otherwise unattainable observations, as the participants I quoted previously emphasized; at the same time, these experiments oversimplify the effects of psychedelics, as well as psychiatric constructs such as depression, post-traumatic stress, etc. For instance, in rodent models, the wide-ranging effects experienced by humans who take psychedelics are reduced to what are known as “head-twitch” responses—a behavioral indicator of drug response in rodents. Carhart-Harris refers to the disconnect of the head-twitch response as a “non-specific” marker of the humans’ psychedelic experience that presents a significant translational challenge for psychedelic medicine due to its “negligible face validity”.

When asked about the translational value of rodent models in psychedelic science, a neuroscientist I interviewed named Mark also described some of the shortcomings associated with this form of methodological reductionism.

I think there's two there's two issues ... and I think both are actually pretty interesting. One issue is at the receptor level it's known that the receptor the serotonin receptors that are likely involved in the psychedelic experience are structurally different than mice and humans. And so that sort of places a limit on what we can learn from mice and extrapolate to human subjects. That problem can be addressed by creating transgenic mice that basically carry human versions of those receptors and that work is in progress, not by me, but by others... so I think that there are distinctions between mice and humans in that regard, in terms of the receptor pharmacology. But I don't think that they're completely distinct... But ultimately you know we won't really have a satisfying explanation for how psychedelics work in human subjects until we do the experiments in human subjects.

According to Mark, one of the biggest translational difficulties of rodent models is the neurophysiological differences between mice and humans. Though increasingly techno-scientific methods of biomedicine may allow for a closer approximation to human receptors in animal models, Mark concedes that more satisfying explanations require human experiments. However, with human experiments, layers of complexity are added as we move from rodents' to humans' experiences of psychedelics.

I think the other interesting distinction between mice and humans is that it's... unlikely that mice are having a comparably rich psychedelic experience to what humans have. And actually I'm agnostic as to whether at the sensory level they're seeing shit that's as crazy as we see on psychedelics. But I think that, certainly the context in which the mice put that experience is very different. So that what that says to me is that, if we can show that there are changes in mouse behavior in validated models of psychiatric disorders after administration psychedelics, then it can't all entirely be due to the psychedelic experience of human subjects. There must also be things going on at the receptor and circuitry level that are sort of underlying that experience or possibly even disconnected from life experience.

To some, it may seem an obvious suggestion that rodents' experiences of "mind-manifesting" drugs is not as rich as a humans'. This is interpreted by some as a fundamental translational challenge for psychedelics since people's experience of psychedelics seems to be fundamentally entangled with why they are valued in the first place. For Mark, the possibility that rodents' experiences of psychedelics are relatively muted compared to humans' is useful for understandings psychedelics' basic receptor and circuitry level effects.

Alluding to the question, which was already looming in the field by the time of our interview, about whether the subjective experience is ultimately necessary for psychedelics' therapeutic effects, Mark suggests that if psychedelics were effective in rodent models of depression despite the incapacity for a comparatively rich experience, then it is possible psychedelics' therapeutic mechanisms are independent of the experience. In other words, rather than posing a translational challenge for understanding how psychedelics work in humans, he suggests that rodent models may serve as evidence in favor of the hypothesis that the subjective psychedelic experience is expendable from a clinical standpoint. Indeed, Olson's proposal to develop new compounds based on psychedelics that can facilitate neuroplasticity without the psychoactive effects is ultimately based on such methodological reductionism.

By attempting to understand psychedelics' basic or fundamental mechanisms through in vitro and animal studies, neurobiological processes such as neuroplasticity present as *the* predominant mechanism in the absence of attention to mediating phenomena that need to be considered when attempting to understand psychedelics in humans. Moreover, the subsequent attempts to develop novel plastogenic compounds reinforces methodological reductionism in the use of animal experiments to show "anti-depressant" effects and a lack of psychedelic activity as measured by non-specific markers such as head twitch responses and prepulse inhibition. While the apparently anti-depressant and non-psychoactive qualities of these compounds are found in highly controlled animal experiments, both depression and drug effects experienced by humans are considerably more complex phenomena that entail

processes occurring at high levels of analysis. Thus, as these compounds advance to human trials, there are good reasons for skepticism about the apparently non-psychoactive qualities of these drugs, as well as their potential for efficacy as treatments for mental distress—especially as classic pharmaceutical drugs.

While the predominance of animal models in the search for psychedelics' mechanisms and the pursuit of novel compounds based on psychedelics' chemical scaffolding can be taken as evidence of methodological reductionism, assumptions about what the neuromolecular insights produced in these experiments can tell us about the nature of mental health, why psychedelics are effective treatments for mental distress, and how psychedelics can be most effectively implemented in medicine brings us to the second form of neuroreductionism in psychedelic science. *Ontological reductionism* refers to the tendency to assume that “higher order phenomena” are indistinct from their more basic underlying parts (Kirmayer and Gold 2011:309). In other words, social, psychological, cognitive, perceptual, or emotional phenomena are thought to be derived from and explainable in terms of the brain and its underlying processes. Most often, this is displayed in how mental distress and specific disorders are conceived in psychedelic science.

The tendency to generally conceive of mental disorders in neurobiological terms can be partially tied to the field's quest for biomedical legitimacy and acceptance of psychedelics into psychiatry's tool-kit. Yet, while neurobiological explanations of consciousness and mental disorder may lend some credibility to psychiatric nosology and practice, the neuroscientific evidence lags behind the desire

to locate mental health disorders in the brain, and prior theories of such as the serotonin hypothesis of depression have been called into question (Ang et al. 2022; Fuchs 2011a; Kirmayer and Gold 2011; Moncrieff 2008b; Moncrieff et al. 2022; Pilgrim 2014; Rose 2016a). One clinical professor I spoke with named Arnold, who has worked in psychiatric medicine for nearly 20 years, noted a discrepancy between the impetus to conceive of mental health issues as neurobiological diseases and the scientific support for these conceptions.

In our quest for kind of legitimacy in psychiatry like we wanted to have brain diseases that are just like pulmonary diseases that pulmonologists deal with. It's like ours are just in the brain organ instead of the lung organ. "Oh, by the way our organ is super more complicated than yours." ... So we try and apply this like this tissue pathology metaphor to the brain and then you say "well, show me the broken spot." You're like "well we think it's in this micro connections" and "we think it's a the neurotransmitter level", ... and so that the explanatory model starts to kind of fall apart, a little bit right because we just don't have the science to really explain it yet.

For Arnold, treating mental illnesses as brain diseases analogous to other physical ailments is part of psychiatry's pursuit of legitimation as a medical specialty. While attempting to root categories of mental disorder in neurobiological phenomena may provide some legitimacy to psychiatric diagnostic categories and clinical practices due to the esteem of neuroscientific methods, Arnold notes the science has not borne out sufficiently meaningful or actionable explanations for mental distress. Many social scientific observers of neuroscience and psychiatry have similarly pointed out that

neuroscience has not produced any meaningful contributions to psychiatric practice or nosology—the classification of mental disorders (Pilgrim 2007, 2014; Rose 2016a)

Nonetheless, as the field has worked to gain approval for the use of psychedelics in biomedicine, the brain has similarly been centered in psychedelic science. Although the important of set and setting to the field serves as a bit of a protectant from ontological reductionism, neuroscientific knowledge about the brain is assumed to be authoritative and valid. In part, this stems from the technoscientific methods of neuroscience lending greater insight into the material reality of mental phenomena. When I spoke with Manoj Doss, a neuroscientist and postdoctoral researcher at Johns Hopkins Center for Consciousness and Psychedelic Research, he noted how neuroscience, and specifically brain imaging, has been used to legitimize psychedelic science.

I think that if you just show a picture of a brain in the background people look more credible. And that's sort of what I think psychedelic research did, you know...we now have a bunch of brains on psychedelics... I've said this before, but fMRI has never been used in psychiatry. It's never been used for diagnosis, prognosis, nothing, and so the idea that this makes us more credible because we have brains from functional magnetic resonance imaging is, yeah that's not good—especially when we're interpreting resting state brains where it's like we have no idea what's going on in their mind.

Despite the capability to construct images of “brains on psychedelics” through neuroscientific methods, Doss does not perceive the credibility afforded to brain

imaging as a positive trend in psychedelic science. The fact that fMRI has not meaningfully contributed to psychiatric practice ultimately raises questions about how and why neuroimaging techniques should legitimate psychedelic science. Yet, as the results of neuroimaging techniques appear authoritative and seem to shed light on the underlying mechanisms of psychedelic assisted psychotherapy, Doss suggests that interpretations of brain observations are disconnected from what is happening in the minds of people laying in the scanners.

The disconnect between observations of the human brain and what a person is experiencing is ultimately at the heart of the debate about the relevance of the subjective effects to the therapeutic process. Olson (Olson 2021b:563) frequently poses psychedelics and non-psychoactive psychoplastogenic analogues as treatments for “neuropsychiatric disorders”—a designation that explicitly locates the source of mental distress in “atrophy of neurons in the prefrontal cortex.” Despite the lack of evidence to support the “neuro” basis of “neuropsychiatric disorders”, the ability to make neuromolecular observations with brain imaging and animal model research has contributed the notion that psychological conditions are indistinct from and arise from malformed or malfunctioning neuronal arrangements. As Fuchs (2021:183) mentions in his critique of neuroscience’s influence on psychiatry, “what can be measured and grasped by technical means determines what is considered significant and finally regarded as actual reality.” In the same way, discernment of psychedelics’ capacity to induce neuroplasticity through animal models and brain imaging has inflated the

importance of neuromolecular phenomena in the description of psychedelics' therapeutic mechanisms to the detriment of alternative explanations.

Along these lines, the last form of neuroreductionism displayed in psychedelic science is *epistemological reductionism*. This form of reductionism assumes that knowledge about phenomena occurring at different levels of analysis, such as cognitive, social-environmental, or biographical, are unnecessary for understanding consciousness or psychological distress. Researchers I spoke to implicitly referred to epistemological reductionism in their critiques of brain-centered descriptions of psychedelics effects. Morgan Shipley, a religious studies scholar at Michigan State University, referenced the limitations of reductionist science when I asked him about how religious studies can contribute to the psychedelic science movement.

There's been a tendency to try to overly, what would be the best word here, to overly stress the material the trackable. The physiological aspects of what psychedelics do to one's body... We are not strictly material cogs. We are not simply these you know electronic systems that you push a button and something happens...

According to Shipley, the emphasis on physiological descriptions of psychedelics' effects is connected to the view that humans are amenable to essentially mechanical interventions directed at biological systems. Of course, the technical approach to *transforming* the human body he refers to is emboldened by the enhanced capacity to observe neurobiological correlates of the psychedelic experience. However, Shipley suggests that this (neruo)biological knowledge may not ultimately be enough.

Wonderful now we know these substances work at the physiological level, but is that enough to understand their value as to why somebody might be able to deal with the stress of a sexual trauma or the stress of war or more on the mundane level somebody who's simply trying to you know recognize their worth in an egotistical materialistic driven consumptive society like we're in right now.

For Shipley, overemphasis on neurobiological knowledge may come at the expense of other relevant considerations, perspectives, and approaches to knowledge that may actually provide more insight into why psychedelics are useful to people who experience persistent mental health issues. Touching on two social psychological phenomena—experiences of trauma and consumerism—Shipley insinuates that the circumstances and past experiences of the people who benefit need to be considered to understand the value of psychedelics for mental health treatment.

In other words, due to the predominance of neuroscientific knowledge in psychedelic science, other ways of understanding psychedelics' therapeutic effects are largely overshadowed by explanations that address the brain. As one psychologist named Alden I spoke to points out, neuroscientific explanations are volatile and incapable of accounting for other phenomena known to be important.

I think that the neurobiological mechanisms are highly faddish, and there's actually not any really strong evidence that any one of them is ascendant. In any given year, things will come into and out of ascendancy. 5HT2A regulation, the DMN [default mode network], the TPN [task positive network], the neuroinflammatory hypothesis, the neuroplasticity hypothesis—Quite probably all of these things are potentially multi causally true anyway and may be linked. But they're also only neurobiological

hypotheses. They have nothing to say about complementary psychological and frankly, theological and religious experiences which we know to be by the evidence strong predictors of treatment outcome.

The neurobiological stuff we don't really know much about it. In any given year, there's like a lot of "hub-bub" about like this new theory about why psychedelics work in the brain... This relies on a highly reductivist and positivist idea that the human mind is the material reality, and everything else is just evanescent vapors, and that that's the real thing. And if we can show this in the brain, then, therefore it is real, and we have evidence to support real change. And I think that that entire worldview is regressive and infantile, frankly.

Despite the excitement surrounding neurobiological hypotheses about psychedelics mechanisms, Alden maintains that the available evidence is insufficient to support any specific theory. Although the specific phenomena referenced in these hypotheses are all likely involved in psychedelic change, the neurobiological orientation only addresses one of the many elements involved in psychedelic change. For Alden, the reductionism inherent in notion that neurobiological processes are the only "real thing" whereas psychological, social, and cultural phenomena are all just "vapors" is "regressive and infantile."

However, in addition to naïve realism about neuroscientific knowledge, the appeal of neuroreductionist explanations in psychedelic science stems from their resonance with broader cultural trends and the cultural legitimacy accorded to neuroscientific knowledge. The various forms of neuroreductionism in psychedelic science may be taken as symptoms of wider trends associated with the rising influence

of neuroscience in psychiatry and popular culture. For instance, in addition to the influence of neuroimaging, the attractiveness of neuroreductionist explanations for mental health issues stems in part from the generation of partial explanations for specific ailments and the perception that biomedical explanations function to destigmatize individuals diagnosed with mental health issues (Kirmayer and Gold 2011). Moreover, neuroreductionism can be seen as a byproduct the inflated claims (i.e. “hype”) associated with pharmaceutical promotion and the inconvenience or difficulty of addressing sociopolitical phenomena that contribute to the occurrence of mental health ailments (Kirmayer and Gold 2011; Moncrieff 2006, 2009). As psychedelic science has increasingly appealed to biomedical sensibilities to achieve federal approval of psychedelics as medicines, neuroreductionist explanations provide a convincing case for psychedelics that fits seamlessly within familiar (biological) psychiatric frameworks. Although he described the overall worldview as “infantile,” Alden ultimately remained ambivalent about neuroreductionism in psychedelic science due to legitimacy it provides to the movement. He continued:

I'm totally in favor of neurobiological hypotheses and research and brain imaging data being used as a mechanism to legitimize psychedelic medicine for the broader public. I think that that's not only inevitable, but like very potentially very helpful. And if that's what people find most useful as a frame to understand what's going on and why these things work? And why this class of going on compounds is a new class in psychiatry and very highly effective? I'm all for that. In fact, I see it as a subversive tactic. If your tactic is to shape and change culture in a revolutionary way, what better

Trojan Horse than to use the neurobiological hypothesis to make an argument to the culture-of-legitimacy of what is ultimately a profoundly radical and marginal practice in our current culture, which is secular medicine.

Viewing the strategic use of neuroscience to convince the wider public of psychedelics' utility as medicines as a "subversive tactic", Alden suggests that neuroscience can help the psychedelic movement achieve its "radical" reshaping of medicine's approach to mental health treatment.

Others in the field are less convinced that the Trojan Horse of neuroreductionism will help reform biomedical approaches to mental health treatment. So why is it that the prospect of non-psychoactive drugs capable of inducing neuroplasticity is so alluring that it has become a central debate in the field? In line with the broader thrust of biomedicalization and contemporary biopolitics, the molecular gaze was not purely academic, despite the intellectual motives of individual scientists. It was accompanied by an increasing sense that because we are able to visualize and measure the most fundamental components of our neurobiological nature, we can also potentially manipulate our biology towards desired ends. In turn, the shift from "psychedelics" to "psychoplastogens" reframes substances from "mind-manifesting" drugs to "plasticity-generating" neurotechnologies useful for reshaping human life at the most fundamental levels of the brain. In the following section, I track how this transformative orientation reflective of biomedicalization manifests in discussions of psychedelics' therapeutic potential. Specifically, I explore how psychedelics have been reshaped as tools for transforming individual brains (rather

than psyches), as well as some of the dynamics contributing to the “hype” surrounding psychedelics, neuroplasticity, and plastogenic analogues.

Hype and hand-waving: Rewiring the brain through psychedelic-facilitated neuroplasticity

I previously examined the prevalence of the molecular gaze manifest in discussions of animal models, which became evident throughout my interviews with several psychedelic scientists, and has been integral to establishing neuroplasticity as the foremost explanation for psychedelics’ therapeutic effects more broadly. The growth of the molecular perspective is essential both to what Rose (2007:15-16) refers to as an “epistemic shift” and Clarke et al. (2009:22) consider to be a major transition from medicalization to biomedicalization. Yet, the molecular perspective alone has not been enough to usher in a new era in medicine. The expanding capacities to observe and visualize fundamental biological phenomena has also been accompanied by an increasing sense that these same phenomena can be manipulated with unprecedented precision. Whereas medical interventions previously sought to regulate, control, and treat certain conditions, more recent technoscientific interventions promise biomedical professionals the ability to harness specific biological processes and transform the body. In turn, transforming the body has become a central ambition in biomedical science and a major pillar of biomedicalization in general (Clarke et al. 2009).

Indeed, the transformative potential of psychedelics is one of the main sources of excitement about their various applications in scientific discourse and popular

media. Although transformational language pervades psychedelic discourse, the predominance of the neuromolecular gaze has meant that the brain is often framed as the basic or “ultimate” target of transformation in psychedelic medicine. Max, a neuroscientist at a Western university attributed psychedelics’ potential to revolutionize mental health care to their brain-altering effects.

Addiction, depression, anxiety, trauma, these are horrible problems in our society. They're only getting worse and massively compounded by the pandemic. We really don't have answers as a society and certainly the medical profession has very, very limited tools...the typical pharmaceutical model, you get on a drug and just take it to mitigate your symptoms for your whole life. In the best case, this is a cure. This is a targeted intervention. Something changes in people's brains, and they no longer have the disorder. Or, they have much, much, much reduced from the disorder. I think that's you know totally transformative, not just for health, but for our entire society.

Psychedelics’ capacity to transform the brain (and ultimately the mind) of users purportedly hinges on their apparent “plastogenic” properties that create temporary states wherein the brain is more amenable to change. Here it can be seen how these plastic properties are seen by some as underlying the potential of psychedelics as *curative* solutions for a number of disorders.

Along these lines, neuroplasticity as a mechanism underlying psychedelics’ therapeutic applications has thoroughly diffused the psychedelic science. As *in vitro* experiments, animal models, and human imaging studies have shown that psychedelics contribute to dendritic growth, synaptogenesis, synaptic plasticity,

neurogenesis, elevated peripheral BDNF levels, acute and sub-acute changes in neural connectivity, and long term changes in connectivity between specific brain regions (for review, see Aleksandrova and Phillips 2021; Calder and Hasler 2022; Grieco et al. 2022; Inserra, De Gregorio, and Gobbi 2021; Kwan et al. 2022; Lukasiewicz et al. 2021; Olson 2022; de Vos, Mason, and Kuypers 2021), several models have been introduced to clarify precisely how psychedelic-facilitated neuroplasticity can be leveraged therapeutically.

One of the most prominent models of neuroplastic change in psychedelic science builds upon the concept of “critical periods” of neuroplasticity. When I asked Caden, a professor I spoke with who researches psychedelics in rodent models and humans, about neuroplasticity, he suggested that the neuroplastic changes psychedelics induce are ultimately what distinguishes psychedelics from other therapies.

So to me the reason that [neuroplasticity is] worth looking at from a clinical perspective is: if there's no additional biological “special sauce”... that the psychedelics are inducing, then the question is, why is this any better than psychotherapy without psychedelics? So unless there's some window being generated where you have enhanced capacity to respond to the stimuli and the interventions that you're getting, you know it sort of begs the question why the drug is even all that important in the first place.

Although he ultimately maintains that the biological changes are what contributes to changes, this professor maintains that the importance of these changes lie in the fact

that these changes enable higher order phenomena to influence underlying neurobiology.

This concept dates back to William James' (1917) discussion of habit, and became properly neuroscientific when Hubel and Wiesel (1970) ran their famous kitten experiments, which found that fundamental sensory capacities such as vision are formed through stimulating experiences during "critical" windows of neurodevelopment. The basic idea suggests that there are certain times throughout life and development when neural growth is most productive and the formation of neural structures are highly susceptible to experiential influence. Evidence from one rodent study suggests that MDMA reopens a critical period of social learning wherein the susceptibility to place-conditioning is enhanced and correlated with activity changes in the nucleus accumbens (Nardou et al. 2019). Researchers from the Mt. Sinai School of Medicine's Center for Psychedelic Psychotherapy and Trauma Research (Lepow et al. 2021) have built upon such findings to forward the hypothesis that psychedelics induce plastic brain states reminiscent of neurodevelopment, which essentially magnifies the role of environmental input in shaping neuronal arrangements and contributes to psychedelics' utility as adjuncts to psychotherapy.

The critical period of plasticity framework has found some support from neuroimaging studies that show heightened levels of neural connectivity during the acute experience of psychedelics, which have subsequently been interpreted as resembling the brain states of infants (Carhart-Harris and Friston 2019:326).

Journalistic media briefly picked up this notion that psychedelics produce infant-like

brain states. Articles in popular outlets such as National Public Radio (2016) and Reuters (2016) ran headlines reading “Your Brain on LSD Looks a Lot Like a Baby’s” and “Brain Scans Show How LSD Mimics the Mind of a Baby.” Yet, these are just two in a long succession of articles describing the new wave of psychedelic research since Griffiths and colleagues (2006) published results of a double-blind experiment that found psilocybin produced spiritually significant or otherwise personally meaningful experiences among a majority of their healthy sample of participants.

The sensationalist way journalistic media approaches psychedelic science has become a major concern of researchers within the field. Throughout my interviews, “hype” frequently came up in discussions surrounding media coverage of psychedelics and psychedelic science, the state of scientific research informing our knowledge about how psychedelics work, as well as patients’ and research participants’ expectations for their experiences. In line with the varied meanings of the word hype (see Vasterman 2005), this generally manifested as concerns over the buildup of publicity and public enthusiasm, outlandish or unrealistic expectations about psychedelics, and exaggerated or inflated claims made about psychedelics by researchers or news outlets.

On the topic of neuroplasticity, many of the researchers I interviewed expressed some skepticism and concerns about the hype surrounding neuroplasticity as a potential mechanism underlying psychedelic change as compared with the actual state of our knowledge. Jason, the postdoc at a Western university who highlighted

role of the media in advancing inflated claims about neuroplasticity, despite expressing some confidence in the role it plays in psychedelics' potential.

I'm not sure how that's all going to play out in terms of [the research] but it's like me and my friends joke about this. "Yeah like I've seen somebody be more neuroplastic and shit their pants." It's like whatever, right? But I mean it is happening. I think it's pretty unequivocal that it is happening. It's rewiring the brain... The media, maybe runs with that a little bit ... It just kind of gets exaggerated through the media, but I think it's happening.

This researcher's tongue-in-cheek response highlights the indeterminacy of neuroplastic brain states by pointing out how psychedelic experiences may not always appear outwardly therapeutic and may even lead to benign outcomes. Moreover, he acknowledges that the media overstates the significance or explanatory value of neuroplasticity. Yet, while poking fun at the hollow assertion that "psychedelics induce neuroplasticity", he also confidently maintains that psychedelic experiences are "rewiring" the brain and alludes to another prominent model of psychedelic change that has captured significant attention in the field and in public discourse on psychedelics—the psychoplastogen model – discussed previously in relation to David Olson's work.

Olson's psychoplastogen framework—which poses psychedelics as but a few of a potentially larger class of substances capable of inducing neuroplasticity through interaction with the 5HT2A receptor—has generated much hype and controversy within the psychedelic movement. The psychoplastogen framework explicitly

illustrates how the transformative orientation of biomedicine has begun to refashion psychedelics as neurotechnologies capable of reshaping the brain for therapeutic purposes. Specifically, he states, “The advent of psychoplastogenic compounds has enabled us to move beyond simplistic therapeutic strategies aimed at controlling monoamine levels toward the selective modulation of neural circuits—a fundamental shift in our approach to treating [central nervous system] CNS disorders” (Olson 2018:2). In an attempt to break from past “blunt instrument” approaches to the treatment of mental health conditions, one of the purported features of the psychedelic “paradigm shift” in medicine is the apparent specificity with which psychedelics and forthcoming “psychoplastogens” address the neurobiological correlates of psychological conditions. Beyond this, the neuroplastic state psychedelics bring about are purported to offer enhanced precision toward the “selective modulation” of brain structures. While very much portraying itself as a break from the ideal pharmaceutical model of antidepressants, this focus on enhanced precision and selective modulation mirrors past attempts to pose new pharmaceutical drugs as functioning with highly specific mechanisms (Martin 2006; Moncrieff 2008b). Moreover, the notion of selective modulation is an explicit manifestation of the transformative orientation of biomedicine, which aims to modify and transform the body (Clarke et al. 2009)

This notion has been picked up in the academic and popular media as a popular way to describe the neuroplastic effects of psychedelics, as language implying psychedelics effectively “rewire” the brain has become a common shorthand for describing their underlying mechanisms. For example, in Van Elk and Yaden’s

(2022:4) review of the psychoplastogen model and the supporting literature, the authors point to evidence indicating that psychedelics “might well have a therapeutic effect by fostering adaptive rewiring of neural circuits.” One journalistic article published by NBC News profiled a recent clinical trial examining psilocybin for alcohol-use disorder and devoted an entire section of the article to “How psychedelics may ‘rewire’ the brain”, despite the study not including any biological measures (Sullivan et al. 2022). The accompanying video features Michael Bogenschutz, a researcher at New York University’s Center for Psychedelic Medicine, asserting that psychedelics “make it possible for the brain to change more than it ordinarily would,” which is immediately followed by an animated description of neuroplasticity.

Similarly, one neuroscientist I spoke with named Andrew considers neuroplastic rewiring to play a large part in psychedelics’ effects. When asked to define neuroplasticity and describe how it relates to psychedelics he said the following:

The changing of our brain structure and function and so rewiring different neural pathways, basically. I certainly acknowledge that it has a major role in in how psychedelics worked and that it up, especially during the acute experience of psychedelic, allowing for more cross talk between different regions of the brain that might not usually communicate with each other. And I acknowledge again how that can work as a sort of reset in the brain to kind of pave over these ingrained thought loops and habitual thought patterns that people might have that characterize depression, addiction, anxiety, and sometimes chronic pain. And so I certainly think

that it can be or is part of the driving mechanism of how psychedelics work, but I also don't want to discount the role of the body and the integrated nature of the nervous system.

For Andrew, the acute experience of psychedelics allows the brain to become more interconnected, allowing for “cross talk” between regions that are ordinarily separated. Since the brain is more connected, he suggests that connections that were previously dominant may be demoted or “paved over” as the brain “resets”. In turn, the brain can effectively rewire its structure, which is in Andrew’s view a “driving mechanism” of psychedelics’ effects.

However, despite the prominence of such “rewiring” explanations for psychedelic change, some suggest that the excitement about neuroplasticity is disproportionate to the concept’s explanatory value. Three researchers I spoke to suggested that there’s a lot of “hand-waving” about psychedelics’ neuroplastic effects, implying that oftentimes the concept can seem vacuous and disconnected from any specific pharmacological mechanism. Jared, a psychologist and post-doctoral researcher, told me he thinks there is probably more involved than just changes in the brain.

There’s a lot of hand waving right now with neuro plasticity and psychedelics.

Neuroplasticity is the ability for the brain to change and make new connections. That does seem to be in line with the wide variety of effects that we’ve documented with psychedelics being effective for a wide variety of treatments, but like I said, I don't think that's all there is to it. I think this therapeutic window that’s opened by

psychedelics is probably an emergent property of this complex system comprised of expectations, neural plasticity, therapeutic alliance, set and setting. I think that this is a package deal, these things are synergistic.

Jared again invoked the notion psychedelic-induced plasticity functions like a critical window. With this, plasticity alone is not a sufficient mechanism for any meaningful therapeutic effects. Rather, neuroplasticity in conjunction with the other social-psychological dimensions informing the experience operate synergistically to produce psychedelic healing.

A neuroscientist I interviewed named Blake was candid in our discussion of neuroplasticity. When I asked him what makes psychedelics adequate agents to induce neuroplasticity in a clinical setting, he began,

This I why checked the box, “don’t quote me by name”...I'd say it's at least as much hype as science, given our current understanding. It's a great buzzword, without really a deep understanding of what it means underneath in relation to relate it to what the drugs may be doing. You know people read into it kind of what they want to read into the phrase.

As he continued on to point out, the meanings applied to neuroplasticity are diverse, clinicians lack insight into the neurological changes of patients, and studies showing support for psychedelic-facilitated neuroplasticity are scarce. Yet, neuroplasticity serves a useful function by providing a mechanistic narrative that reinforces the rational, technical, and scientific nature of psychedelic interventions.

It's a popular term and it allows us to pretend we're being mechanistic in our understanding of the disease, but I think different people use it in different ways. I think that's why people like the term. You can kind of bring to it what you want to choose to bring to it. Folks like me will be a little bit more insistent on some underlying mechanism that I could really point to—something I can measure in a microscope...Some people are happy to use it in a generic sense of 'well, the brain's changed. Okay, that's plastic.' It is. And when we see changes in resting state networks, which we do, that *is* a reflection of plasticity.

The vagueness and imprecision with which neuroplasticity is used to describe psychedelics' effects was a fairly common concern among researchers I interviewed. Blake suggests people can project any meaning on the concept, while he insists on striving for more specified explanations of mechanism.

During our conversation, Blake revealed a clue as to why individuals and organizations might inadvertently or intentionally contribute to the hype surrounding psychedelics' biomedical potential.

We were talking to somebody—a wealthy person who I won't mention—and when we mentioned plasticity [they] got very excited: 'Oh well, you know if it can open up plasticity to help you stop ruminating and improve your outlook on the world and help your depression, [it could] kind of help you, get to the point where you could learn new languages like you did when you were plastic as a child or learn anything new.'

Blake's interaction with a wealthy person, who was presumably a potential funder as many wealthy people who develop an interest in high-status and innovative research tend to be, begins to lend some insight about the complexities of "hype" in a

burgeoning scientific field. While, on one hand, the hype surrounding psychedelic induced neuroplasticity may exceed the scientific evidence, on the other hand, the *potential* applications of psychedelics and *potential* for biomedical innovations stemming from research on psychedelics and their plastogenic effects makes for an attractive pitch to individuals and entities with the funds to support continuing research. Thus, while extraordinary claims about the promise of psychedelics clinical utility can generate unrealistic expectations, the field also benefits from such hype in the form of legitimation and funding.

The notion that psychedelics *could* be used to alter neuronal arrangements or to develop novel tools for doing so is advantageous for attracting various potential funders and investors. In this way psychedelics are similar to other biotechnologies that attract significant investment and research funds based on future potential. Indeed, potentiality is an important part of the political economic dynamics characterizing biomedicalization, which gains legitimacy through *promissory capital* (Clarke et al. 2009:8). Promissory capital essentially builds upon potentiality and hype, which function to stoke excitement about the future possibilities of emerging fields and their technoscientific developments to generate vital funding to support continued research.

In spite of concern about the “hype bubble” (Yaden, Potash, and Griffiths 2022), the contemporary psychedelic science movement has successfully leveraged possibilities, potentials, and promises to establish the infrastructure and attract the funds necessary to continue research. Psychedelic-facilitated plasticity stands to be especially lucrative for researchers pursuing the psychedelic analogues that are clearly

patentable. For instance, in addition to publishing general guidelines for researchers seeking funding for psychedelics, the National Institutes on Mental Health (June 2022) published a call for funding proposals aimed at the development of “psychoplastogenic” compounds. In addition to the explicit aims of developing novel psychoplastogens for the treatment of substance use disorders, promissory capital is evident in this call-for-proposals’ eligibility criteria, which restricts proposals to for-profit small businesses.

The synthesis of novel substances is one of the principal frontiers for promissory capital in the psychedelic movement. David Olson’s proposal to focus on developing new, “safer”, and non-psychoactive psychoplastogens has coincided with substantial efforts realize such potential in private ventures. A company co-founded by Olson, Delix Therapeutics, raised over \$100 million in the year 2021 to fund Phase 1 clinical trials of two new drugs and the continued expansion of their psychoplastogen discovery program (Delix Therapeutics 2021, 2022b; Garber 2022). With the promise of “*selective* re-wiring of pathological neural circuits” (emphasis in original), Delix projects that its “scientific rigor” will enable the company to lead a “mental health revolution” by bringing novel psychoplastogens to the clinic by 2023 (Delix Therapeutics 2022a). While Olson has perhaps been the most aggressive and prolific in his promises to develop psychoplastogens on psychedelics’ chemical scaffolding, he is not alone in the venture to refashion psychedelics into more precise, efficient, and apparently “safer” neurotechnologies for reshaping the brain.

Bryan Roth, Professor of Pharmacology at the University of North Carolina and Director of the NIMH Psychoactive Drug Screening Program, received \$26.9 million from the Defense Advanced Research Project Agency earmarked for drug discovery using state-of-the-art “structural biology and computational approaches” (Clarke 2020). Previously making notable contributions to understanding how psychedelics’ 5-HT_{2A} receptor agonism is implicated in neuroplasticity, Roth’s current drug development work focuses on developing new 5-HT_{2A} agonists that presumably share similar plastogenic properties without the psychoactive effects of classic psychedelics (for review, see McClure-Begley and Roth 2022). Recently, Roth’s work has culminated in the identification of two compounds that demonstrate similar antidepressant effects of psychedelics without the hallmark “head-twitch” response that is thought to be suggestive of psychedelic effects in rodent models (Derewicz 2022). The patents for these substances are licensed to the company Onsero Therapeutics, which was co-founded by Roth (Kaplan et al. 2022:597)

As a final example of how aspirations centered on leveraging psychedelic-induced neuroplasticity to transform the brain contribute to promissory capital in psychedelic science, one of the main projects taking place at University of California Berkeley’s Center for the Science of Psychedelics seeks to understand the neuroplastic mechanisms underlying long-term changes with psychedelics. Building upon such an understanding, the researchers hope to use the neuromolecular knowledge gained in conjunction with CRISPR genome editing tools to help develop novel “molecular technologies” capable of counteracting defects in neuroplasticity. Although the degree

to which potential neurotechnical advancements motivated the multiple private donations funding the existence of and research taking place at Berkeley's CSP, it is notable that "psychedelics and neuroplasticity" is listed as one of Center's five main areas of investigation.

Conclusion

While the potential for neuroplasticity to explain psychedelics' transformative effects and to serve as a vehicle for continued technoscientific innovation in drug development has generated considerable excitement and investment, the general sentiment expressed by researchers I spoke to was that the discourse around plasticity has exceeded the evidence. Yet, across the board, psychedelic researchers generally concede that neuroplasticity plays some role in psychedelic transformations.

Considerable evidence from preclinical and clinical studies, as well as phenomenological and psychological investigations, does seem to suggest that psychedelic-induced plasticity can contribute to individual transformations. Moreover, researchers, state agencies, investors, and the public are acting on this evidence to adopt psychedelics as biomedical tools for instigating neural and subjective transformations in clinical settings. In other words, psychedelic-generated neuroplasticity is coming into its own as a scientific fact. However, this raises important questions about what to make of psychedelic plastogenesis given that our knowledge of it is shaped by various dynamics of biomedicalization—namely the

neuromolecular gaze, the transformative orientation of biomedicine, and the influence of investment in psychedelics as promissory capital.

Is it possible to disentangle this fact from the social conditions that have produced it? Can the psychedelic science movement retain its revolutionary character in the face of significant capital investment and pressure to refashion psychedelics as technologies for rewiring the brain at a neuromolecular level? And can psychedelics, as agents of neuroplasticity, contribute to neuronal liberation by acting as tools that help individuals make and remake their own brains? In the following chapter, I venture to answer these questions by exploring the neuropolitical conflicts of the psychedelic science movement and the significance of having tools with the power to rapidly induce states of neuroplasticity.

As I come to show in Chapter 6 *Embodying Psychedelic Plasticity*, the privileging of the neuromolecular perspective in mechanistic descriptions of psychedelics may be a hindrance to fully addressing bioethical issues of agency and autonomy, since in pharmacocentric or neuroreductionist models, agency is predominantly ascribed to drugs themselves (Gearin and Devenot 2021). In turn, psychedelics are generally assumed to exert therapeutic effects primarily through pharmacological actions, such as neuroplastogenesis. While neuroreductionist approaches, due to their cultural salience and authority, predominate in psychedelic science, neuroplasticity is ultimately suggestive of the vital importance of the social environment in psychedelic healing.

Chapter 4

THE NEUROPOLITICS OF PSYCHEDELIC TRANSFORMATION

“Indeed, so long as we do not grasp the political, economic, social, and cultural implications of the knowledge of cerebral plasticity available today, we cannot do anything with it.”

(Catherine Malabou 2008:82)

Introduction

Eight years after the decade of the brain, philosopher Catherine Malabou (2008:8) proclaimed that “humans make their brain, but they do not know they are doing so.” She argued (Malabou 2008:13) that the predominant neuroscientific depictions of the brain are largely “political and ideological constructions.” What’s worse, according to Malabou, is that neuronal ideology obscures our fundamental capacity for creatively acting on the brain by rendering individual neurobiology as passive, flexible, and adaptable to external demands of the environment. Yet, emboldened by the growing stock of knowledge about neuroplasticity—our capacity to change our brains through the stimulation, growth, and maintenance of neural connectivity (Pitts-Taylor 2016; Rose and Abi-Rached 2013; Wexler 2011)—Malabou (2008:13) hoped that raising consciousness about the plastic potential of the brain can help achieve “neuronal liberation”. In turn, she suggests asking “what should we do with our brain?” as a political question. The answer to this question provided by many

of the psychedelic luminaries of the 20th century is, in one way or another, to use psychedelics.

Building on the growing enthusiasm surrounding the potential for neurochemical solutions to human problems following the 1950s “psychopharmacological revolution” (Langlitz 2013:32), some of the most important predecessors of the contemporary psychedelic science movement, such as Aldous Huxley, Timothy Leary, and Terence McKenna, commonly conceived of psychedelics as tools for taking charge of one’s own consciousness. Huxley (1977[1963]) suggested that psychedelics could enable selective adaptation to one’s culture by facilitating experiences that allow individuals to see through culturally-conditioned assumptions, patterns of thought, and dogmas handed down to them. Perhaps most notably, Timothy Leary suggested that psychedelics could be used for “learning to control one’s own nervous system” (Metzner and Leary 1967:19). Leary (1990:253) identified the brain as a resource vulnerable to exploitation by those who wish to claim “underdeveloped areas of your cortex”. Yet, the brain, according to Leary (1990:246–53), is also a site for political resistance because individuals can use psychedelics to expand consciousness beyond the cultural filters instilled in their “neural networks” by education, television, radio, and yet-to-emerge technologies for consciousness control in order to live free and authentic lives. Finally, building upon the ideas forwarded by Huxley and Leary, psychedelic scholar Terence McKenna (1992:237, 253) insisted that psychedelics effectively “dissolve cultural conditioning” and counteract the states of consciousness designed by “Madison Avenue...the Pentagon... [and] Fortune 500

corporations.” By critically highlighting how cultural trends and technological developments in Western societies threatened all-encompassing control of brain, these psychedelic thinkers posed the intentional *changing* of one’s mind and brain through psychedelic use as a remedy to individual and social problems stemming from harmful cultural forces.

The contemporary psychedelic movement has taken a less confrontational stance to the predominant culture in favor of pursuing ways of gaining widespread cultural and legal acceptance. Nevertheless, despite following a decidedly “straight-edged” path to seek approval of these substances through official channels (Giffort 2020), the psychedelic renaissance is not apolitical. The movement retains a political orientation in its attempt to appeal to mainstream sensibilities and medicalized understandings of mental health issues. While the movement has attempted to filter out the more radical political implications of reclaiming one’s brain through psychedelic use, contemporary efforts to legitimize the movement is often framed as “revolutionary” nonetheless. Indeed, apart from the pursuit of broad political appeal, the current psychedelic movement is still rooted in the premise that we can radically alter our ways of thinking and experiencing the world through psychedelic use (e.g. see Pollan 2018).

The question of whether subjective experience is relevant to psychedelics’ therapeutic effects has become one of several issues contributing to internal tension as the movement pursues stabilization. Concerns about the impact of financial investment in the field and whether leaning into biomedicalizing processes is the best way

forward for the movement have similarly led to tension. Given how the movement has been diversely influenced by processes of biomedicalization, the resulting fractures in the field should come as no surprise. Several (neuro)political disputes stem from the advent of technoscientific tools and practices for manipulating the material underpinnings of the human body. Neuropolitics, biopolitics, or more generally the politics of life fundamentally pertains to the validity of certain forms of knowledge, how best to handle social problems, and the ethical implications of emerging biotechnologies (Clarke et al. 2009; Rabinow and Rose 2006; Rose 2007; Rose and Abi-Rached 2014). Along these lines, medicalization and biomedicalization do not occur unilaterally and are frequently the subject of critical discourses that emerge in response to biomedical knowledge practices.

The psychedelic science movement has been no exception as the influence of biomedicalizing processes become more apparent. In turn, the field has become a site for neuropolitical conflicts. For instance, the attempt to “mainstream” psychedelics is frequently critiqued for conforming to neoliberal understandings of mental health conditions (Devenot, Conner, et al. 2022; Gearin and Devenot 2021; Plesa and Petranker 2022). Several of the conflicts are a direct product of the processes of biomedicalization, as they center on concerns about devaluation and appropriation of indigenous knowledges, equitable access to psychedelic medicines, the potential for therapist training/abuses, and even whether “medicalization” is right way forward for the psychedelic renaissance.

Beyond grievances specifically directed at processes of biomedicalization, psychedelics' "plastogenic" properties can also be seen as a significant source for their attendant biopolitical issues. Here we might think of psychedelic plasticity in both the figurative and material sense. First, psychedelics exhibit a certain "cultural plasticity" in that the meanings ascribed to psychedelics are contextually variable (Langlitz et al. 2021; Pace and Devenot 2021). In part, this stems from the influence of set and setting on the experience and interpretation of the psychoactive effects. Cultural plasticity also pertains to the diverse ways in which psychedelics take on cultural significance as medicines, sacraments, or dangerous drugs. Several biopolitical issues also stem from psychedelics' capacity to facilitate plastic changes to the material underpinnings of conscious experience. A *psychedelic bioethics* has emerged to grapple with the unique ethical implications associated with the use of substances that intervene on neurobiological processes, radically alter consciousness, and have the potential to instigate sustained changes in perspective (Jacobs, Yaden, and Earp 2023; Langlitz et al. 2021; Miceli McMillan 2021; Peterson et al. 2023; Smith and Sisti 2021). Additionally, the question of whether people should be free to alter their consciousness with psychedelics or if the authority to implement these neurotechnologies should be restricted to medicine still persists.

Ultimately, psychedelics force us to reckon with what it means to have tools capable of facilitating self-transformation by capitalizing on the brain's inherent potential for neuroplasticity. In turn, they offer a useful case for shedding light on the biopolitical issues associated with neuroplasticity. Much like Malabou, Pitts-Taylor

(2010, 2016) contends that the presentation of neuroplasticity in public discourse conforms to neoliberal ideals of personal optimization and enhancement, risk mitigation, and commodification of the resources geared towards optimizing the brain health of patients-turned-consumers. However, Pitts-Taylor is less sanguine about the potential for neuroplasticity to translate into agency or “liberation” and ultimately questions our ability to separate the phenomenon of neuroplasticity from the (neoliberal) conditions informing our knowledge of it.

The remainder of the chapter explores the neuropolitical disputes associated with psychedelic science. First, I detail the subjective experience debate, which has become a cornerstone issue in the field, as well as how neuroplasticity is implicated in the debate. I draw on my interview participants’ accounts to illustrate how researchers perceive the value of the subjective experience. Additionally, I touch on how this debate is intertwined with biomedicalizing processes that inform the competing interests and commitments characterizing the different sides of the debate. Next, I explore additional issues that are sources of tension in the field such as the role of capital investment, the medicalization of the field, as well as the issue of homogeneity in clinical trial samples. I conclude by exploring how neuroplasticity is implicated in the framing of psychedelics as enhancement drugs. Focusing on the practice of psychedelic microdosing, I interrogate how induced plasticity (iPlasticity) is representative of biomedicalization, as one of the key processes involves a growing focus on using biomedical technologies for health and enhancement (Clarke et al. 2003). I demonstrate the entanglement of these enactments of neuronal subjectivity,

neoliberal ideology, and the hype surrounding psychedelics and neuroplasticity. Finally, in light of the prevailing neoliberal framings of psychedelics, I reflect on the biopolitical significance of psychedelics given their potential to promote neuroplasticity. Specifically, I begin to examine whether psychedelics, as “agents of plasticity”, yet have the chance to serve as tools for neuronal liberation (Malabou 2008) or are merely being recast to support the neuronal ideology of modern neoliberalism and contemporary biomedicine (Gearin and Devenot 2021).

The Subjective Experience Debate

While mechanistic discussions of psychedelics potential have predominantly focused on the brain, a debate has emerged over whether psychedelics’ therapeutic effects can be attributed to the pharmacological action and subsequent neurobiological phenomena the drug produces or the psychoactive experience. As I have shown in the previous chapter, neurobiological mechanisms—neuroplasticity in particular—have received an inordinate amount of credit for psychedelics’ therapeutic properties both in scientific and popular discourse. The hyper focus on neurobiological mechanisms ultimately raises questions about whether psychedelics represent a meaningful departure from pharmacocentric understandings of drug effects that underly the logic of treating mental health issues with other psychiatric drugs. However, even as psychedelics are on the one hand being reframed as neurotechnologies capable of transforming users’ brains through neuroplasticity, they are simultaneously advanced

as experiential medicines that represent a model of drug treatment focused on how they supplement psychotherapy. In light of the latter view, proposals to eliminate the psychoactive effects of psychedelics, which are perceived as epiphenomenal and therefore non-essential, through the production of new drugs have spurred a debate over the clinical relevance of psychedelics' subjective effects. In this way, the subjective experience debate can be seen as a proxy-conflict over whether the movement will capitulate to the existing conventions of biomedicine, and in particular psychiatry, or whether it will retain its “revolutionary” character by pushing to revise the theoretical and practical models of mental health issues and treatment.

The most aggressive proponent of psychedelics as “plasticity generating” substances, David Olson, has suggested that the altered perceptions characterizing the psychedelic experience are “undesirable.” Olson forwards his argument based on what he perceives as significant shortcomings of psychedelic medicines. Specifically, he suggests that psychedelic experiences pose safety risks due to the potential incidence of “bad trips” and that the logistic requirements of administering psychedelics in the psychedelic-assisted psychotherapy (PAP) protocol preclude widespread adoption due to high costs. Olson advocates for possibility and potential utility of developing novel psychoplastogens for instigating neuroplasticity without the psychoactive effects that accompany plastogenesis with classic psychedelics such as LSD, psilocybin, or DMT. The subsequent debate about this question has become a central story surrounding the psychedelic movement and the potential adoption of psychedelics in biomedicine. One *New York Times* opinion piece titled “Taking the Magic Out of Magic Mushrooms”

juxtaposes Olson’s efforts with opinions from other prominent researchers in the field who maintain the importance of the subjective experience (D. G. Smith 2022). A special issue of *Nature Outlook* organized by atai Life Science devoted a perspective piece called “Treatments not Trips” to detailing Olson’s quest to develop new drugs to rewire the brain. The debate has also been presented more formally in a special issue of the American Chemical Society’s journal *ACS Pharmacology and Translational Science* and an issue of the *Cambridge Quarterly of Healthcare Ethics* where the two perspectives on this debate are represented.

Arguments in favor of the significance of the subjective experience typically rely on the preponderance of evidence from clinical trials that find a correlation between the subjective experience of psychedelics and their therapeutic effects (Nautiyal and Yaden 2022; Peterson and Sisti 2022; Yaden and Griffiths 2021). Yaden and Griffiths (2021) suggest that psychedelic experiences may serve as turning points in the lives of people suffering from mental health disorders, which may provide the impetus for self-change. This argument leverages data obtained from surveys—administered to participants on their “dosing days”—developed to evaluate the qualities of altered states of consciousness and mystical experiences. The authors suggest that psychedelics’ therapeutic effects are tied to their influence on subjective meaning attribution, as participants frequently report psychedelic experiences to be among the most meaningful events of their lives (Griffiths et al. 2006) and that attribution of acute and sustained meaning to the experiences corresponds to scores on scales measuring mystical experiences (Griffiths et al. 2011). Beyond this, higher

scores on items relating to mystical experiences are associated with improvements in symptoms of depression, anxiety, and substance use disorder (Garcia-Romeu et al. 2019; Griffiths et al. 2016; Johnson et al. 2017).

Many of the researchers I spoke to maintained that the psychedelic experience helps individual patients gain insights, as well as facilitates the psychotherapeutic process. Ari, a psychiatrist, emphasized that in the psychedelic-assisted psychotherapy model the drug is primarily conceived as an adjunct.

Effectively the treatment that we offer has a huge therapy component, whether or not it's emphasized that any of our publications. I do think that the psychotherapy component is critical to the kinds of success that we see. I don't think it's like exactly the same as prescribing Prozac to somebody were like it's really just something happening on a biological level that's separate totally separate from the experiential part of it. It's still an open question about the importance of that experience component though.

Highlighting the difference between psychedelics and the prevailing psychiatric drug of choice, Prozac, Ari suggests that psychedelics are not purely neurobiological treatments. Instead, psychotherapy is an integral part of the protocol. In this way, she maintains that the subjective meaning making processes occurring throughout a psychedelic-assisted psychotherapy protocol are critical. Still, Ari states that the role of the psychedelic experience itself is treated as an open question in the field.

A basic scientist I spoke to named Gary who conducts psychedelic research on animal models alluded to the fact that some researchers in the field are trying to empirically test whether the experience is necessary to achieve therapeutic effects.

So that's been a huge debate for several years. You know, how do you test if the subjective effects are necessary or not? Some people thought "well let's just give them anesthesia. Knock them out and see if it's still anti-depressant." Well, one of the issues with that is that anesthesia has rapid acting antidepressant effects. So that sort of confounds the issue.

Although he points out a potentially damning flaw in this sort of experiment, Gary was not any less open to the idea that the psychedelic experience might not be necessary. When I raised the question about subjective experience to participants, some were open minded to the idea that it may be irrelevant. Others were adamant that the experience is essential. However, few of the researchers I spoke to were willing to say that the experience is irrelevant or that it can be "decoupled" from the therapeutic effects. Gary was the only researcher I spoke to who advocated for the pursuit of non-hallucinogenic substances.

I think a lot of the pushback on what's happening now in this space are people who look at psychedelics as a sacrament and see people trying to commercialize their Jesus. So there's a lot of pushback from certain demographics on the research into psychedelics even at a fundamental basic science level. Throwing drug development and capitalization on that aside, I think it's really kind of unique amongst all kinds of drugs that would produce that. "Why do you want a non-psychedelic psychedelic?"

You're taking the magic out of it, the plant wisdom.” Because these are tools. Maybe you want to spiritual experience that will help you, with your substance recovery. On the other hand, maybe don't want a psychedelic experience to treat depression in your great grandma. So, in some instances maybe you do and some you don't. I think different types of 5HT2A receptor agonists—some that may be associated with these behavioral peak experiences and some that don't—all have a role in developing these drugs as therapies for several different indications.

Here, Gary advances the logic behind developing novel non-psychoactive drugs capable of exerting therapeutic effects. The primary target of these drugs is still the 5HT2A receptor. Although this receptor is responsible for the hallmark psychoactive effects of psychedelics, Olson has suggested that it may be possible to activate this receptor without initiating any consciousness changes. The main benefit of such a pursuit according to Gary is that some people may not actually desire to have meaningful experiences linked to psychedelics effects. Therefore, anyone, even your great-grandmother, can benefit from the new agents of plasticity without having to go on a psychedelic trip.

However, researchers like Alan Davis, who have worked with psychedelics in human participant, often described the psychedelic experience as critical. During our conversation, Davis, the founder of the Source Research Foundation and director of the Center for Psychedelic Drug Research and Education, suggested that the psychedelic experience can be important even if it is difficult to decipher.

Well, I think the acute experience is critical. It's critical for the therapeutic process for a lot of people. It's not critical for everyone, and what I mean by that is: not everybody has an experience that is meaningful to them. Not everybody has an experience that makes sense to them in a way that is able to be put into words. It's difficult to engage and talk therapy, if there are no words to be said about it... A lot of people have moments of insight and realization, and that insight and realization can be very important to people. When these insights and mystical experiences happen together, that can sometimes be the most profound elements of their therapeutic process. They feel like a major shift has happened in their life. Any way in which any of that happens, that therapeutic component kind of evolves from that acute experience.

The ineffability of the psychedelic experience can sometimes be a hindrance to engaging in talk therapy, according to Davis. However, many people do have experiences wherein they gain meaningful insights that help advance the therapeutic process. He went on to describe this as an “unfolding” process that can unfold in a variety of ways, but in some cases is experienced as a “major shift”.

Another clinical psychologist I interviewed named Meg reiterated that insights gained by working with psychedelics are important aspect of psychedelic treatments.

The more I get into my career and as a clinician and a researcher, the more I recognize that most health disorders, whether they're physical conditions or psychiatric issues or anything, it seems to stem from a lack of self-love and self-understanding. And so to me, I think psychedelics' most profound aspects of healing can come from a greater sense of self understanding.

Here, Meg suggests a limitation of neurobiologically focused descriptions of the etiology of mental health conditions. Rather than stemming from disordered brains, she maintains that mental health issues are derived from a lack of understanding. Like Davis' suggestion, Meg emphasizes how realizations experienced through psychedelics are an essential part of healing.

While the subjective experience of psychedelics is considered by many to be important for gaining insights that can be useful for making meaning during the therapeutic process, some of my participants acknowledged that part of the reason why psychedelics are effective adjuncts to psychotherapy is psychedelics' plastogenic properties. A psychiatrist named Jeremy I spoke to, who takes a psychoanalytic approach to his practice, invoked the critical period of neuroplasticity to explain why psychedelics can be so effective.

One of the things that ... practitioners notice is that it's really hard for people to become more flexible because we're so entrenched in our inflexibility. The two or three days of neuroplasticity that follow psychedelic experience allow somebody to experience, not just talk about, but to experience the [therapeutic] principles more deeply, more genuinely... [Psychotherapy] moved from being something that's informative, where you're learning how your mind works, to transformative where you're experiencing your mind in a different way.

Here, he suggests that psychedelic-facilitated neuroplasticity enables people to open up to the therapeutic process and internalize it more effectively. Because the transient neuroplastic state allows people to become more flexible, Jeremy suggests that

psychedelics help people change by *experiencing* the therapeutic principles. Moreover, he asserts that this alternative experience of one's mind can contribute to subjective transformation.

Even as participants recognized the phenomenon of psychedelic-facilitated neuroplasticity or at least used it as framework to explain the process of learning and self-transformation that can occur through psychedelic-assisted psychotherapy, some did not view the attempt to decouple the experience from psychedelics favorably. One postdoctoral neuroscientist suggested that it might be important to consider more than just the neuroplastic effects when trying to understand the clinical utility of psychedelics.

I'm a little skeptical of the attempts to divorce our understanding the efficacy of psychedelics away from the subjective effects. Like to come up with just like a pure plastogen that does not involve an altered state [where] the psychological level doesn't really matter and you could be anesthetized and wake up and there you go: shiny new brain. [I'm skeptical] largely because there's kind of like a subjective come-on feeling. But also, it's just trusting what people say a little bit, you know? "This is the most meaningful experience my life." Maybe that has something to do with it.

Andrew highlights the disconnect between the objective and subjective point of view, as he mentions that perhaps what people say is relevant when trying to assess improvements in well-being. In part, this could be interpreted as a response to the general devaluation of the subjective point of view that commonly stems from neuroreductionism. He went on to question the translational value of animal models.

Alluding to the experiential richness of human consciousness, he said “rats are great, but they’re not people.” The question of translational value is especially relevant to Olson’s proposal given that *in vitro* and animal experiments are the basis of his hypothesis. Although it has been claimed that non-psychedelic psychoplastogens have been developed, thus far these substances have only been tested in animal models that use “head-twitch” responses as indicators of psychedelic effects.

An anthropologist and doctoral candidate I spoke to was more explicit in his opposition to the neuroreductionism inherent to the attempts to decouple the experience from psychedelics’ plastogenic effects. Joshua maintained that despite the capacity to measure neurochemical processes correlated to the psychedelic experience, “there’s still somebody there” when making those observations. He went on.

We have a big problem with the way the scientists are trying to reduce this experience. And then there's the politics of these guys that are trying to take “the trip” out of the trip, you know? The David Olson guy and the psychoplastogen kind of guys. I'm like, oh shit, that's really fucking political too! If people are having these transformative experiences of the self, learning something about themselves, then taking that out of the experience is problematic. And who is allowed to actually have a psychedelic trip? Do you have to be mentally ill to go seek psychedelics from a psychiatrist?

Joshua’s comments make clear that this debate encompasses much more than simply whether the relevance of the subjective experience to therapeutic outcomes can be empirically demonstrated. To him, the attempt to filter out the subjective experience in

pursuit of new drugs means denying people the opportunity to have potentially meaningful insight and transformative experiences. The potential to learn about oneself is integral to psychedelics' value in his view, and removing that is not neutral, but an intrinsically political endeavor.

Indeed, Olson has advocated for a focus on non-psychedelic psychoplastogens both because he thinks they may be *safer* and a *cheaper* alternative to psychedelic-assisted psychotherapy. The notion that psychedelics' therapeutic effects can be replicated by facilitating neuroplasticity while cutting costs associated with PAP protocols might be also viewed as a way to appeal to funders and existing biomedical institutions that demands minimal theoretical or structural changes. Arguments advocating for prioritizing non-hallucinogenic alternatives may be forwarded with altruistic intentions (e.g. see Peterson and Sisti 2022). However, it is questionable whether facilitating neuroplasticity through pharmacological means without instigating any psychoactive effects is plausible to begin with. Moreover, these claims are ultimately entangled in the growing political (bio)economy surrounding psychedelics (i.e. it is no surprise that authors' positions seem to align with their conflicts of interest as potential drug developers; Rasmussen and Olson 2022).

As the push to refine psychedelic medicines into non-psychoactive pharmacological treatments gains traction, there is a concern that such neuroreductionism will water-down the important or even revolutionary aspects of psychedelic medicines by discounting the value of the subjective experience. Tom, a clinical psychologist and professor, expressed some misgivings about the

consequences of reducing psychedelics to their pharmacological effects during our conversation.

I mean science has to explore everything, so I support it. However, there are efforts to determine is it the experience that's changing people, or is it just biology? Do we need the mystical peak experience? There are some conversations around trying to tweak the molecule somehow ... Could they have biological impact that through neuroplasticity and various neurochemical changes they could provide relief in certain kinds of suffering, and the person takes them over time repeatedly somehow some kind of schedule? Sure, I'm sure that's possible.

But these experiences around end of life or alcoholism and things we see in these trials, it's clearly impact of this incredible transformational experience. So I get a little worried that a model of biological reductionism could lead to a minimization of the experience involved, and then it becomes just another Prozac. Or they try to make it a Prozac... I mean for half a century and more it's been this experience that people tell us about that's really reshaped their suffering.

Overall, Tom is open to the idea that the brain contributes to psychedelics' therapeutic efficacy and even that it may be possible for non-psychoactive drugs capable of neuroplasticity could be applied in a therapeutic way. However, he also expressed a concern that neuroreductionism devalues the experience and threatens to replicate existing models of treatment such as selective-serotonin reuptake inhibitors (SSRIs) for mental health issues, which have had only limited success.

Tom’s skepticism of the neuroreductionist pursuit of “non-hallucinogen psychedelics” is rooted in the scientific evidence base produced by the psychedelic science movement, as he references studies for several forms of psychological distress that implicate the psychedelic experience in people’s healing. The transformational experiences, he says, are important for improving psychological distress—an insight that participants in trials, ceremonies, and experimentation have reiterated for “half a century.” Indeed, the bulk of current evidence supports the suggestion that the subjective experience is essential, or at least important, to therapeutic outcomes (Yaden and Griffiths 2021). Peterson and Sisti (2022) also point out that many arguments advocating for the prioritization of non-hallucinogenic alternatives lack supportive evidence for the safety and efficacy relative to classic psychedelics and MDMA.

Overall, the subjective experience debate can be seen as a proxy-conflict over whether the movement will capitulate to the neuroreductionist approaches of biomedicine, and in particular psychiatry, or whether it will retain its revolutionary character by pushing to revise the theoretical and practical models of mental health issues and treatment by instituting an experiential treatment that elevates psychotherapeutic approaches and the role of the environment. While some scientists conceiving of mental health issues as “neuropsychiatric disorders” suggest precise modification of neural circuits with psychoplastogens as plausible treatments, several researchers in the field maintain that the insights and self-understanding gained from the acute experience of psychedelics is vital for transformative healing.

(Bio)Power Struggles: Conflicts over the psychedelic science movement's direction

Like the choice between competing political institutions, that between the competing paradigms process to be a choice between incompatible modes of community life. (Kuhn 2012:94)

As with any social movement, scientific or otherwise, the psychedelic science movement is fundamentally political. The movement itself is entangled in United States' drug politics and its accompanying baggage. The concerns, assumptions, biases, and legal restrictions informing United States drug culture also present a barrier to the acceptance of psychedelic drug use in science, medicine, or any other context. This context informs the movement's general bent towards legitimizing psychedelics in order to support continued scientific research and state approval of adult, religious, or medical uses of these substances. Yet, the psychedelic movement is also engrossed in internal political struggles over its values, aims, and identity as the movement works toward mainstream acceptance.

The biopolitical struggles associated with psychedelics stem from internal competition for attention, resources, and authority within the interdisciplinary field of psychedelic science, as well as the interactions between the field and existing disciplines and institutions with expertise, growing financial interests, and authority relevant to the regulation, implementation, and distribution of drugs. Moreover, growing knowledge about psychedelics' capacity to facilitate neuroplasticity has helped to recast psychedelics as neurotechnologies capable of reshaping individuals' brains and dispositions. Since the capacity to intervene on and transform the neural

substrate of everyday consciousness with psychedelics marks a significant advancement in biopower, psychedelics' transformative potential magnifies questions pertaining to the control of these substances. Despite the fairly universal aim of increasing access to psychedelics in one form or another, the plastic meaning attributed to psychedelics' transformative potential—which some refer to as cultural plasticity (Langlitz et al. 2021; Pace and Devenot 2021)—has contributed to fundamental disagreements about how exactly to pursue psychedelic legitimacy. Thus, while the psychedelic science movement has been shaped by and contributed to certain processes associated with biomedicalization, researchers and scholars within the movement have also contested trends perceived to be harmful.

Andrew is a postdoctoral neuroscientist who perceives the divisions in the field as a source of drama stemming from the high hopes people have for the potential of psychedelics. He suggests that vested interests often approach the conflicts with an inflated sense of importance.

[I am concerned with] you know things like political infighting. As I kind of see psychedelics is like a kind of culture war where... we don't quite know what these compounds are doing, but we're trying to projecting our highest hopes with a story like, "this is what they do!" And it's like, well sure they'll do that sometimes. They did that maybe for you, and maybe they do a different thing for different people...But, it's almost like people are projecting their highest hopes for humanity, maybe not wrongly, onto these compounds that we didn't really understand. But it seems like it's almost like it's like a spiritual battle almost like, "what should we be?"

In Andrew's view, the indeterminacy of psychedelics' effects is partially responsible for their cultural plasticity, as individuals often "project" idiosyncratic interpretations of psychedelics onto the movement. He suggests disagreements are a product of undue certainty about psychedelics' potential, which ultimately exceeds the state of scientific knowledge, as well as contributes to the central identity crisis within the movement.

Much of the biopolitical infighting stems from concerns that psychedelics and psychedelic science may be corrupted by commodification and corporatization, respectively. The infusion of capital into the biomedical sciences is a major feature of biomedicalization which has contributed to shifts toward privatization, proprietary knowledge, routinization of medical practices, cooptation of preceding knowledges, and exclusionary practices resulting in stratified impacts of biomedical innovations (Clarke et al. 2009). Along these lines, the battle over what the psychedelic movement "should be" has primarily centered around the fact that the movement itself has become a new frontier for bioeconomic expansion with speculative investments and biotechnological/pharmaceutical start-up companies saturating the field. As discussed in the previous chapter, the possible future of psychedelics as biomedical tools for transforming users' brains and subjectivity functions as form promissory capital, which has attracted the interest of numerous investors seeking to get in on the "ground floor" of the psychedelic revolution in biomedicine. While some psychedelic researchers play an entrepreneurial role in these ventures, others are more reticent and, in some cases, actively critical of how the field is being shaped by processes of biomedicalization.

Some of the scientists I spoke with were fairly pragmatic about pursuing a medical model to get psychedelics approved. David Nichols, the chemist who synthesized the drugs for nearly all of the psychedelic experiments that launched the psychedelic science movement, saw the medical model as the only plausible route within the context of the United States' "controlling" culture.

I have had debates with people who say "this medicalization of psychedelics! everybody should be free to use them." And I say that's one argument, but I was interested in getting these back into society as medicines to heal people. The only way I could see to do it was with what I knew was the medical model. Go through the clinical trials. And, of course, Rick Doblin did it too. He believes that at some point in the future that everybody will be able to use mdma and have MDMA with their children or pets, but I think we'll never get to that point. That's his beat. But for now he understands to make it happen in our society, you need to go through the FDA. You need to get all the approvals, you need to do your phase one, two and three studies. Show it works. I've told people maybe 50 or a hundred years in the future attitudes may change and maybe there will be churches that use these. But for now I just want to see it get out as a medicine to help people, and the medical model to see being able to do that.

Nichols presents the "cognitive liberty" perspective as basically ineffectual. He views medical approval as the only feasible way for psychedelics to be considered as legitimate in the United States. Compared to pursuing religious exemptions, as in the cases of a few churches he mentioned, the FDA approval process is much more

straightforward to achieve. Moreover, as medicines, he believes that psychedelics stand a better chance of helping people.

In general, resistance to bioeconomic expansion into psychedelic science centers on concerns about the corporatization of psychedelics, unequitable access to psychedelic therapies, and distortion of the psychedelic therapy model to maximize profit. Several researchers I spoke to expressed concerns about the impending consequences of capital investment in psychedelic medicine. When asked about his biggest concerns in the field, Kelan Thomas, a professor of pharmacy at Touro University, says he is worried about the potential for corporate monopolization of psychedelics.

[The] elephant in the room is Compass. The one psilocybin company that was first bankrolled by Peter Thiel and has been aggressively pursuing patents. Their founder has written white papers on this idea of “vertical integration” to where they could find a way in backdoor deals with regulatory agencies to control the entire healthcare supply chain, I think that that would be a very bad outcome. Essentially, if they said we get to decide which clinicians can give this drug, where they can give this drug, and if things go to sort of this vertical-integration monopoly of the psilocybin supply chain, that's one of my biggest concerns... I think that could go very wrong if you know certain people were controlling it in such a rigid way.

This professor views the patent collection strategy of companies like Compass Pathways as an outward attempt to control the emerging psychedelic market. He suggests that such attempts at unilateral control would have grave implications for the

practical problems facing the field, such as the distribution of psychedelics, the certification of practitioners, and in what contexts psychedelics are able to be administered. Yet, the patent issue and the influence of companies like Compass Pathways and atai Life Sciences—a biopharmaceutical company with investments in Compass—has been far from an elephant in the room for a segment of journalists and critical researchers in the field who have been actively pushing back on the practices associated with the growing “psychedelic sector” of the bioeconomy.

Just as atai recently used a paid feature in a special issue of *Science* on psychedelic medicines to proclaim why “the time is now” for psychedelics and tout its growing drug-development portfolio, critical scholars have been publicly scrutinizing the practices of psychedelic companies and the ideologies of high-profile funders. Pace and Devenot (2021), for example, call attention to the significant contributions of right-wing billionaire Peter Thiel who has invested millions of dollars in both Compass and atai and is open about his monopoly-oriented business strategies. Rather than directly contributing to egalitarian, progressive, or environmentally conscious dispositions as some research suggests (Lyons and Carhart-Harris 2018; Nour et al. 2017), Pace and Devenot (2021) warn that the cultural plasticity of psychedelics makes them potentially susceptible to uses and interpretations that reinforce naturalized social hierarchies, support authoritarianism or other radical political ideologies, and contribute to existing social inequalities.

At the same time, these critiques have not gone unchallenged by some scientists who have developed working relationships with companies like Compass

Pathways (Henceforth: Compass) and view medicine as the most expedient way to legitimize psychedelics. Despite the aggressive pursuit of monopoly by companies like Compass (Hausfeld and Nickles 2021; Love 2021a), critics of medicalization are generally painted as radical, countercultural, or unserious in contrast to researchers who take a more pragmatic approach of pursuing psychedelic legitimacy through medical approval (e.g. Sessa 2018). Recently, a group critical scholars and journalists were banned from entry to Wonderland Miami, a psychedelic conference that featured appearances by former professional athletes turned investors and more talks from executives than researchers. Hamilton Morris, a documentarian and chemist I interviewed who is receiving funding from Compass to work on drug development, was especially dismissive of critical voices in the psychedelic movement. After rejecting concerns about hype and inadequate attention to risks in the psychedelic field, Morris sarcastically addressed the increasing number of articles raising questions about the corporatization of the psychedelic field.

What I really see are just these enormous numbers of moralistic, hand-wringing articles, ‘LSD Capitalism promises a bad trip for us all’, okay, great. ‘The Psychedelic Renaissance is on the verge of an uneasy enlightenment’ Oooh! ‘Patenting and cultural appropriation raise questions about who should profit from psychedelics’ and on and on, ‘the gentrification of consciousness,’ ‘The rise of the psychedelic industrial complex’ and of course the ever-present threat of ‘right-wing’ people using psychedelics. Uh-oh, what are we gonna do? Right wing people use the same drugs as

left-wing people? I had no idea. The basis for this article is this peer reviewed scholarly article is so absurd, I can't even believe people are not criticizing this. As in this example, the actors describing and pushing back on narratives, ideologies, and practices contributing to the growing psychedelic bioeconomy are at times depicted as alarmist and obstructionist. Critiques of corporatization are framed as an impediment to increasing acceptance of psychedelics and the legitimation of some form of legal access. Morris was especially incredulous about the concern surrounding patents, stating, “[there’s] this sort of moralistic handwringing about people making psychedelics like ‘oh what if they patent them.’ I just don’t really understand why that is such a bad thing.”

Restricted access is the most frequently cited consequence of aggressive patent-seeking by pharmaceutical and biotechnology companies hoping to corner the psychedelic market (Devenot, Conner, et al. 2022). Compass has filed extremely broad patent applications claiming rights to common features of the therapeutic setting (e.g. decoration of the room where drug administration takes place), practices not unique to their protocols (e.g. encouraging participants to direct attention “inward”), and a formulation of synthetic psilocybin (Devenot, Conner, et al. 2022; Love 2021a).

Researchers I spoke to directly expressed concerns about how business practices linked to the corporatization of psychedelic science could hinder access to psychedelic medicines. Noah a PhD candidate doing basic science was surprised the way bioeconomic expansion has influenced the field.

I always thought like psychedelics are immune to this toxic capitalism, but I don't think that's the case at all and there's. You know, people are making businesses to make money, and you can sort of sell the psychedelic experience short and an effort to make a better business model or to make a to make more of a profit and I'm sure that that's going to be going to be the case with a lot of these companies and treatments that are that are kind of in the pipeline. And I guess maybe also on that same note accessibility too for people who are maybe unable to afford or get away from work to access these treatments. It's going to be a big issue.

The way financial interests have gravitated toward the field of psychedelics makes it clear that these drugs are not exempt from commercialization or the business practices of pharmaceutical companies. Affordability is one of the primary casualties of the for-profit business model according to this PhD candidate. As companies find ways to profit off of psychedelic medicine by patenting “creative alterations” to therapeutic protocols or settings, many are worried that psychedelic medicine’s consumer costs will make these agents of plasticity prohibitively expensive.

The apparent relationship between psychedelic legitimation and corporatization left some researchers feeling ambivalent about psychedelic biomedicalization. When I asked him whether he had any concerns about the psychedelic science movement, Michael J. Winkelman, an anthropologist who has been studying shamanism and psychedelics since the 1980s, conveyed mixed feelings about psychedelics finally gaining some legitimacy.

You know what seems to be our ally, which is medicalization and all these startup companies that are now trying to figure out how to make billions of dollars off of the psychedelics. I think while as useful as these entities are to the progress of science, they also are into this for profit motive as well. As well inspired as many of the funders and founders and participants are you know, the bottom line is if you've got a company you got to make money somewhere along the line. And to me the risk is that sure you know, in the future, you can go take psilocybin but you got to pay \$5,000 for a weekend retreat in order to do it legally. You know it's not going to really enhance you know the ability of these substances to help the mass of people.

Although bioeconomic processes associated with psychedelic biomedicalization have contributed to de-stigmatization of psychedelics and psychedelic use, Winkelman reiterates that attempts to extract profit from psychedelic medicines will lead to “the masses” being priced out of the psychedelic renaissance. The profit motives underlying the efforts of the psychedelic industry suggest that significant barriers to access will emerge and turn psychedelics into “boutique treatments”, as one east coast PhD Candidate in psychology described it. The general trend toward corporatization of medicine now being witnessed in psychedelic science ultimately threatens turn the field into another example of “stratified biomedicalization”—the ways in which products of biomedicalization are disparately applied or made accessible to different groups (Clarke et al. 2009).

Divisions within the psychedelic movement have also been exacerbated by corporatization of the field because of the potential impacts commodification has on

scientific knowledge production. As Winkelman suggested, the psychedelic industry could understandably be seen as an “ally” for social and scientific progress. However, many in the field maintain that psychedelic capitalism threatens to interfere with the production of knowledge in psychedelic science. The same psychology PhD candidate who expressed concerns about access viewed psychology and the medical models used to explain psychedelics’ transformative healing potential as “limited.” Devenot, Connor, and Doyle (2022) also call attention to how considerable investment in the field contributes to motivated (over)interpretations of research findings, as researchers, bio-technology companies, and financial organizations seek to cash in on psychedelics’ “disruptive” potential. Plesa and Petranker (2022) maintain that the current financial incentives (research funding and potential profit) bias the psychedelic field towards certain types of evidence and interpretations and advocate for responsible research practices to avert the pitfalls of a looming “psychedelic self-help industry”.

Psychedelics’ cultural plasticity makes it clear that neither psychedelics, nor the experiences they facilitate, are fundamentally generative of progressive behaviors or social change. I have begun to describe here how some of the central biopolitical divisions focus on the issue of how psychedelics should be controlled. In general, political economic developments in the movement have provided some critical scholars with the impetus for resisting psychedelic biomedicalization. However, the pursuit of FDA approval for clinical applications of psychedelics has set in motion several key processes of biomedicalization to help incorporate these agents of

plasticity into the biomedical toolkit. As consequences of privatization and commodification have become contentious issues for psychedelic science, several researchers have focused their critiques on the assimilation of psychedelics into the neoliberal frameworks of (bio)capitalism, which they argue ultimately compromises scientific integrity (Devenot, Conner, et al. 2022; Gearin and Devenot 2021; Pace and Devenot 2021; Plesa and Petranker 2022; Tvorun-Dunn 2022). While psychedelics' plastogenic quality would make them a unique addition to the biomedical toolkit, the revolutionary potential of psychedelic facilitated plasticity is potentially muted by the bioeconomic imperatives of biomedicalization. In turn, the following section interrogates whether psychedelic-facilitated neuroplasticity can be extracted from the conditions of psychedelic capitalism to substantively contribute to "neuronal liberation".

iPlastic? Neuronal Subjectivity, Psychedelic Enhancement, and Neoliberalism in the 21st Century

The connection between neuroplasticity and neoliberalism has been a consistent claim in social studies of neuroscience (Malabou 2008; Papadopoulos 2011; Paterson 2022; Pitts-Taylor 2010, 2016). Yet, as suggested at the beginning of this chapter, there are debates over the meaning and political implications of neuroplasticity that can be informed by developments in psychedelic science. The plastic meaning of plasticity has given the concept "universal appeal" and made it a target of political and ideological projection. Where Malabou sees the potential for neuronal liberation in neuroplasticity, others more pessimistically view the invocation of plasticity as further

reification of neoliberalism. Papadopoulos (2011) describes Malabou's vision for achieving neuronal liberation and resisting neoliberal governance as a "fantasy". In a much more charitable evaluation of Malabou's critique of modern capitalism, Pitts-Taylor (2010) found similar trends in how neuroplasticity is intertwined with neoliberal ideals of health maintenance and risk avoidance where the brain is the (flexible) object of diverse techniques for enhancement and training. Yet, she contends that trying to resist neoliberal governance by seizing control over our own brains through neuroplasticity merely reinforces biocapitalist configurations of the brain as a "biovalue".

In spite of how neuroplasticity might support neoliberal ideology about the brain, body, and health, questions about neuroplasticity still remain. Does neuroplasticity provide us with the capacity to achieve agency by shaping or influencing our neuronal arrangements? And, can the awareness of this capacity "liberate" us from the way in which neuroplasticity is posed as a mechanism for making us more amenable to ways of life under neoliberal capitalism? While the answer for Pitts Taylor seems to be a resounding no to both questions, psychedelics certainly complicate the picture by acting as tools with the capacity to intentionally induce plasticity in the brain—a process sometimes referred to as iPlasticity (Castrén and Antila 2017; Olson 2018). On one hand iPlasticity is a simple shorthand referring to the intentional induction of plasticity in the brain. The I is, in this view, a signifier for the transformative orientation of biomedicine. On the other hand, the I in "iPlastic" can be read as a marker of the agentic potential to shape one's one brain—a reminder

that I am plastic. With psychedelics capable of iPlasticity, self-directed brain change may be possible.

Despite neoliberal trends in psychedelic science (Gearin and Devenot 2021; Pace and Devenot 2021; Plesa and Petranker 2022; Tvorun-Dunn 2022), psychedelic-induced neuroplasticity is potentially amenable to interpretations that entail the possibility for individual agency and biopolitical progress unbound by neoliberalism. However, it certainly is *difficult* in this case to extract the phenomenon of psychedelic-facilitated plasticity from the social conditions shaping our knowledge of it. The social conditions shaping our awareness of psychedelic-facilitated neuroplasticity and the psychedelic movement generally include the historical malignment of psychedelic drugs as well as contemporary processes of biomedicalization that have helped propel the movement to the “mainstream.” Specifically, many neoliberal qualities of the contemporary psychedelic movement have been shaped in part by 20th century predecessors, such as Timothy Leary and Aldous Huxley, as well as by the parallel and overlapping growth of psychedelic science alongside booming biotechnology and wellness industries.

During and after the “first wave” psychedelic movement, Timothy Leary (Leary 1990) and Aldous Huxley (1999[1963]) speculated about how psychedelics could be used as tools access states of consciousness unencumbered by the cultural forms and habits of thought and perception received throughout life. Describing the brain as the “work” of language and culture, Huxley (1999[1963]:248) suggested that psychedelics could offer a respite from these external constraints by temporarily

allowing an experience of the world without conceptual filters. The ability to change consciousness by intervening on one's own biochemical system was seen both as a source of individual freedom and social change, as the number of individuals who saw beyond the "cultural fences" shaping everyday consciousness accumulated. Huxley even suggested to Leary that he ought to instigate a social movement around the use of psychedelics (Elcock 2013). In turn, promoting this sort of "self-directed brain change" was a cornerstone value shared by the architects of the mid-20th century drug culture, by Timothy Leary's (1983) account.

The notion of "self-directed brain change" prominently forwarded in the 20th century psychedelic culture can be seen as an early form of what is now variously referred to as neuronal, cerebral, or neurochemical subjectivity. Neuronal subjectivity refers to how expert knowledge about the brain shapes how people conceive of themselves and engage the world (Martin 2010; Ortega and Vidal 2011; Pickersgill, Cunningham-Burley, and Martin 2011; Rabinow and Rose 2006; Rose 2003, 2007). Although brain-based references to the self and understandings of subjectivity precede the advent of the modern neurosciences (Vidal 2009), advancements in knowledge about the brain and the corresponding neurotechnologies for intervening on its processes have expanded the language and the means for enacting neuronal subjectivity (Martin 2006, 2010; Pitts-Taylor 2010; Rose 2003). However, the role of the brain in contemporary self-making is often partial, unarticulated, coexistent, or layered upon other frameworks of understanding (Martin 2010; Ortega and Vidal 2011; Pickersgill et al. 2011; Rose 2007; Rose and Abi-Rached 2013). Despite the

prevalence of neuronal subjectivity, Rose and Abi-Rached (2013:220) maintain that, “Personhood has [still] not become ‘brainhood.’” Nevertheless, popular presentations of the brain and its relation to our everyday experience often encourage ideal forms of neuronal subjectivity wherein individuals variously act on their plastic brain through technologies and practices that can purportedly help unlock or maximize the brain’s potential and simultaneously avert risks that could compromise brain health and cognitive function (Pitts-Taylor 2010). Although pursuing this as an end in itself or in an effort to meet the increasing demands on labor may be inauthentic, these practices can plausibly be seen as expressions of freedom enhanced by neuroscientific knowledge.

Based on current trends, psychedelic use is an increasingly popular way to enact neuronal subjectivity. The portrayal of psychedelics as cutting-edge neurotechnologies for self-directed brain change in both scientific and popular media has corresponded to an increase in the use of psychedelics by adults nationwide . Moreover, specific applications of psychedelics for enhancement, wellness, and self-medication reveal how psychedelic use is informed by neuronal subjectivity. Self-directed brain change has been taken up perhaps most notably in circles of white-collar professionals ranging from Silicon Valley to the academy where workers are “microdosing” psychedelics (Bornemann 2020; Glatter 2015; Gray 2020; Hartogsohn 2020; Liokaftos 2021; Santos 2022; Solon 2016; Tvorun-Dunn 2022). Microdosing refers to the consumption of small amounts of a substance within a weekly regimen where doses are frequently scheduled to be taken at regular intervals (Anderson et al.

2019; Hutten et al. 2019; Kuypers et al. 2019). Although not intended to produce noticeable psychoactive effects, microdosing is often assumed to improve performance, creativity, and mood among other beneficial effects and contribute to cognitive flexibility (Anderson et al. 2019; Bornemann 2020; Hutten et al. 2019; Liokaftos 2021).

The use of psychedelics as “cognitive enhancers” in this way is frequently associated with Silicon Valley technology entrepreneurs and employees who microdose as a way to enhance productivity (Glatter 2015; Santos 2022; Solon 2016; Tvorun-Dunn 2022). Hartogsohn (2020:147–60) traces this specific framing of psychedelics as enhancement drugs to the considerable overlap between the psychedelic research and counterculture of the 1960s and 70s and the growth of the so-called “cyberculture” stemming from the burgeoning technology industry in the San Francisco Bay Area. One study, which took place in Menlo Park, California (now home to Facebook/Meta), recruited professionals working in the local technology industry to assess the utility of psychedelics for solving technical or creative problems. Although the study itself was small, lacked a control group, and ultimately made a modest impact on the field (Hartogsohn 2020), it was held up by some as evidence of psychedelics’ potential to facilitate creativity (Stafford and Golightly 1967). The study also represented the ethos of enhancement that would characterize psychedelic use by intellectuals, scientists, and entrepreneurs influenced by 1960s psychedelic culture. One of the psychologists working on the study, James Fadiman, has gone on to become one of the most prominent proponents and investigators of psychedelic

microdosing (e.g. Fadiman 2011; Fadiman and Korb 2019). Fadiman’s book, *The Psychedelic Explorer’s Guide: Safe, Therapeutic, and Sacred Journeys*, presents several recommendations for individuals pursuing self-directed brain change with psychedelics including a recommended microdosing schedule, as well as anecdotes that purport to “reveal how ultra-low doses improve cognitive functioning, emotional balance, and physical stamina.”²¹

Consistent with the salience of optimization as a value and aim in processes of biomedicalization (Clarke et al. 2009; Rose 2007), psychedelic microdosing has been forwarded as a way to take control of one’s brain and mental health in order improve wellness and enhance productivity. Emphasizing the how this type of psychedelic use conforms to middle-class values is a proven strategy for achieving mainstream acceptance. Similar assimilationist narratives have been successful in supportive destigmatization of other so-called deviant behaviors such as cannabis use (Lavin and Barnes 2020). Plesa and Petranker (2022:2) argue that the trend of framing psychedelics as enhancement drugs parallels developments in the self-help industry, which promotes existing neoliberal cultural norms such as “individualization, responsabilization, and competition.” Paul Austin, a “microdosing coach” who provides video consultations to customers, believes “the concept of microdosing will

²¹ Quote taken from: <https://www.psychedelicexplorersguide.com/> (Accessed 3/5/2023)

help normalize psychedelics so they can become integrated in western culture.”²² The home page of Austin’s (2022) website also suggests that he is a “leading voice on the use of psychedelics for personal growth, creativity, insight, and professional transformation” and entices readers to “catalyze transformation through personal psychedelic use.” Self-improvement is also a major ethic underlying psychedelic use in the technology sector, as entrepreneurs, executives, and employees have turned to psychedelic micro- and macro-dosing in an effort to “biohack” the brain to facilitate creativity and productivity (Tvorun-Dunn 2022). Yet, Tvorun-Dunn argues biotech-entrepreneurs also have a financial interest in legitimating such practices, since broader public approval will ultimately aid in the commercialization of psychedelics and privatization of the field.

In line with the transformations in the production and distribution of knowledge associated with biomedicalization, the diffusion of knowledge about psychedelics and how to use them has been accelerated by digital media and the diverse information channels on the internet. Broadcasting these practices is a highly effective way of normalizing psychedelic use as rational aspect of neuronal subjectivity. Frequently, biotechnology entrepreneurs and researchers find common cause in publicly communicating the scientific, individual, and social significance of psychedelics. As suggested above, researchers benefit from public legitimacy and the

²² <https://www.paulaustin.co/> (Accessed 3/7/2023)

hype surrounding psychedelics because it attracts funding. Biotech entrepreneurs similarly benefit from the scientific authority of researchers who (directly and indirectly) lend legitimacy to the use and future sale of psychedelics through their research and scientific communication. As such, researchers are prominently featured as “scientific advisors” on the websites of various psychedelic start-up companies, hosted on popular podcasts to discuss psychedelic research, or invited to sit on panels to discuss the science of psychedelic research for wide-ranging audiences. For example, Tim Ferris, a prominent entrepreneur, podcast host, and self-help author, and a notable donor supporting psychedelic research, published audio from a panel he hosted on psychedelics at a conference held by the Milkenen Institute, a policy think tank. Titled “Psychedelics—Microdosing, Mind-Enhancing Methods, and More”, the panel featured prominent researchers Matthew Johnson²³ and Robin Carhart-Harris²⁴ alongside Christian Angermayer, a co-founder of atai Life Sciences, and Ayelet Waldman, an author of a popular microdosing book.

Between forays into the details of research by the scientists, the other panelists portrayed themselves as exemplars of how otherwise “normal” people could benefit from using psychedelics. Specifically, Angermayer and Waldman both remarked on how their personal experiences shaped their perception of psychedelics’ potential, but

²³ Johns Hopkins University, Center for Psychedelics and Consciousness Studies

²⁴ University of California, Berkeley Center for the Science of Psychedelics and formerly involved in research at Imperial College, London

they were sure to make distinctions between their relatively normal or pragmatic psychedelic use and more insidious, unproductive drug using practices. Prior to applying his experience as a biotech entrepreneur to psychedelics, Angermayer reports total sobriety. “I didn’t drink alcohol, I’ve never smoked a cigarette, I’ve never smoked a joint. I’ve never done anything else till about six years ago.” Similarly, Waldman followed up shortly after by differentiating her psychedelic microdosing practice from other types of drug use that lead to impairment.

It’s somewhat ironic that I’m the resident drug user because... I don’t do drugs other than these. I don’t smoke, I don’t like to smoke weed. Sometimes I take CBD because you can’t get a massage without it nowadays. But I don’t like to experience any — I like my mind to be sharp at all times.

Waldman began using psychedelics after reading studies for a course she was teaching on the War on Drugs as an adjunct professor at University of California-Berkeley School of Law. Although she initially pursued psychedelic microdosing to help with depression that withstood conventional drug treatments, Waldman’s preference for a sharp mind alludes to one of the unexpected benefits of her psychedelic experiment.

My productivity — I wasn’t in it for mind enhancement, for productivity enhancement — but my productivity changed dramatically. The book that you can buy afterwards at the bookstore was the first draft that was written in a month.

For Waldman, her psychedelic microdosing regimen displays a self-help ethic of taking individual responsibility for one’s health. Moreover, the unintended effect of improving her productivity further aligns with the skepticism of drugs that impair or

increase pleasure that characterizes prevailing middle class views about drugs in the United States. Rather than impairing her daily activities, psychedelic microdosing makes her mind sharper and boosts writing productivity.

While psychedelic use (at micro-doses or otherwise) has not yet been fully integrated into the mainstream, the public communications about psychedelics—such as the sort that occur at conferences and on podcasts like the Tim Ferriss Show—are part of a broad effort to make psychedelics palatable to “mainstream” middle class America. Emphasis on psychedelics’ potential applications as enhancement drugs has been somewhat effective for gaining support and encouraging psychedelics as normal tools for enacting neuronal subjectivity. Studies investigating rates of microdosing are sparse, but indirect evidence suggests that the practice has grown in popularity in tandem with the progression of the psychedelic movement and popularization of psychedelics by media personalities, celebrities, and executives from the technology industry. Anderson and colleagues’ (2019) survey experiment comparing microdosers with a control group indicates that there are nearly 40,000 subscribers to the Reddit web forum /r/ microdosing. Since then, this forum has grown to over 230,000 subscribers.²⁵ The demographic makeup of microdosers suggests that the practice has been adopted outside of the technology industry, by middle- and upper-class professionals and students (Hutten et al. 2019; Lea, Amada, Jungaberle, Shecke, and

²⁵ <https://www.reddit.com/r/microdosing/> (Accessed 3/5/2023)

Klein 2020; Rosenbaum et al. 2020; Webb et al. 2019). Gray (2020) has even described microdosing as “pervasive” in higher education, as scholars clamor to stay productive in an increasingly competitive academic culture.

Microdosers’ motivations highlight the salience of self-improvement and optimization in shaping their enactments of neuronal subjectivity. Psychedelic microdosers frequently report motivations oriented toward wellness and optimization, such as personal development and cognitive enhancement (Lea, Amada, Jungaberle, Shecke, and Klein 2020a; Lea, Amada, Jungaberle, Shecke, Scherbaum, et al. 2020b), performance enhancement (Hutten et al. 2019), enhancing mindfulness, creativity, and learning (Hutten et al. 2019; Rootman et al. 2021), and improving mood (Johnstad 2018; Rootman et al. 2021). The motivations most frequently reported differ across study, as individuals experiencing mental health conditions tend to highlight self-medication as the primary reason for microdosing (Hutten et al. 2019; Lea et al. 2020a; Lea et al. 2020b; Rootman et al. 2021). Yet, while Rootman et al. (2021) found that the majority of respondents report microdosing motivations related to psychological wellbeing, otherwise “healthy” microdosers are more like to report motivations such as enhancing learning and creativity. Moreover, Webb et al.’s (2019:35) qualitative study found that microdosers commonly invoke narratives of self-improvement claiming that they microdose to be productive, efficient, and “the best possible version of themselves in their professional and personal lives”. Similar to Waldman and Angermayer’s attempts to distinguish their use of psychedelics from other drug use, Webb et al. (2019:38) also found that microdosers saw themselves as

“conventional citizens” whose drug use is rational, controlled, and affirms their commitment to conventional life and middle class values by improving their capacity to work and study.

The growing number of reports that psychedelics are being consumed in microdoses suggests that self-directed brain change is being established as part of neuronal subjectivity. As suggested previously, neuronal subjectivity is intertwined with several vocabularies of self-making, such that references to the brain are not ubiquitous (Rose and Abi-Rached 2013). Yet, the brain is not far removed from most accounts of microdosing, as wellness narratives implicitly and explicitly invoke the brain as a target for techniques intended to promote cognitive enhancement and productivity (Liokaftos 2021; Tvorun-Dunn 2022; see also Pitts-Taylor 2010). While many of the participants quoted in Webb et al.’s (2019:37) study did not directly reference the brain, one described microdosing as a way to “hack” the brain. This explicit framing of microdosing as a neuronal intervention is unsurprising given the cultural authority of neuroscience and the focus on neuromolecular mechanisms for explaining psychedelics’ effects. The parallels and overlaps between the psychedelic science movement, the wellness industry, and (bio)technology entrepreneurs have helped to advance the reframing of psychedelics as technologies for “rewiring the brain.” Actors within these domains have concurrently popularized the notion through conferences and several forms of media.

The microdosing coach Paul Austin, appearing on an episode of the Neurohacker Collective's podcast called Collective Insights Podcast, remarked how he thinks neuroplasticity can be leveraged through psychedelic microdosing.

when I heard about micro-dosing... I thought, this is interesting because micro-dosing could be a tool to elongate that window of neuroplasticity that happens after a high-dose psychedelic experience. And if we could integrate it, and I could work with it, then I might be able to integrate behavioral change on a more consistent basis. Rather than just going through these spurts and it dying down, it could be a much more elongated process.

By avoiding the drastic launch into a psychedelic experience that occurs with a full dose, Austin hypothesizes that microdosing allows users to harness psychedelics' neuroplastic effects more effectively by regularly activating 5HT2A receptors. The notion that microdosing can encourage neuroplasticity has been most prominently forwarded by Paul Stamets, a mycologist who has become a leading proponent of psychedelic microdosing and a popular figure in the psychedelic science movement stemming from his science communication about the significance of mushrooms.

The "Stamets Stack", according to Austin, refers to the nootropic cocktail of psilocybin mushrooms, lion's mane mushrooms, and niacin—a popular microdosing regimen. In the inaugural West Coast satellite of the Horizons: Perspectives on Psychedelics Conference, Stamets presented results from several studies he has conducted to investigate whether microdosing has benefits beyond the placebo effect, as well as to understand the underlying (neurobiological) mechanisms. On the latter

point, Stamets suggested that the components of his recommended stack have “synergistic” effects that contribute to brain-derived neurotrophic factor (BDNF) production and “neuronal outgrowth, forking, and also helping atrophied nerves being able to really become alive again to regrow.” He reassures the audience that the neuroplastic potential evidenced by the dramatic results of his in vitro studies is “all at the microdosing level.” While advocating for the clinical utility of the stack as a technique to help “refortify” neural pathways developed following macrodoses or even counter neurodegeneration associated with aging or diseases such as Parkinson’s or Alzheimer’s, Stamets suggests that psychedelic-facilitated plasticity, especially through microdosing, can help usher in a better society by solving individual problems. From depression to Parkinson’s to interpersonal violence and other forms of crime, psychedelics are cast as neurotechnologies that can turn people into “law-abiding citizens” by virtue of their neuroplastic effects. Yet, in Stamets’ estimation, psychedelics’ ultimate potential is not limited to social change or scientific “paradigm shifts”.

Homo sapiens are only two years old. We're a new species. I think it's time for us to evolve into a new species. Psilocybin... used for the commons, and microdosing, which is affordable and usable to everyone, which does not need you to be sitting in a clinic, could have an enormous impact for stimulating us to evolve into new species. I'm proposing that new species. We go from *homo sapiens* to *homo ascendus*. It's time for us to ascend to being a new species.

This evolutionary vision holds that psychedelics can enhance the human itself and facilitate a grand transformation into a new species. Stamets' view of psychedelics' potential as tools for transformative change displays a significant parallel to the biotech-entrepreneurs' whose interest and investment in psychedelics fits within futurist, utopian, and transhumanist rhetoric and ideology (Tvorun-Dunn 2022). Extending well beyond the confines of medicine, Stamets' evolutionary futurism is representative of the essence of contemporary biomedicalization—the pursuit of control over the fundamental components of human life (Clarke et al. 2009; Rose 2007).

However, such aspirations always exist within a context of political-economic relations that inform and incentivize certain types of rhetoric to attract both social and economic capital. Promises of a paradigm-shifting ability to harness neuroplasticity to cure mental health conditions, enhance human cognitive capacities, inhibit age related neurodegeneration, and even usher in evolutionary advancement are effective for stoking excitement about psychedelics' potential. Such extravagant claims can help bolster the pursuit of legitimacy by attracting the attention of funders to provide economic support, legislators who can create the legal frameworks for access to psychedelics, and patient-consumers who hope to change their brains to improve health, performance, or overall self. As I have demonstrated in the previous chapter, hype is a critical issue in the psychedelic science. Researchers' contributions to hype function as a self-preservation mechanism, since public attention can further their status, influence, authority, and entrepreneurial interests. For instance, Stamets sells

Lion’s Mane mushroom capsules alongside several other mushroom and wellness supplements under the brand name Host Defense—a company he founded to proliferate “the use of beneficial mushrooms...and mushroom mycelium to support the health of both people and planet.”²⁶ As Franklin points out in relation to stem cell research, “Scientists need stories to support their work—stories they tell to funding bodies, governments, venture capitalists and the general public. Without the right story, their research cannot survive.”

When it comes to which stories have been “right” for the legitimization of the psychedelic science movement thus far, the predominant narratives have been rooted in individualistic notions of health, disorder, and treatment. Psychedelics are proposed to revolutionize our capacity for individual transformation by harnessing neuroplasticity to reshape neural arrangements. Pursuit of mainstream acceptance has led to suggestions that psychedelic-assisted therapy represents a paradigm shift in medicine that can serve as a solution to social problems, such as the mental health crisis, issues with crime and criminal justice, and even political conflict, through individual reform. The historical associations with the countercultural movement of the 1960s has made contemporary researchers wary of deviating from mainstream sensibilities, methods, and scientific self-presentations (Giffort 2020). Owing to the pursuit of “respectability” and integration into contemporary biomedicine, the

²⁶ <https://hostdefense.com/pages/who-we-are> (accessed 3/10/2023)

psychedelic science movement promises an apolitical revolution that will minimally disrupt existing social forms. Using a logic of neuronal transformation, psychedelics are posed as neurotechnologies that are consonant with middle class life and have utility as both transdiagnostic treatments for medicalized mental health disorders and tools for self-improvement in otherwise healthy people. Consequently, these notions of psychedelics' transformative potential, which are broadcast across diverse forms of media, have contributed to the neuronal subjectification and informed neuronal enactments by an untold number of people who have sought out psychedelics through various channels.

Contrary to the apolitical aims of the contemporary psychedelic science movement, critical voices in the field have pointed out how the field displays several neoliberal tendencies in its attempts to mainstream psychedelics. The presumption that decisions and strategies associated with the legitimization of psychedelic are apolitical can be considered an example of the neoliberal tendency to naturalize interpretive frameworks and practices that are congruent with capitalist aims (Gearin and Devenot 2021; Moncrieff 2006). Gearin and Devenot suggest that, "psychedelic medicine is being constructed within neoliberalism as a means of furthering neoliberal priorities." Specifically, they point out how conceptions of psychedelics as treatments for medicalized disorders places the cause within the individual mind rather than acknowledging sociopolitical phenomena that contribute to the occurrence of mental distress. In a more recent critique, Devenot et al. (2022:19) point out how Michael Pollan's public opposition to psychedelic legalization beyond medicine advances the

interests of corporate actors pursuing the monopolized commodification of psychedelics by focusing on “the transformation of the individual within an unchanging hierarchical order.” Keeping psychedelics within the jurisdiction of medicine helps such companies consolidate market share with less competition from non-medical commercial entities. This tracks with concerns that the expansion of psychedelic medicines and the subsequent inclination to view their effects within in a model of linear causation will lead psychedelic companies to strip psychedelic therapies of important features to streamline administration and maximize profit (Noorani 2019)—a possibility that seems increasingly likely as psychedelic microdosing and proposals to develop “non-psychoactive psychedelics” gain popularity. For Noorani (2019:38), the “the pharmaceuticalizing of psychedelics hopes to harness the transformative power of psychedelics ‘one individual at a time.’” Plesa and Petranker (2022) similarly raise concerns about how the emerging psychedelic industry has considerable economic interests in posing psychedelics as a medical solution for individual’s problems and has followed a similar trajectory to the neoliberal self-help industry.

While appealing to middle class values and uncritically forwarding neoliberal ideology may be an effective strategy for normalization, it has distorting effects on our understanding of psychedelics’ potential. As neoliberal tendencies in psychedelic science have led to a focus on the individual mind, the privileging of the neuromolecular perspectives in the scientific pursuit of mechanistic explanations has reinforced this individualistic ethic by focusing on the brain. In turn, the

transformative orientation of contemporary biomedicine has been adopted in psychedelic science in the attempt to reframe psychedelics as neurotechnologies capable inducing neuroplasticity. Can we separate the understanding that psychedelics induce neuroplasticity from the motivations and narratives that inform the science? Can consciousness of psychedelic iPlasticity be leveraged to achieve neuronal liberation? As I have shown in the preceding pages, the production of knowledge about psychedelics is entangled with various political-economic dynamics. The hype surrounding psychedelic neuroplasticity is partially the consequence of how biomedical innovations thrive off of promissory capital. Claims about the potential utility and future capabilities to precisely intervene on the brain to reshape neural connections attract both investment from research funders and biotech entrepreneurs, as well as public attention. Although the field is concerned with the epistemological consequences of hype, scientists within the field are simultaneously motivated to publicize psychedelic research to gain public and institutional legitimacy and funding.

Malabou has previously suggested that discourse about neuroplasticity has reflected the changing demands of capitalism. Discourse about potential to rewire the brain through psychedelic use displays a similar quality, as researchers, advocates, and entrepreneurs implicitly and explicitly advance conceptions of psychedelic plasticity that reflects the values of neoliberal capitalism. In line with Pitts-Taylor's view, consciousness of and even acting on the neuroplastic potential of our brains with psychedelics does not necessarily result in neuronal liberation, since neoliberal and (bio)capitalist conceptions of neuroplasticity ultimately shade our own understanding.

For instance, it's clear from studies of microdosers that enactments of neuronal subjectivity are informed by the hyped neoliberal framings of psychedelics promoted by biohackers, entrepreneurs, and researchers. Psychedelics are used as tools to reshape brains that are viewed simultaneously as the source of mental health conditions and a resource to be tapped for productivity and creativity. Here, the entanglement of the circular developments of scientific knowledge about microdosing is also visible, as these microdosers, whose use is informed in part by the publicity surrounding the movement, are tapped by researchers seeking to understand and scientifically demonstrate the impacts of this practice through epidemiological studies and "citizen science" (Fadiman and Korb 2019).

While it is clear from neoliberal appropriation of the psychedelic experience that there is nothing inherently liberating or revolutionary about psychedelics, the decision to consume a psychedelic and engage in self-directed brain change need not be in service of the neoliberal capitalist order. However, since neuroplasticity is an indeterminate process, it does expose us to vulnerabilities in the social environment, such as efforts to propagandize or otherwise control consciousness. Architects of the 1960s drug culture realized this, as consciousness control was viewed as a looming threat associated with the growing technological capacities of society. From the writing of *A Brave New World* onward, Huxley expressed concerns about the development of pacifying drugs or threat of mass communication as a device for more effective techniques of propaganda and manipulation (Elcock 2013). Leary (1990:252–53) warned that following the advent of "electrical and chemical techniques" a

(bio)ecomony will emerge where, “there will be no lack of people who will be delighted to use the underdeveloped areas of your cortex.” Taking cues from his psychedelic predecessors, McKenna (1992:253-254) warned that electronic drugs, which act “directly on the user’s sensorium, without chemicals being introduced to the nervous system”, function as a means of coercion, manipulation, and imposition of values by what he refers to as the “dominator culture.” Together, these thinkers’ advocacy for the values “internal freedom”, “freedom of consciousness”, and “cognitive liberty” entails both a freedom from pathogenic attempts at shaping consciousness, as well as a freedom to engage in self-directed brain change with psychedelics.

With psychedelics as agents of plasticity, the brain no longer *has* to be a passive recipient of form that is flexible “without limits.” The capacity for iPlasticity with psychedelics provides actors with the opportunity/decision to rearrange their own neural circuitry. Self-directed brain change with psychedelics can thus be considered as one way in which individuals could retain authenticity, overcome dogma, see beyond the perceptual filter inherited from one’s culture, and potentially contribute to social change. Along these lines, acknowledging our brain as a resource does not necessarily reinforce biocapitalist or neoliberal forms of subjectivity that encourage us to tap into the brain to maximize productivity and efficiency. Rather, recognizing the brain’s status as a “biovalue” is to take the initial step toward reclaiming the brain and protecting ourselves from forces that would control consciousness. Neoliberal ideology may obscure our consciousness of plasticity and the potential of psychedelics

to contribute to radical subjective and social transformation, but it does not eliminate the possibility that our neuroplasticity and iPlasticity with psychedelics can further an emancipatory politics and help us to collectively achieve neuronal liberation.

As agents of plasticity, psychedelics generate the same tensions between freedom and determination, agency and control, or liberation and domination fundamental to the notion of neuroplasticity (Malabou 2008; Pitts-Taylor 2016:17-23). By allowing users to destabilize the neural basis of self-experience internalized throughout socialization, psychedelic iPlasticity facilitates cognition beyond the cultural frameworks of understanding that shape our ordinary perception. As McKenna argued, psychedelics may function as “deconditioning agents.” By facilitating the experience of “culturally uncontaminated consciousness,” Huxley (1999[1963]:256) thought psychedelics can help individuals “selectively adapt to...culture, rejecting its evils, stupidities and irrelevances, gratefully accepting all its treasures of accumulated knowledge, of rationality, human-heatedness and practical wisdom”. Viewed in this way, psychedelic-facilitated neuroplasticity retains some potential to support an emancipatory politics and “draw attention to and transform the invisible, hegemonic infrastructures and ideologies that subtly naturalize and perpetuate deeply unequal societies and experiences” (Devenot, Conner, et al. 2022:20). However, agency, freedom, and liberation are not fixed or stable endpoints at the resolution of an epic struggle with mental health or with oppressive neural or social arrangements. Neuroplasticity is a constant quality of the brain which “is always already actively shaped and shaping” (2010:648). Jacques Ellul (1964:xxxii-xxxiii),

whose famous work *The Technological Society* was translated to English at the recommendation of Aldous Huxley, provides useful insight to help reveal neuroplasticity's dual association with freedom and determination.

Reality is a combination of determinisms, and freedom consists in overcoming and transcending these determinisms... We must look at it dialectically, and say that man is indeed determined, but that it is open to him to overcome necessity, and that this act is freedom. Freedom is not static but dynamic; not a vested interest, but a prize continually won.

Whether psychedelics' potential to facilitate neuronal liberation is realized or lies dormant depends in part on our ability to identify instances where oppressive theories, practices, institutions and other social forms harness neuroplastic change in ways that undermine freedom and agency. We cannot get caught up in concerns about reifying the brain's status as a resource or "biovalue" (Pitts-Taylor 2010). Consciousness of the plastic brain may not be enough to empower individuals to achieve neuronal liberation through iPlasticity or to protect against the consequences of the vulnerabilities associated with neuroplasticity—especially the false-consciousness exhibited in neoliberal iterations of the "neuronal-self" (Pitts-Taylor 2010). Yet, as it stands, brains are already being treated as a resource by Silicon Valley entrepreneurs who aim to capture our attention, create dependence, extract information, and sell access to those wanting to manipulate behaviors (Zuboff 2015). If the individual does not and cannot take ownership of their brain, someone else will. Equipped with agents of neuroplasticity, agents of plasticity can cultivate experiences that facilitate

transcendence of previously internalized interactions to enact agency, independently of various “determinisms.”

Conclusion

The neuropolitics of psychedelic transformation encompass several issues pertaining to scientific questions about psychedelics’ therapeutic mechanisms, the influence of biomedicalizing processes on the movement, including the commodification of psychedelics and corporatization of the field, as well as the growth of neoliberal forms neuronal subjectivity. While the cultural plasticity of psychedelics makes them amenable to several interpretations and applications, their capacity to materially induce neuroplasticity may potentiates self-directed brain change. This is not an inevitable outcome, however. The influence of set and setting on the psychedelic experience exposes users to several potential outcomes. Moreover, given the neuroplastic state induced by psychedelics, this can make users vulnerable to interactions in their social environment that could variously contribute to self-directed agency and transformative change or expose users to various forms of vulnerability.

In the next chapter, I offer a theoretical synthesis of set and setting theory with embodied cognition theories to help make sense of these tensions. By furthering a biocultural account of set and setting, I demonstrate the co-constitutive nature of brain, mind, and social environment. In my attempt to advance set and setting theory, I suggest a model that makes sense of and integrates the role of the subjective

experience, neuroplasticity, and the social environment and that can counter neuroreductionist conceptions of psychedelic change. Furthermore, I discuss the ethical implications of such a model for psychedelic science.

Chapter 5

EMBODYING PSYCHEDELIC PLASTICITY: TOWARD A BIOCULTURAL UNDERSTAND OF SET, SETTING, AND TRANSFORMATION

Introduction

Non-ordinary states of consciousness are the hallmark feature of psychedelic drugs. Often enigmatic, contradictory, and transient over the course of the acute experience, the phenomenological elements of the psychedelic experience are wide ranging and experienced as major shifts from normal waking consciousness. The psychedelic experience has been the subject of an untold number of attempts to depict what it feels like to consume psychedelics in their varied forms and methods of administration, despite the common claim that the experience itself is ineffable. A considerable portion of historical and contemporary medical interest in psychedelics has centered on making use of these experiences. Diverse theoretical approaches have shared a view that psychedelics and the unique experiences they facilitate are useful tools for understanding the mind, studying psychological disorders, and improving psychological conditions. One of the key insights established through the mid-20th century surge of psychedelic research is that the subjective and behavioral outcomes of psychedelic use depend on much more than the pharmacological properties of the drug (Hartogsohn 2020) .

The “extra-pharmacological” phenomena that shape the psychedelic experience have come to be referred to as “set and setting” (Hartogsohn 2017; Neitzke-Spruill 2019b). In the most basic sense, set and setting refer to an individual’s

psychological disposition and the context in which psychedelic use takes place. Elements of set and setting have been acknowledged and cultivated through indigenous practices involving the ritual use of psychedelics for countless years prior to Western interest. Although some researchers engaged in psychotherapeutic research had previously recognized the importance of contextual phenomena in shaping the psychedelic experience, set and setting were popularized largely due to Timothy Leary who “turned a growing sentiment into a simple slogan and made explicit the crucial importance of the set and the setting in which a drug experience takes place” (Hartogsohn 2017:8). In fact, despite attempts to dissociate it from his legacy (see (Giffort 2020), the notion of set and setting is Leary’s most lasting contribution to psychedelic science, as the concepts have retained fundamental importance for understanding how to administer the drugs safely and effectively (Garcia-Romeu and Richards 2018; Johnson, Richards, and Griffiths 2008) In fact, several studies have provided direct and indirect evidence for the influence of both individual disposition and context informing psychedelic use (Becker 1967; Bunce 1979; Carhart-Harris et al. 2018; Hartogsohn 2017; Strickland, Garcia-Romeu, and Johnson 2021).

As described in previous chapters, the predominance of neuroscientific perspectives in psychedelic science has contributed to a focus on the brain in the search for mechanisms underlying transformative change and clinical efficacy. Perhaps most notably, the identification of neuroplasticity as a fundamental mechanism underlying psychedelics’ therapeutic effects stems from the privileging of neurobiological explanations and methods, such as neuroimaging and animal models.

As the psychedelic science movement is entangled in political-economic processes associated with biomedicalization, these technoscientific methods and neuromolecular interpretations of psychedelics' effects have helped establish the drugs as a form of promissory capital. Specifically, evidence that psychedelics facilitate dendritic growth, synaptogenesis, synaptic plasticity, neurogenesis, and lasting changes to neural networks has informed hype about psychedelics' potential as agents of neuroplasticity capable of transforming the brains of users for the purposes of therapy and enhancement.

Neuroreductionism contributes to fractures in the movement due to its inability to adequately explain complex phenomena, such as psychedelic transformation, as well as how it supports neoliberal approaches to implementing psychedelic medicines. Ultimately, these fractures have occurred in line with interdisciplinary divisions. However, they also stem from philosophical differences and the lack of an integrative theoretical framework for understanding psychedelic transformation. As neuroreductionism and neoliberalism are associated with the wider processes of biomedicalization that have infused the movement in its pursuit of cultural acceptance, the acquiescence to familiar ways of understanding the mind and brain simultaneously calls into question the revolutionary potential of the psychedelic movement.

In this chapter, I aim to begin bridging the social scientific/humanistic and medical-scientific factions of psychedelic research by advancing a biocultural understanding of set and setting. Specifically, by showing how social-environmental and psychological phenomena intervene on the brain, I aim to explicate the

significance of psychedelics' subjective and neuroplastic effects. Along these lines, I argue that accurately describing and effectively implementing psychedelic therapies requires grappling with questions concerning the nature of the synergistic relationships between culture, cognition, and the brain because, as set and setting theory suggests, psychedelics intervene on, and the experience of psychedelics is shaped by, each of these processes.

To this end, I bring together theories of embodied cognition (e.g. Gallagher 2018; Fuchs 2020; Varela, Thompson, & Rosch 1991) and “set and setting” in order to theorize the involvement of phenomena occurring at multiple levels of analysis (i.e. social, cognitive, and biological) in mechanisms of psychedelic-assisted change. I begin by drawing on embodied cognition theory to argue for the essentialness of the subjective experience for making sense of knowledge about the brain and understanding psychedelic-facilitated change. I assess the implications of psychedelic-induced neuroplasticity for understanding how the social environment shapes neuronal arrangements via subjectively perceived interactions. Specifically, I draw out the dual aspects of plasticity—agency and vulnerability—in reference to how the effects of psychedelics are mediated by the social environment. On these grounds, I highlight the fundamental importance of questions of agency to psychedelic medicine.

Psychedelics' ability to enhance individuals' agency by enabling them to enact changes to previously entrenched patterns of thought and behavior is essential to psychedelic self-transformation. In light of this, I also argue that prioritizing the

agency of participants is fundamental to the ethical implementation of psychedelic medicines.

Embodied Cognition and the Psychedelic Experience: The Interrelationship of Mind, Brain, and Environment

Throughout my study of psychedelics, my interest was repeatedly drawn to issues relating to the philosophic and scientific understanding of consciousness, cognition, or mind. This convergence stems from the fact that drugs seem to reveal the intrinsic unity of mind and body as demonstrated by the changes in consciousness that follow the ingestion of psychoactive drugs. Psychedelics especially have garnered attention for their potential to shed light on problems relating consciousness and mind, due to the unique character of the experiences they facilitate (Hauskeller and Sjöstedt-Hughes 2022; Neitzke-Spruill 2019a; Sjöstedt-H 2015). The experience that follows ingestion of a classic psychedelic is often described as boundary dissolving because users typically describe how the separations between cognitive, emotional, and sensory phenomena characterizing normal waking consciousness are blurred (Neitzke-Spruill 2019a). Interpretive frameworks that ordinarily filter awareness are suspended such that perceptions of self and the life-world may be temporarily unbridled by the preconceived notions, assumptions, “hang ups”, and ideological commitments that influence subjective meaning attribution. Changes in the character of visual, auditory, or somatic perception, fluctuations in emotional content and intensity, and altered self-

experience are also among the types of acute effects of psychedelics that have led some to believe that psychedelics can provide some insight into the nature of mind.

A neuroscientist I spoke with named Max expressed how intervening on the brain with psychedelics can be a good way to learn more about the mind.

I see psychedelics as an incredible tool for understanding the basic properties of the mind and the brain. You know it's well appreciated in in all types of biology, that if you have a complex system that you want to understand—that could be a cell that could be you know... the human brain—and you have a well-defined perturbation and you introduce that...then you see how the system responds to that perturbation. So in this very basic sense pharmacology in general but psychedelics in particular are a terrific way of understanding just the basic properties of the mind and then how the brain kind of censors the mind.

Speaking to the general spirit of experimental pharmacology, Max views psychedelics as uniquely equipped to glean insights about the mind and the neurobiological constraints on mind. This pharmacological technique is paralleled by the phenomenological technique of breaching described by Garfinkel (1967:54). When applied to the acute psychedelic experience, the subjective perturbations of mind psychedelics induce draw attention to the taken-for-granted assumptions that structure normal waking consciousness (Neitzke-Spruill 2019a). While these techniques purport to shed light on the mind, they both leave unanswered questions about the nature of the relationship between the physical and the subjective. In other words, neither technique can explain the emergence of the subjective experience of mind.

A few post-doctoral scholars I spoke with also alluded to the potential to glean insights about the mind and brain through the study of psychedelics. When I asked Leila, a post-doctoral associate and psychologist, about the importance of studying psychedelics, she told me that the study of psychedelics “enables us to learn more about the human psyche and about neurological correlates of different kinds of psychological functions.” Another postdoctoral scholar and cognitive neuroscientist named Andrew emphasized that the phenomenal experience of psychedelics could even shed light on the neural roots of consciousness itself.

You're like pushing to a place where like your body is falling away and so right there you could even use that to like, by looking at the neural correlates if you have enough detail, you can maybe get purchase on the physical and computational substrates of consciousness. Specifically, what lets you have like a mind's eye and a live body.

These scholars at least partially view psychedelics as tools that can be used to produce greater scientific understanding of the neural roots of mind and consciousness. What's more, Alan boldly suggests that the substrates of consciousness could be revealed through the study of neural correlates to psychedelic experiences characterized by disembodiment. Of course, in addition to methodological barriers, this possibility depends on whether in principle there is a distinctive neurobiological substrate from which consciousness emerges.

Not all researchers in the field are optimistic about psychedelics' potential to yield meaningful insights about the neurobiological basis of mind. Yaden and several

colleagues (2021) from Johns Hopkins Center for Psychedelic and Consciousness Research have recently expressed doubt that psychedelics can meaningfully contribute to an understanding of the biological basis of consciousness (i.e. the “Hard Problem of Consciousness”). Instead, the authors advocate for “epistemic humility” about what is feasible when it comes to the utility of psychedelics as tools for understanding consciousness. When I spoke to Manoj Doss, a cognitive neuroscientist, postdoctoral researcher at the center, and coauthor on the “epistemic humility” article, he told me that he gets fed up with the field’s preoccupation with mind.

I think that there is this thing that psychedelics make you think you're getting some insight into, you know “the mind”, and yet I've learned jack-shit about the mind during this psychedelic, you know, Renaissance. I've learned about the mind from just basic psychology studies...I mean have you learned anything about the mind?

I reflexively nodded because I do think the study of psychedelics reveals important insights about the social origins of mind and cognition. But I was a bit thrown off when Manoj pressed me on the question: “what have you learned about the mind that was novel from psychedelics?” By this point in our conversation, I had already settled into to a standard interview routine with a back-and-forth rhythm of questioning. I replied with what he thought was an “ambiguous” response about how the role of set and setting demonstrates the indeterminacy of drug responses and the mind-brain’s dependence on the social environment.

As a sociologist, the concept of “set and setting” has always signaled to me the possibility of a more holistic way of thinking about drug effects, and therefore mind in general, that accounts for the influence of socialization processes, social interactions, and social structures in contrast to neuro- or pharmaco- centric notions. While the psychedelic science movement may not have produced any findings that have taught us anything new about the mind, as Manoj suggests, psychedelic experiences and psychedelic science both reveal shortcomings of frameworks that predominate in science and contribute to difficulty integrating the diverse forms of knowledge. As Benny Shanon (2010:39) suggests in his study of ayahuasca, the psychedelic experience “brings us to the boundaries not only of science but also of the entire Western world-view and its philosophies.” In other words, the fundamental assumptions, distinctions, and overall schemas that guide how we understand and act in the world are challenged by the psychedelic experience.

Perhaps the most fundamental attribute of the “Western” world-view is its naturalistic ontology. Much in the same way Kuhn conceptualizes the idea of a paradigm, anthropologist Phillippe Descola’s use of the term ontology suggests a specific, “[system] of distribution of properties among existing objects in the world, that in turn provide anchoring points for sociocosmic forms of aggregation and conceptions of self and non-self.” In other words, ontologies are far more than philosophical frameworks debated at the philosopher’s armchair. Ontologies—or ideas about what “things”, “kinds”, “entities”, or “objects” exist in the world in the most fundamental sense—form the underlying basis for the cognitive schemas that guide

how individuals attribute meaning to perceptual phenomena, interface with the external world, and establish conceptual and social systems of relationships (Descola 2005). The ontology referred to as “modern naturalism” is characterized by a proclivity to objectify the natural and the human in a bid for control over the “underlying” material processes (Descola 2013). As we have previously seen, this bid for control characteristic of modern naturalism is also a fundamental characteristic of biomedicalization in general and psychedelic biomedicalization specifically because novel technologies have contributed to the perception that fundamental constituents of nature are in reach to be harnessed and transformed.

As I previously described, this frequently takes the form of neuroreductionist conceptions of mind and mental health, which are manifest throughout psychedelic science and the project aiming to minimize the subjective psychedelic experience in favor of unproven non-hallucinogenic analogues (Olson 2018; Peters and Olson 2021; Rasmussen and Olson 2022). The neuroreductionist tendencies in psychedelic science contribute to the devaluation of sociocultural phenomena and the dismissal the relevance of the subjective point of view. However, I maintain that psychedelics do reveal the shortcomings of prevailing conceptions of mind based on materialist understandings. When taking into account set and setting theory, psychedelics can provide insights about the interrelationship between mind, body and environment that reaffirm the fundamental importance of the subjective to psychedelic transformation. I argue that theories of embodied cognition can help make strides towards a biocultural approach to psychedelics that recognizes the co-constitutive role of neuroplasticity, the

subjective point of view of the person, and the sociocultural environment. To this end, I bring together such theories with “set and setting” in order to theorize the involvement of phenomena occurring at multiple levels of analysis (i.e. social, cognitive, and biological) in mechanisms of psychedelic-assisted change.

Embodiment and the Psychedelic Experience

To help resituate the brain and refocus on the subjective experience of the whole person in psychedelic science, I aim introduce the theory of embodied cognition to help make sense of the role of the brain in the context of a person living in a social-environment. In addition to making sense of the subjective experience in psychedelic science, the embodied perspective will also help develop a holistic understanding of how neuroplasticity may be implicated in psychedelics effects, therapeutic or otherwise. In the social sciences, the existence of a social reality full of symbols, organizations, systems, and social groups supported by *subjective* actors with a certain structure of consciousness is a fundamental presupposition. In trying to understand mind, let alone its relation to biology and the social environment, the subjective experience should never be far afield because mind is something that belongs to someone. As Nagel (Nagel 1974:444–45) has previously suggested, “If the subjective character of experience is fully comprehensible only from one point of view, then any shift to greater objectivity—that is, less attachment to a specific viewpoint—does not take us nearer to the real nature of the phenomenon: it takes us farther away from it.” Luckily, several scholars in philosophers, social theorists, and even psychiatrists have

responded in kind to the challenges posed by cognitive sciences (e.g. Fuchs 2018; Gallagher 2013, 2013, 2018; Glannon 2009; Shalin 2017a, 2017b; Zerubavel 1999). These scholars have contributed to not only a refutation of materialist approaches to mind but also a positive theory of cognition that is consonant with subjective experience and the role of society in shaping cognition.

Mind can be described most succinctly as something that is *embodied, enacted, extended, and embedded*. Together making up the 4E approach to cognition (Bruin, Newen, and Gallagher 2018), these features provide a framework for describing the various ways in which cognitive processes emerge through and are shaped by the dynamics of subjective actors interacting in the world. In the general sense, this understanding serves to remedy conceptions of mind as a mere byproduct of brain activity. Considering the 4Es holds promise for enriching inquiry in psychedelic science because it can help reconcile humanistic approaches, which recognize the vital importance of social-psychological and sociocultural phenomena through the concept of set and setting, with biomedical approaches that tend to emphasize neurobiological phenomena. By bringing these approaches together through a 4Es understanding of mind, the field can achieve a biocultural synthesis that can inform scientific descriptions of the mechanisms underlying psychedelic transformation, as well as guide ethical inquiry concerning safe and effective implementation of psychedelic medicines.

Beginning first with the embodied quality of cognition, *embodiment* refers to the ways in which our cognitive processes are bound to and built upon our physical

bodies (Varela, Thompson, and Rosch 1991). Our sensory apparatus shapes our awareness of our surroundings, and it is through the physical capacities of our bodies that we interface with and interact in our social environment. How we use our bodies, the demands placed on our bodies, and repetitive or intense physical experiences can influence our cognitive tendencies, perceptual habits, and expectations as we navigate the world. Our bodies may at times be relegated to the background of our awareness until something hurts, breaks, malfunctions, or requires intense focus or coordination.

Next, *enactment* refers to the way that cognition and perception are active processes that people *do*. In the spirit of George Herbert Mead's conceptualization, mind is a process. This process relates to the subjective perception and understanding of phenomena and thereby encompasses cognitive, emotional, and somatic experience. Consciousness is always *of* something or oriented *to* something. Even involuntary or automatic sensory perceptions require attention and enter awareness when we notice them. In order to make sense of our perceptions which are undifferentiated as we go about life, we actively typify, mark, classify, categorize, organize, associate, and otherwise draw boundaries to distinguish subjectively experienced phenomena and interpret their meaning as we reflect upon them (Schutz 1970; Zerubavel 1991). Moreover, given that cognition is always of or oriented to something in the social environment, mind emerges through the interaction between the individual and their social environment (Fuchs 2018).

In addition to being embodied and enacted, cognition is also *extended* beyond the body, in that it is constituted through "feedback loops" established through social-

environmental interactions (Fuchs 2018; Gallagher 2013). This may involve the use of certain tools to enhance or outsource cognitive capacities, as in the examples of quills and parchment, calculators, internet search engines, or mapping applications on GPS-enabled mobile smartphones. More broadly, cognition is extended in that it is socially supported through relationships, patterned interactions, or institutions and practices, as in the case of legal judgements for example (Gallagher 2013). For instance, our sense of self and identity is instantiated and maintained through socialization and relationships with significant others (Mead 2015[1934]; Berger and Luckmann 1966).

Finally, cognition is always *embedded* within a social environment (Brekhus and Ignatow 2019; Zerubavel 1999). These environments encompass the intersubjective life world as well as the organic and built environments we inhabit. Moreover, how we think and perceive the world can be specifically attuned to the details of our surroundings, the conventional signs and symbols exchanged, as well as what and how we are taught to think in the communities in which we are socialized. This embeddedness of cognition is what most saliently demonstrates that mind is a social phenomenon our thinking takes shape according to the communities we take part in. The “thought communities” to which we belong help reinforce certain ways of thinking and perceiving that become embodied through repetition and reinforcement (Fleck 2012; Zerubavel 1999). We can also recognize that cognition is always embedded in a specific social environment and our thoughts and perceptions shaped by certain context cues.

Importantly, the embodied mind or 4E perspective on cognition does not rule out the involvement of the brain. However, the brain is not conceived as the source or cause of cognition, nor is knowledge about the brain privileged in explanations of cognition, perception, or psychological distress. So how does the brain figure into understanding in a way that does not regard the subjective as merely a product of neurobiological activity? Furthermore, how can this understanding help make sense of the utility of the subjective psychedelic experience for psychedelic science and medicine? The next section explores how neuroplasticity may help temper the neurocentric approaches to cognition, as well as reaffirm the role of the subjective experience in psychedelic science.

Subjectivity, Neuroplasticity, and Social-Environment

Much in the same way that cognition is embodied by a living person embedded in a social environment, the brain is embedded within the context of a living organism and its environment. In the former case, the focus is on the subjectively *lived*-body, while in latter the objective *living*-body is in the main view. Fuchs (2018, 2020) refers to these distinct but complementary ways of knowing about humans in their environment as the “dual aspects of the living being”. These dual aspects ultimately represent *descriptions* of the same entity from different perspectives. Although the typical dualism between mind and body has mistakenly posed these aspects as distinct substances (i.e. mental and physical), these aspects are ontologically inseparable. While some would be happy to simply adopt a version of naturalism or materialism to

simply do away with any semblance of a mental reality by conflating mind with neurobiological processes, the dual aspect approach enables us to place the brain in a role that is consonant the subjective experience of mind. Fuchs (Fuchs 2018:78) suggests “the living organism is in one sense a *composite entity of physiological processes* and in another sense a *subject of life acts*.” At once, the living being manifests as an individual’s subjectively embodied life acts, as well as their physical body shaped by interactions with the social environment. The objective physiological processes permitting human life and action belong to someone, and their subjective experience is of and through the physical body. While consciousness, cognition, or mind cannot be identified in neurobiological processes, mind is observed at the level of the person (which occurs intersubjectively from a second person perspective; Fuchs 2018, 2020). Therefore, understanding the role of the brain in cognition necessitates an understanding of how it supports the cognitive processes of the living person.

An expedient way to conceive of the brain’s role in cognition is as a human organ that simultaneously mediates and integrates subjective interactions with the social environment. By providing the physiological basis for sensorimotor functions, the brain mediates our embodied experience. Yet, as previously described in relation to the extended quality of cognition, these perceptual capacities are enacted through interaction with our surroundings. Your perception of these words, the device you are reading this on, and whatever is in the background of your awareness is not simply the product of bottom-up brain activity. Rather, these perceptions stem from the external stimulation of the sensory apparatus. In order for the diverse array of perceptions to be

made sense of and attributed meaning, the brain functions to integrate “elementary processes into higher order patterns” (Fuchs 2011b:215). These higher order patterns are subjectively ascertained and interpreted according to prior experience retained as embodied knowledge. At this point, addressing the significance of neuroplasticity to these processes is unavoidable.

Neuroplasticity is vital to realizing a more holistic (or ecological) view of the brain that preserves the subjective standpoint of the individual and recognizes the role of the social environmental context or setting. As Fuchs (2018:139) puts it, “The significance of insights into neuronal plasticity can hardly be overestimated. They reveal that it is the interaction with the environment that creates the necessary conditions for experiencing that environment.” In other words, neuroplasticity functions by translating experiences and behaviors into neuronal structures that have a structuring influence on future thoughts, perceptions, and interactions. It serves as mechanism for society and culture to “enter the body” and leave an impression that becomes subjectively embodied through future cognitive and perceptual acts. It is the basis of neurodevelopment.

Infants do not come out of the womb with a fully formed capacity to interpret the meaning of objective events. Certain structural and functional systems are genetically pre-established and form during embryonic stages of development (Atzil et al. 2019). Yet, aside from some building blocks of sensory and motor networks, infants are born “without the neural infrastructure that supports adult sociality” (Atzil et al. 2019). These elementary building blocks of sensorimotor functions are

fundamental to cognitive and neuro- development, as the stimulation, growth, and maintenance of neural connections occurs in concert with sensory experiences. In turn, the neural infrastructure that supports adult sociality and a subjective sense of self is achieved through the gradual accumulation of experiences beginning with the infant's interactions with its caretakers. For instance, an individual subject learns and adapts to the social patterning of experience through the process of *internalization* in which there is "immediate apprehension of or interpretation of an objective event as expressing meaning" (Berger and Luckmann 1966:149). Since this apprehension occurs through the brain's sensory networks, these social interactions structure the growth and maintenance of neural network arrangements. These arrangements reflect the unique ensemble of neurons simultaneously activated in concert with the specific configuration of subjective perceptions. In other words, interactions in the social environment are retained as embodied capacities, habits, skills, and memories through the accumulation of neural connections corresponding to the individual's subjective experience. This translation of experience into meaningful perceptions and durable neuronal arrangements is fundamental for cognitive development.

Returning to the notion of set and setting, *set* refers to the embodied dispositions that are internalized through interactions with the social-environmental *setting*. Setting simultaneously exerts a structuring influence on both the subjectivity and neurobiology of the individual. Importantly for the present aims, this framework resituates the brain as an organ that is both a mediator of an individual's experiences and interactions, as well as a *product* of subjective experiences and interactions.

Through the duration of diverse social-environmental stimuli experienced by the individual subject, the brain develops as a “social, cultural, and biographically shaped organ” (Fuchs 2018:175). Along these lines, a much broader perspective must be taken in attempting to understand the origins of cognition, the etiology of mental disorders, the effects of drugs, or more specifically the mechanisms of psychedelic transformation. The brain does not cause cognition, mental disorders, or drug experiences. Rather, the brain is one component in the circular processes that produce these phenomena.

For example, mental disorder is a phenomena involving an individual’s subjective evaluation of and relation to their self and circumstance (Fuchs 2018). It is predicated on the individual’s experience and the disruption of their social interactions (Fuchs 2011a, 2018; Moncrieff 2007, 2010; Pilgrim 2007, 2014). Mental disorder is summarily diagnosed through intersubjective social evaluations. As previously mentioned in the chapter *Agents of Plasticity*, neither the brain nor any other biological markers are used for diagnosing mental disorders. In line with the understanding of neurodevelopment described here, the involvement of the brain in the incidence of mental disorder can be understood as top-down effects that social-environmental interactions have on the brain, which are carried through in the embodied dispositions of the person into further interactions. This may be seen in the case of post-traumatic stress, wherein harmful experiences, by virtue of their frequency or severity, leave a mark on the subjective disposition, social functioning, and neurophysiology of an individual. A similar dynamic may be seen in the case of

problematic patterns of substance use (i.e. “addiction”). Here, it is well known in the drugs literature that repetitive use of drug does not result in the condition known as addiction. Rather, the development of problematic patterns of drug use is mediated by social-psychological phenomena, such as trauma or social dislocation, and social-environmental context—even in the presence of physical tolerance and withdrawal symptoms (Alexander 1987, 1990, 2008; Anderson 1998; Decorte 2011; Duff 2007, 2012; Hunt and Barker 2001; Kaye 2012; Reinerman 2005; Weinberg 2002, 2011; Zinberg 1984).

In these examples, mental disorders do not originate in a mechanically faulty brain, but instead from the internalized patterns of thought and behavior that impact appraisals of self, social functioning, and become manifest in neuronal connections. Therefore, meaningfully treating mental disorder must occur through the individual’s embodied subjectivity rather than simply intervening on and correcting more elementary neurobiological processes without reference to the subject. Fuchs (Fuchs 2011a:341) conveys the essentialness of subjective experience for improving mental disorders effectively.

Only conscious, embodied experience is able to correct the corresponding dysfunctional patterns of neural activity. And only repeated interactions with the environment—in other words, processes of interpersonal learning—can stabilize new attractors of perception and behavior in the brain. Since the neural structures that underly our personal dispositions are shaped by

embodied experience, there will probably never be a way to create new views of the self and the world by brain manipulation directly.

As psychedelic science has increasingly conformed to biomedicine, psychedelic drugs have been reframed as tools for rewiring the brain by inducing neuroplasticity. Some theories about psychedelic-induced plasticity are more consistent with the notion that the mechanisms underlying psychedelics' therapeutic effects are not purely neurobiological or pharmacological. However, as discussed in the previous chapters, neuroreductionism in psychedelic field is a problem as evidenced by the concerns expressed by researchers and the influence of biomedical and neoliberal logics as the field pursued mainstream acceptance. Thus, consistent with the field of psychiatry, psychedelic science would benefit from “theories of social and cultural biology that recognize the fundamental role of social processes not only as determinants of health and illness but as the mediators and mechanisms of psychopathology as well as of healing and recovery” (Kirmayer and Gold 2011:323).

The attention to neuroplasticity as a mechanism to explain psychedelics' therapeutic effects has so far led to a focus on changing brains rather than helping people change how they relate to self and others in their social worlds, which consequently changes the brain. This has been most explicitly drawn out in the psychoplastogen model which, in addition to suggesting psychedelics efficacy in treating “neuropsychiatric” disorders stems from the ability to stimulate neuroplastic change, is aimed towards developing drugs to capable of producing highly specific neuroplastic changes that do not produce any psychoactive effects. While the premise

of producing neuroplastic changes *without* corresponding changes in consciousness is itself questionable, the psychoplastogen model also seems to take neuroplasticity as inherently therapeutic. The following section will challenge this assumption by drawing out the “dual-aspects” of psychedelic plasticity to highlight the contingency of psychedelics therapeutic effects.

Agency and vulnerability: The dual aspects of psychedelic plasticity

A fundamental premise of neuroplasticity is that it functions as a mechanism for *experience* to shape the formation of neural connections (Atzil et al. 2018; Paterson 2022; Pitts-Taylor 2016; Wexler 2011). Some describe it as a quality of the brain that allows for adaptation to environmental surroundings, while others emphasize the role that neuroplasticity plays in learning and socialization. In both cases, brain development is thought to occur in concert with interactions in and with one’s social environment. This suggests that neuroplasticity may result in any number of diverse forms of neural arrangements depending on one’s social environment and the nature of one’s interactions. Therefore, inducing neuroplasticity (in a clinical setting or otherwise) in no way guarantees a positive or therapeutic outcome. At the same time, the prospect of using psychedelics to induce neuroplasticity for the purposes of facilitating individual transformations still marks a significant step in development of biopower (the search for increasing control over the processes of life). Yet, the possibility of “rewiring the brain” with psychedelics raises concerns about who is doing the rewiring and how the connections are determined.

In her attempt to make sense of the contemporary knowledge about neuroplasticity, philosopher Catherine Malabou draws attention to the multiple meanings of the term plastic. Pointing out how “plastic” can refer to both the ability to give and receive form, she suggests the meaning of plasticity is amenable to both “closed” and “open” interpretations that exist on a continuum between determination and freedom respectively. The interpretations of neuroplasticity’s significance typically fall somewhere along this spectrum. On the one hand, closed conceptions of the term plastic generally imply a vulnerability to formation by the circumstances of biology or milieu. In this closed interpretation of plasticity, form is largely *determined* and relatively fixed or otherwise resistant to change no matter whether that form is pre-determined by some genetic blueprint or inscribed sociocultural influences. On the other hand, open definitions suggest that neuroplasticity implies a freedom from biological constraints and an agentic capacity to shape the brain through intentional action. Pointing out the etymological connection to certain plastic explosives, she suggests that plasticity may also denote the annihilation of form. Placing it at the extreme of freedom’s end of this continuum, Malabou (2008:6) also takes plasticity to imply “agency of disobedience to every constituted form, a refusal to submit to a model.” This manifests as a perceived *freedom from* biodeterminist accounts of difference such as in sex difference research, *freedom to* take actions to purposefully modify our neurobiology, and the potential to take on any number of unique forms in response to creative efforts and environmental influence.

In Malabou's case, she sees in plasticity the potential for freedom from the capitalistic "neuronal ideology" that renders the brain a passive, flexible recipient of form capable of adapting to the increasingly variable demands on one's schedule and labor. Once we realize our neuroplastic potential, she suggests, we can act to destroy the maladaptive forms we have unknowingly internalized in our capitulation to the demands of neoliberal capitalism and reform them anew. While Pitts-Taylor (2010, 2016) points to the ways in which the presentation of neuroplasticity in public discourse conforms to neoliberal ideals of personal optimization and enhancement, risk mitigation, and commodification of the resources geared towards optimizing the brain health of patients turned consumers, she ultimately departs from Malabou's more optimistic assessment. Where Malabou insists that raising consciousness about our capacity to act creatively and selectively on the brain's inherent plasticity will help us achieve "neuronal liberation", Pitts-Taylor maintains that such suggestions are a further reflection of neoliberal ideals that constitute the brain as a "biovalue" and for a variety of reasons doubts the possibility that neuroplasticity leads to any sort of "self-directed" agency.

Before proceeding more into the discussion of how psychedelics figure into these dual-aspects of plasticity—agency and vulnerability—I should clarify my usage of each concept. In line with Barad's (2007) conception of agential realism, I consider agency as something that is *exercised* in concert with one's environmental surroundings. In other words, agency is an enactment. It is not a characteristic, possession, or quality of individuals (Barad 2007; Emirbayer and Mische 1998;

Giddens 1984). Rather, agency is something “achieved” in relation to the capacities and opportunities afforded by the social environment. Along these lines, agency may include habitual responses stemming from recognition of certain patterns in the environment (Emirbayer and Mische 1998:975–83), as well as the potential that individual actors can change their patterns of acting or relating to the environment in light of aspirations for change and reflexive deliberation (Barad 2007:178; Giddens 1984; King 2013). The capacity to enact *transformative* agency is shaped by the actors’ reflexive deliberations, as well as the opportunities available in the social environment for supporting or legitimating transformative change (i.e. roles, resources, life chances, peer-networks, etc.; King 2013).

In contrast to the notion of agency, vulnerability has received considerably less attention in social theory and philosophy. Yet, as of late, philosophers, feminist theorists, and bioethicists have built on Nussbaum (1986) and Goodin (1985) to more fully develop the concept of vulnerability, particularly to understand how vulnerability is tied to various political and ethical obligations (Mackenzie 2014). Vulnerability refers to a variety of needs, exposures, and dependencies inherent to the human condition (Mackenzie, Rogers, and Dodds 2014). In many respects, humans’ various vulnerabilities are a function of both our embodiment and embeddedness in an environment that shapes or determines our circumstances. However, vulnerability also stems from the mutual dependencies stemming from sociality and susceptibility to the influence of others in the process of self-formation (McConnell 2016). Mackenzie and colleagues outline three types and two states of vulnerability that are important to keep

in mind to understand the implications of psychedelic facilitated neuroplasticity. First, there are inherent vulnerabilities, which are the consequence of our biological makeup and corporeality. Second, situational vulnerabilities, which are context dependent, stem from the circumstances of individuals or groups in the social environment (i.e. in the case of unequal access to resources or opportunities). Third, pathogenic vulnerabilities refer to instances where situational or inherent vulnerabilities are targeted, exploited, or inadvertently exacerbated through dysfunctional social relations. In other words, pathogenic vulnerabilities may stem from the actions of groups or the structure of social systems that generate social inequality. Ultimately, part of vulnerability's essence is the potential for humans' corporeal and cognitive fate to be determined by factors beyond their control such as other individuals or environmental circumstance.

As alluded to above, neuroplasticity's meaning exists on a continuum between agency and vulnerability, and it is often associated with the potential for freedom or control. Along these lines, since psychedelics can induce neuroplastic states in users, it is important to consider how neuroplasticity may be responsible for the varying outcomes along this continuum potentiated by psychedelic use. Regarding agency, I discuss how creativity and shifting perceptions of self and suggestibility—two common effects of classical psychedelics corresponding to each pole of this continuum—are useful examples for showing how neuroplasticity can translate into both self-directed agency and vulnerability.

Psychedelic-Facilitated Plasticity and Transformative Agency

Creativity is a concept frequently invoked in discussions of agency, as it is thought to encapsulate the potential for individuals to intentionally interact with, shape, and transform their surroundings by drawing on unique experiences, schemas, and perspectives (Emirbayer and Mische 1998). Psychedelics have been associated with creativity since the psychedelic boom of the mid-twentieth century (Hartogsohn 2020). In addition to the array of potentially therapeutic uses of LSD, Stafford and Golightly (1967:255) assert in their book *LSD: The Problem Solving Psychedelic* that, “for all of LSD’s powers as a problem solver, the greatest appears to lie in its ability to summon and titillate the creative imagination.” The excitement about the potential of creativity stemmed from several studies and a plethora of anecdotes about the uses of psychedelics to spark creativity for the purposes of artistry and technical problem solving in architecture, engineering, and science (Hartogsohn 2020; Stafford and Golightly 1967). The association between psychedelics and creativity is also clearly established in “psychedelic culture” and culture at large, as psychedelics have made an extensive mark on visual arts and music that persists to this day (Hartogsohn 2020:129–46).

Contemporary discourse on the relationship between psychedelics and creativity is sparse relative to more clinically pressing questions pertaining to efficacy, mechanisms, and exploration of additional conditions for which psychedelic assisted psychotherapy could be useful. Nonetheless, the study of psychedelics and creativity has persisted as a question of interest in the current psychedelic movement and yielded

some insight into the role neuroplasticity plays in generating creating and ultimately contributing to the achievement of self-directed agency. For instance, psychedelics' ability to spark creativity is sometimes tied to their wide-ranging cognitive effects, which have been found to variously impair ordinary cognitive processing and contribute to forms of divergent thinking conducive to creativity in a dose- and time-dependent manner (Carhart-Harris and Friston 2019; Girn et al. 2020; Kuypers 2018; Kuypers et al. 2016; Mason et al. 2021; Wießner et al. 2022). Phenomenologically, the psychedelic experience displays several features suggestive of creative thinking, such as unconstrained thought²⁷, hyper-associative thinking, or changes in meaning attribution (Girn et al. 2020; Hartogsohn 2018; Neitzke-Spruill 2019a; Swanson 2018). Neurobiologically, as with all of psychedelics' hallmark effects, the road to creativity runs through 5HT2A receptor. In turn, as psychedelics' capacity to facilitate neuroplasticity stems from the activation of 5HT2A receptors, hypotheses addressing the neural roots of psychedelic creativity have focused on the plastic changes in neural connectivity during and following acute psychedelic effects (Carhart-Harris and Friston 2019; Girn et al. 2020; Mason et al. 2021).

²⁷ Here, I refer to thought unconstrained by ordinary boundaries of consciousness and perception, as well as a freedom from the constraints of everyday life and the “natural attitude” (Berger and Luckmann 1967; Schutz and Wagner 1970). In many ways, the psychedelic experience represents a “flight from reality” wherein everyday demands are bracketed, allowing for more reflexive thought.

The enhancements to creativity are hypothesized to stem from plastic changes to the default mode network (DMN), which is thought to be linked to abstract cognitive functions pertaining to “self”, such as autobiographical memory, conceptualization, first and third person experience, imagining the future, and constructing “mental scenes” (Andrews-Hanna et al. 2010; Barrett and Satpute 2013). In what is called the REBUS model, Carhart-Harris and Friston (2019) suggest that the psychedelic experience facilitates a relaxation of prior beliefs, which can culminate in ego dissolution—an experience characterized by a loss of self. As an abundance of evidence suggests that psychedelics can lead to disruptions in functional connectivity of this “high level” brain network and increases in connectivity both globally and among certain networks (Preller et al. 2019), creativity is hypothesized to stem from the disruption to everyday frameworks of thought embodied in these networks and the subsequent novel associations achievable due to increases in connectivity elsewhere in the brain. From the standpoint of embodied cognition, all of the normal socially-conditioned frameworks of thought that structure our awareness drop away allowing for more creative thought as increases in neural connectivity facilitate a subjectively embodied perception of novel associations. The only study directly investigating the role of psychedelics on creativity that employs measures of brain activity supported

this idea, finding a link between disintegration of DMN connectivity and subjective reports of creative thinking (Mason et al. 2021).²⁸

As it pertains to the discussion of whether using psychedelics to facilitate neuroplasticity can enable one to achieve some level of self-directed agency, the significance of these findings lies in the notion that psychedelics allow individuals users, by way of neuroplasticity, to temporarily demote prominent neural networks and establish novel patterns of connectivity throughout the brain, which may persist beyond the acute effects of psychedelics (Carhart-Harris and Friston 2019; Girn et al. 2020; Kuypers 2018; Kuypers et al. 2016; Mason et al. 2021; Wießner et al. 2022). Ordinarily, neuroplasticity functions as an essential mechanism facilitating the *internalization* of interactions had throughout the social environment, as it is heavily implicated in both learning during early life and development of important networks, which occurs in conjunction with social-environmental demands (Atzil et al. 2018). Just as neuroplasticity is implicated in the formation of neural network connections that sediment learned or trained habits in the brain, those same networks previously established, differentiated, and synchronized are subject to enhanced connectivity with psychedelic-induced neuroplasticity. As the physical traces of life experience and

²⁸ However, objective measures of creativity in this study found mixed results. This is in line with other research on the relationship between psychedelics and creativity, which suggests psychedelics do not increase creativity writ-large (Girn et al. 2020).

memory are increasingly interconnected after psychedelic use, (subjectively) novel associations and syntheses of cognitive frameworks contribute to a sense of creativity.

One additional dimension of the psychedelic experience illustrating how psychedelic facilitated neuroplasticity contributes to self-directed agency is changes to one's experience of self. The individual capacity to respond creatively to emergent circumstances or develop future-oriented plans of action require pointed deliberation and reflection that incorporates existing knowledge/previous experience with a vision for the future to guide decision-making (Emirbayer and Mische 1998; King 2013). In this way, individuals can enact transformative agency by distancing themselves from previous habits of thought and behavior and pursuing ideal projections of their future-self. Evidence from phenomenological and neuroscientific studies of psychedelics suggest that these agents of plasticity may be useful for encouraging the reflexive thought conducive to enacting transformative agency (Fischman 2019; Lebedev et al. 2015; Millière 2017; Neitzke-Spruill 2019a, 2022). Phenomenological investigations have found that psilocybin and LSD can lead to a variety of changes to self-experience, including: increased self-awareness or self-consciousness, seeing one's true or whole self, or dissolution or dissociation from self entirely. Psychedelic-induced changes in self-experience have been linked to reflexive thought in several studies finding that subjects report insights into self-identity (Noorani et al. 2018), revision of life priorities and identity changes (Belser et al. 2017), self-knowledge and notions of possible-selves (Neitzke-Spruill 2022), or dissolution their sense of self (Swift et al. 2017).

The ability to modify one's self experience in a way that enables reflexive thought through psychedelic facilitated neuroplasticity is a first step towards enacting transformative agency. Neuroplasticity appears to be implicated in these changes to one's self experience through psychedelics' effects on the DMN, which is associated with several dimensions of self-experience, future oriented thought, envisioning mental scenery, and autobiographical memory (Andrews-Hanna et al. 2010; Barrett and Satpute 2013). Moreover, the phenomenological changes appear to be associated with the projective dimension of agency that corresponds to the ability to imagine future selves to orient one's actions toward (Emirbayer and Mische 1998; King 2013; Neitzke-Spruill 2022). Psychedelic induced changes to sense of self, most notably the phenomenon of ego-dissolution, has been correlated with plastic changes (decreased connectivity) in the DMN during the acute experience of psychedelics (Carhart-Harris et al. 2012, 2016; Lebedev et al. 2015; Muthukumaraswamy et al. 2013; Smigielski et al. 2019; Tagliazucchi et al. 2016). Specifically, the relationship between the acute neurobiological changes and self-altering effects of psychedelics has largely been interpreted as release of the physically embodied "constraints" shaping everyday cognition, which then leads to a wide variety of radical alterations to conscious experience (Carhart-Harris and Friston 2019; Mason et al. 2021; Swanson 2018).

As psychedelics dissolve subjective boundaries characterizing normal waking consciousness, this is subjectively experienced as being untethered from everyday distinctions, meanings, expectations, understandings (Neitzke-Spruill 2019a). These cognitive boundaries are essentially a reflection of embodied interactions had

throughout the social environment which have established social meanings in the brain's neuronal arrangements through internalization. In turn, as predominant brain networks that are ordinarily segregated display enhanced connectivity during the acute effects of psychedelics (Carhart-Harris et al. 2012, 2016; Müller et al. 2018; Roseman et al. 2014; Tagliazucchi et al. 2014, 2016), this dissolution of routine patterns of thought and taken-for-granted understandings is also accompanied by novel associations, alternative or “fresh” perspectives, and perceived insights pertaining to self, circumstance, and other worldly concerns (Neitzke-Spruill 2019a, 2022).

The simultaneous disruption of connectivity in important networks associated with self-understanding and increases in connectivity broadly throughout the brain is essential to understanding how psychedelic facilitated plasticity can lead to enacting transformative agency. Specifically, because the neuroplastic effects of psychedelics are associated with reflexive thought and disintegration of self, it provides individuals the opportunity to “distance” themselves from habitual patterns of thought and identity commitments to craft ideal possible selves to focus future action. Through their plasticity generating properties, psychedelics capacitate individual actors to ascertain, evaluate, and potentially extinguish unwanted habits of thought and behavior that have been internalized and act intentionally to rebuild them anew.

While more radical and future-oriented attempts to reform oneself correspond most directly to the projective dimension of agency (Emirbayer and Mische 1998), psychedelic experiences may also opportune smaller revisions to everyday thought-patterns that contribute how one acts in response to more immediate events and

interactions encountered throughout the social-environment. Along these lines, some evidence indicates that psychedelics can contribute to mindfulness (Sampedro et al. 2017; Smigielski et al. 2019; Soler et al. 2016; Uthaug et al. 2018, 2019, 2019) and cognitive flexibility (Davis, Barrett, and Griffiths 2020; Doss et al. 2021b; Murphy-Beiner and Soar 2020)—both of which may function as contributors to the practical-evaluative domain of agency (Emirbayer and Mische 1998). In either case, psychedelics equip individual users and health professionals alike with the tools to leverage neuroplasticity in a directed fashion for several purposes.

Despite this potential, any attempt to achieve transformative agency through the use of psychedelics is contingent upon the individual and the social-environmental context of the immediate experience and subsequent integration as suggested by the “set and setting” literature (Hartogsohn 2016, 2017; Neitzke-Spruill 2019b, 2022). In line with more general conceptions of agency, the capacity to achieve transformative agency through psychedelic-facilitated neuroplasticity is mediated by various constraints posed by the social-psychological context, cultural context, and social-structural context (Emirbayer and Mische 1998:970). Yet, more than just simply limiting the potential for agency, these contextual constraints may expose and effect vulnerabilities generated by psychedelic-facilitated neuroplasticity. Neuroplasticity is equally implicated in the possibility for negative outcomes, as it is responsible for the enriching, enhancing, or therapeutic potential of psychedelics. As I describe below, vulnerability is an essential aspect of psychedelic-facilitated neuroplasticity, which

ultimately presents neuroethical concerns surrounding psychedelics' use as technologies for normalizing and enhancing brain function.

Psychedelic-Induced Plasticity and Vulnerability

Neuroplasticity is an indeterminate phenomenon. Even throughout development, maturation of neural structures tied to fundamental cognitive capacities is inextricably linked to stimuli in the environmental surroundings (Atzil et al. 2018; Malabou 2008). Although developmental neuroplasticity follows a genetically predetermined template, the influential role of early-life experiences and socializing interactions on the formation and volume of neural connections demonstrates the criticality of plastic brain states as well as the potential for negative stimuli to shape the brain. Deprivation, trauma, and other harmful experiences stemming from dependence on caretakers are all internalized—that is, crystallized in developing neural networks. The internalization of such experiences contributes to dispositions that become relatively stable features of self and may act as a hindrance to future socialization. Thus, inasmuch as psychedelic facilitated plasticity potentiates agency and creativity, opening a “critical window” of plasticity with psychedelics can lead to harm stemming from negative interactions had while in this vulnerable state.

Since neuroplasticity is an essential characteristic of the brain, it constitutes an *inherent vulnerability* experienced by all humans (Mackenzie 2014). Vulnerability is an unavoidable feature of the psychedelic experience from both a subjective and neurological standpoint. From the subjective and phenomenological point of view,

consuming a psychedelic will bring about a changes to subjective time sense, self-experience, and other features of normal waking consciousness, which can be experienced as disorienting and impede one's ability to meet the demands of everyday life. In view of the underlying neurobiology, destabilizing ordinary function to create a more neuroplastic state exposes individuals to a state of enhanced vulnerability to experiences that might create a lasting impression through the rearrangement of neural connections. Yet, because this vulnerability hinges on the brain's susceptibility to and dependence on social-environmental influence, individual manifestations of the inherent vulnerability associated with psychedelic experiences differ across contexts. This contextual variation suggests psychedelic-induced neuroplasticity is also a *situational vulnerability* (Mackenzie 2014).

Contrary to most pharmacocentric approaches to drug effects in science and public discourse (see Decorte 2007; DeGrandpre 2006), the centrality of neuroplasticity in producing psychedelic experiences compels us to look beyond the brain to identify the various sources of influence contributing to neural and subjective outcomes of psychedelic use. Set and setting have been two prominent concepts for understanding the role of “extra-pharmacological” mediators in the psychedelic experience (Carhart-Harris et al. 2018; Hartogsohn 2016, 2017; Johnson et al. 2008; Neitzke-Spruill 2019b). While much of the set and setting literature focuses on mitigating “bad trips”, ensuring a comfortable environment, the influence of specific dimensions of set and setting, and techniques for structuring the experience to maximize the benefits of psychedelics, the setting before, during, and after a

psychedelic experience may present several situational challenges that affect the vulnerable neuroplastic state occasioned by psychedelics.

One dimension of setting constituting a primary source of vulnerability is the influence of others. The influence of interactions with others has become an object of concern in the psychedelic movement (Anderson et al. 2020). The inherently vulnerable neuroplastic state induced by psychedelics exposes users to potential *pathogenic* vulnerabilities stemming from the relationships that develop through the course of psychedelic use. For instance, psychedelic use frequently often takes place in the presence of a therapist, guide, shaman, friend, sitter, or significant other, which entails voluntarily placing oneself in someone else's care. During the experience, this creates a dynamic in which the psychedelic user is immediately dependent on the person(s) acting as a liaison for the individual's foray into an altered state of consciousness. As the patient's brain enters a heightened state of neuroplasticity during the psychedelic experience, interactions had with guides and others take on greater importance as the neural infrastructure underlying their ordinary waking consciousness and sense of self are more sensitive to outside influence.

Suggestibility and an altered sense of meaning are two sources of vulnerability stemming from psychedelics' neuroplastic effects, which both have the potential to be amplified by intersubjective interactions during and after the psychedelic experience. Meaning enhancement is a prominent subjective effect of psychedelics, as users commonly report perceiving experiences, encounters, and insights with greater significance than ordinary consciousness (Fischman 2019; Hartogsohn 2016, 2018;

Swanson 2018). Although these changes to perception of meaning are likely one of the most subjectively rewarding aspects of the psychedelic experience (Griffiths et al. 2006), this effect is commonly tied to psychedelics propensity to increase suggestibility (Carhart-Harris et al. 2015; Dupuis 2021; Hartogsohn 2016). Suggestibility refers to an individual's susceptibility to the internalization of thoughts, perceptions, or proclivities to specific action at the suggestion of others. Bearing many similarities to the notion that psychedelics open up a neuroplastic window that promotes social learning, the hypersuggestibility associated with psychedelics elevates users' susceptibility to pathogenic forms of vulnerability, which stem from the intentional or unintentional actions of others (Mackenzie 2014).

Concerns about “brainwashing” and “mental manipulation” associated with psychedelics have largely been discredited since the failure of mid-20th century attempts to administer psychedelics for mental manipulation in the United States and Germany (Dupuis 2021). However, evidence that psychedelics contribute to the amplification/alteration of (pre-existing) beliefs (Lyons and Carhart-Harris 2018; McGovern et al. 2022; Nour et al. 2017) and reports of boundary violations and abuses by psychedelic therapists and shamans (Goldhill 2020; Hall 2021; Lindsay 2021) suggest that psychedelic users in the context of supervised use are potentially vulnerable to being manipulated, controlled, or led to think or behave in ways they otherwise would not. This does not mean that individuals who take psychedelics under guided supervision are automatons lacking the capacity to achieve agency (see Dupuis 2021). In fact, existing evidence that psychedelics can modify beliefs is disputed as a

reflection of participant selection bias, the influence of set and setting, and the tendency for psychedelics to act as “non-specific amplifiers” (Pace and Devenot 2021). Nonetheless, individuals still remain situationally vulnerable to unscrupulous, deceptive, or malicious actors who may take the advantage of the uniquely suggestible and plastic mind-brain state psychedelics instigate. In other words, the capacity to achieve agency through psychedelic use is mediated by the contextual variation of aims, commitments, and frameworks of meaning guiding the action of those administering the drug and/or overseeing the psychedelic experience. In turn, there may be unique ethical obligations associated with administration of these apparently plastogenic substances to others, such as abiding by enhanced consent procedures (Smith and Sisti 2021).

Careful attention to what is “put in” during the heightened states of neuroplasticity during and following psychedelic experiences is a central bioethical dilemma for the psychedelic movement. Smith and Sisti (2021:7) understandably posit that many “ethical challenges arise because knowledge of mechanisms, safety and further benefits is limited and norms about standard practice outside of the research context have yet to emerge.” Yet, rather than merely an artifact of scientific ignorance, many ethical challenges in psychedelic science appear to emerge *because* of the increasing knowledge about the putative mechanisms of psychedelic transformation inherently entail vulnerability. The meaning-enhancing quality of the experience seems to be related to the positive outcomes of psychedelic use (Griffiths et al. 2011, 2016; Hartogsohn 2018). Due the enhanced responsiveness to others’ ideas, hyper-

suggestibility is also thought to be partially responsible for psychedelics' value as therapeutic tools (Dupuis 2021; Hartogsohn 2016, 2018; Johnson et al. 2008).

Furthermore, the implication of neuroplasticity in psychedelics' therapeutic mechanisms highlights the fundamental contingency of psychedelic outcomes, since neural (re)arrangements occur in response to stimuli encountered in the social environment. In turn, one key ethical challenge associated with psychedelics emerges from the necessity of limiting exposures to damaging experiences and interactions during the inherently vulnerable period of neuroplasticity.

Although the establishment of practice standards would help to eliminate some of the risks associated with administering psychedelics in general, and especially to patient populations who may be uniquely vulnerable, vulnerabilities associated with psychedelic-facilitated plasticity are likely to exceed acute administration. Control over "what goes in" is lost as individuals are let go from the lab, carefully curated tripping room, therapist's office, or ceremonial maloca. Integration, or the incorporation of novel insights obtained during the psychedelic experience into everyday life, is considered vital for realizing the benefits of psychedelic experiences (Garcia-Romeu and Richards 2018; Gorman et al. 2021). The psychedelic integration literature tends to focus on the role psychotherapists can play in assisting integration by helping participants make meaning of their experiences (Earleywine et al. 2022; Gorman et al. 2021; Pilecki et al. 2021). However, less attention is paid to the social environment and especially the structural barriers that individuals may interact with in the attempt to enact "transformative agency".

There is some evidence to suggest that the significance of integration is linked to neuroplasticity, as some neuroimaging studies find that global and network specific changes to neural connectivity persist at least 24 hours following psychedelics' acute effects and can even last for one month after the psychedelic experience (Barrett et al. 2020; Carhart-Harris et al. 2017; Pasquini, Palhano-Fontes, and Araujo 2020; Sampedro et al. 2017; Smigielski et al. 2019). Along these lines, as individuals return to everyday life, situational vulnerabilities preceding their psychedelic experience may expose them to harms that could be exacerbated by the vulnerable state of heightened neuroplasticity. General experiences of impoverishment or deprivation, an abusive home life, neighborhood disadvantage, and other social determinants of health all represent situational vulnerabilities that can contribute to the occurrence of mental health problems and could also negatively impact participants in a psychedelic intervention—even after the acute effects of the drug have worn off. Not only do these situational vulnerabilities mediate the occurrence of disorders for which participants are seeking psychedelic treatment in the first place, but they could present harms to individuals experiencing states of heightened neuroplasticity in the days following their acute experience. Excluding such individuals from psychedelic trials may function to inflate our perception of efficacy and contribute to stratified biomedicalization. Yet, at the same time, including them would expose them to harm. Further ethical inquiry should be devoted to weighing the costs and benefits of such practices.

Beyond the vulnerability to specific harms, social-structural constraints may also impede the ability of psychedelic users to maintain novel neural connections and cognitive changes achieved during the acute experience of psychedelics and subsequent integration. In other words, absent some changes in living conditions, subjective shifts that occur during a period of psychedelic-facilitated plasticity may not persist outside of the therapeutic container due to an insufficiently supportive setting. In a recent secondary analysis of psychedelic experience reports collected during the concord prison experience, I found that participants' self-transformations were unsustainable *despite* reporting psilocybin experiences that were conducive to instigating self-change (Neitzke-Spruill 2022). The majority of participants' integration occurred within the confines of prison, and the lack of sufficient social supports outside the prison walls prevented the subjects from enacting transformative agency in the outside world. Psychedelics' transformative potential thus depends on what Eisner (1997) refers to as one's "matrix"—a concept referring to the living situation in which a subject was raised, their present living environment, and the environment to which they return following a psychedelic experience. Phenomena such as discrimination, victimization, opportunity for gainful employment, family ties, and social networks all constitute situational vulnerabilities in an individual's matrix. How these phenomena manifest in the lives of people seeking psychedelic self-transformation will differentially impact outcomes and are likely to confound results of investigations aiming to quantify an objective measurement of psychedelics' impact on constructs such as depression, addiction, and post-traumatic stress.

Conclusion

Throughout this chapter, I have attempted to advance a biocultural understanding of set and setting by using theories of embodied cognition to demonstrate how the body, mind, and social environment all contribute to the psychedelic experience, as well as the relationship between subjective experience, internalization, and neuroplasticity. I argue for the essentialness of the subjective experience on the basis of the brain's dependence on subjectively experienced stimuli for neurodevelopment. Finally, I have attempted to show how neuroplasticity is implicated in psychedelics' dual association with agency and vulnerability. The joint potential for both positive and negative psychedelic experiences has been recognized since Aldous Huxley's popular essay *Heaven and Hell*. More recently, Timmermann and colleagues (Timmermann, Watts, and Dupuis 2022) have suggested that psychedelics are a "double-edged" sword due to the potential for therapeutic and harmful outcomes. Here, I have illustrated that psychedelics' neuroplastic effects are likely responsible for at least some of the indeterminacy of outcomes associated with psychedelic use. Because neuroplasticity invites the influence of experience, action, and interactions to form neuronal connections, the potential for psychedelic-facilitated plasticity to exacerbate vulnerability or enable the achievement of transformative agency depends on the individual's social environment. Of course, choosing to destabilize the neural basis of consciousness and self-experience by taking psychedelics can itself be considered an expression of agency. Nevertheless, it is vital that maximizing the ability for participants to achieve transformative agency be

prioritized in the clinical application of psychedelics. This may require a greater commitment to emphasizing the self-directed elements of psychedelic transformation. Additionally, participants could be provided access to resources beyond integration therapy that would help integrate cognitive shifts beyond psychedelics' acute effects.

Specifically, I describe how acute and long term changes in neural connectivity have been implicated in psychedelics' capacity to foster creativity, as well as facilitate a range of phenomena pertaining to the experience of self. I suggest that destabilizing the neural bases of self with psychedelics can contribute to transformative agency by providing individuals with the opportunity to reform habits of thought and behavior that have been crystallized in neural networks. Yet, this potential for transformative agency is mediated by several constraints encountered the social environment. In turn, I describe how the psychedelic-induced neuroplasticity exposes users to the inherent vulnerability associated with neuroplasticity, as well as several possible situational vulnerabilities shaped by the context of the psychedelic experience. By bringing attention to how neuroplasticity is equally implicated in the potential for injury and healing, I demonstrate how neuroplasticity is responsible for the contingency of psychedelics' therapeutic value and touch on the importance of agency in psychedelic self-transformations.

Chapter 6

CONCLUSION: THE INTEGRATION PROBLEM

The psychedelic science movement shares the same problem as someone who has just returned to their normal waking consciousness following a psychedelic experience—albeit at a different scale. In both cases, an exceptional state needs to be assimilated into the normal practices of everyday life. For the individual, after crossing the boundaries of normal consciousness and experiencing several changes to ordinary awareness, they must return to the pragmatic imperatives of daily life. Their psychedelic experience and any accompanying insights must be made sense of in some idiosyncratic way or within a common framework of understanding derived from philosophy, religion, science, or some other cultural system for viewing the relations between things in world. In psychedelic science, this process is referred to as integration (Garcia-Romeu and Richards 2018; Gorman et al. 2021; Neitzke-Spruill 2019a, 2022).

The psychedelic science movement itself must similarly transition from a state of radical non-ordinary scientific practice to one of “normal” science (Kuhn 2012). It could also be thought of as a shift from fringe or experimental to mainstream and approved. This requires necessary acceptance of and legitimation by resource-granting institutions, such as regulatory and funding agencies (Frickel and Gross 2005). As it stands, the movement’s claim to a paradigm shift is largely based upon the apparent rapid acting, “curative”, and transdiagnostic qualities of psychedelics, as well as the

model of treatment that is explicitly based upon the administration of a consciousness altering substances in the context of a psychotherapeutic protocol.

Regarding the therapeutic qualities, psychedelics' do represent a significant divergence from conventional psychiatric treatment practices. Conventional psychiatric drugs, such as antidepressants, are chronically administered—often in lieu of psychotherapeutic approaches to treatment due to the incentives of managed care to begin with the cheapest available treatment option (Rose 2003). Far from being curative, conventional drug treatments often function as forms of symptom management that enable users to meet demands of daily life and work (Moncrieff 2008b). Furthermore, the development of psychiatric drugs in step with the DSM has meant that drugs such as SSRIs have been conceived in a disease-specific manner. This has given us various forms of “antidepressants”, “anti-anxiety”, or “antipsychotic” drugs which are perceived as acting directly on neurotransmitter systems that are responsible for, or at least related to, the disorders they are used to treat (Moncrieff 2008a). This is in stark contrast to psychedelics, which appear to have efficacy for a wide range of ailments. Moreover, psychedelics are used in periodic drug dosing sessions, and preliminary evidence suggests that users receive benefits after a few sessions.

However, as many participants who worked with psychedelics suggested, psychedelics are not producing these clinical effects on their own. In other words, the efficacy of psychedelic therapies does not lie in drugs themselves, but rather, the model of psychedelic-assisted psychotherapy wherein the drugs serve as *adjuncts* to

the relational processes that occur during the course of the therapeutic protocol. Researchers I spoke to emphasized the difference between this framework and the conventional practice of dispensing psychiatric drugs, which in many cases is considerably less personal. In addition to being a more personal and relational process, psychedelic-assisted psychotherapy is often described as providing insights and realizations, which suggests that meaning-making plays an important role in psychedelics' therapeutic effects. This is a far cry from the subjective meaning of taking conventional psychiatric drugs to manage symptoms or correct a chemical imbalance perceived to be contributing to mental distress.

Still, the successful transition of a SIM from a challenging to becoming the prevailing paradigm and offering a new framework for the progression normal science requires more than good ideas, new technologies, or even demonstration of efficacy. SIMs are inherently political by virtue of the potential to disrupt existing social forms with alternative knowledge. New ways of understanding require new practices to reflect such an understanding, which may be expensive or upset existing power relations. In turn, scientific and intellectual movements theoretically fare better when claims are made in such a way as to appeal to mainstream sensibilities (Frickel and Gross 2005). The psychedelic science movement's execution of this strategy has been to focus on demonstrating medical efficacy. As I have attempted to show throughout the preceding pages, the construction of knowledge about psychedelics, though sometimes portrayed as an apolitical attempt to bring psychedelics into the mainstream, is politicized through the influence of biomedicalizing processes.

Primarily through the influence of neuroscientific research, the field has increasingly trended towards neuromolecular conceptualizations of psychedelics mechanisms. While the use of authoritative neuroimaging techniques (e.g. see Joyce 2005, 2008) and animal models that allow for invasive techniques impermissible in human research function to legitimate psychedelic research, the influence of these techniques has led to a privileging of neuromolecular explanations of psychedelics' therapeutic mechanisms. This neuroreductionist tendency supports individualized understandings of psychedelic treatment that conforms to neoliberal approaches to mental health treatment (Moncrieff 2006). Neuroreductionist of understandings psychedelics mechanisms such as neuroplasticity function to recast psychedelics as technologies for transforming the brain. The use of psychedelics as neurotechnologies has manifested in the practice of microdosing—a practice that has grown in popularity through the distribution of psychedelic knowledge via new media sources. While in some cases this practice is motivated by mental health, psychedelic microdosing also supports neoliberal ideals of enhancing well-being, improving cognitive and brain function, as well as optimizing productivity.

Beyond this, I have shown how the neuroreductionism in psychedelic science has informed the transformative orientation toward the brain, which is evident in discussions of psychedelics' neuroplastic mechanisms. Furthermore, I have shown how the bid to pursue entangled with bioeconomic incentives to invoke psychedelics and the synthesis of clinically useful analogues as promissory capital to drive investment in research and development. The influx of speculative investment in

psychedelic science has further incentivized attempts to find ways to reduce costs and devise psychedelic analogues that can easily be distributed widely. Indeed, several companies and even the Department of Defense has invested significant funds into the development of drugs capable of inducing neuroplasticity without producing psychoactive effects.

Along these lines, the biomedicalizing influences on the psychedelic science movement has been a double-edged sword. On the one hand, biomedicalization of the field has been a politically viable path for the movement. The success of paradigm shifting SIMs requires sufficient infrastructure to support long term stabilization as a scientific field, and the psychedelic science movement has seen some success along these lines. As the movement has grown and attracted funding from private donors and investors, it has reached the point of having sufficient resources to establish professional associations, research centers and groups, regular conferences, as well as education and training programs. The field's long-term success is still undetermined, as this largely hinges on the success of yet-to-be completed clinical trials and decisions by federal regulators. Notwithstanding legalization efforts around the country (Krishnan 2022; Psychedelic Alpha 2023), the psychedelic science movement's pursuit of legitimation through demonstration of medical utility still requires considerable research efforts to fully understand how psychedelics work and how they can be most effectively and ethically implemented. Nevertheless, the movement has been successful in gaining acceptance among the general public and federal organizations tasked with facilitating research, as well as convincing several

individuals and entities to support the movement's effort with money for the time being.

On the other hand, the biomedicalizing processes influencing the movement threaten to dull the revolutionary potential of psychedelics. For instance, in elevating neuroreductionist understandings of psychedelics' therapeutic effects that display a narrow focus on pharmacological mechanisms underlying therapeutic effects, the field risks the reification of existing models of pharmaceutical forms of treatment that are based on the notion that mental health disorders stem primarily from biological malfunction. Additionally, the significant investment in developing analogues pushes the field closer to the development of new substances that fit with the existing pharmaceutical model of treatment. The influence of biomedicalizing processes on the movement has also become a source of contention within the field and may contribute to fractures in the aims and research agenda of psychedelic science. Several scholars have forwarded critiques suggesting commercialization mirrors neoliberal tendencies to individualize mental health issues and threatens to recreate existing inequalities in mental health and mental health treatment (Devenot 2011; Pace and Devenot 2021; Plesa 2021; Tvorun-Dunn 2022).

In this way, biomedicalizing processes have simultaneously provided psychedelics the legitimation necessary for movement success while also filtering out important aspects of psychedelic science that might make it a threat to existing knowledge in psychiatry and the neurosciences (i.e. the essential role of the subjective experience to subjective and neural changes and the significance of the *relationship*

between brain, mind, and social environment). Thus, the question of whether the psychedelic science movement constitutes a paradigm shift in mental health treatment will depend on whether the movement can maintain the will and resources to implement this knowledge without becoming distorted through the biomedicalization of the field. In order to retain the revolutionary potential of the field, it will require further theory development to capture the findings from diverse disciplines contributing to this movement.

Recentring the Person in Psychedelic Science

To move towards theory in psychedelic science that is better able to account for humanistic, social scientific, and neuroscientific knowledge, I have pursued a biocultural understanding of the field's central concepts of set and setting by bringing them together with embodied cognition theory. I intended to leverage this synthesis in order to make sense of the relationship between psychedelic neuroplasticity, the subjective experience of psychedelics, and the social environment. I have illustrated that psychedelics' neuroplastic effects are likely responsible for at least some of the indeterminacy of outcomes associated with psychedelic use. Because neuroplasticity invites the influence of experience, action, and interactions to form neuronal connections, the potential for psychedelic-facilitated plasticity to exacerbate vulnerability or enable the achievement of transformative agency depends on the individual's social environment.

Along these lines, as the psychedelic science movement is faced with integrating into mainstream society as a normal scientific field (and possibly a new standard in the treatment of mental health problems and for general wellbeing), the movement's integration problem is doubled because it is tasked with facilitating successful integration for any individual who undertakes a psychedelic experience in clinical trials or, in the future, a psychedelic clinic. The responsibility associated with administering a psychedelic to someone in your care cannot be understated. I have attempted to show how the subjective conscious experience, as well as the neuroplastic state induced by psychedelics simultaneously potentiate agentic self-transformation or vulnerability to the social-environmental surroundings. One implication stemming from these dual aspects of psychedelic plasticity is a necessary commitment to the agency of individuals to make self-directed changes in their lives.

A commitment to individual agency means that the etiology of mental health conditions, the conditions themselves (however we classify them), and the process of recovery are conceived in terms of a "whole person" living in a particular social-environmental context (Fuchs 2021; Rose 2016a:97). Along these lines, observations of neurobiological phenomena cannot be taken out of the context of the whole person or the person in their milieu. With this in mind, Fuchs (Fuchs 2021) has proposed we conceive of psychiatry as a form of *relational* medicine, which emphasizes the psychotherapeutic relationship between the psychiatrist and the patient as the most potent tool at the practitioner's disposal. There is still a place for the brain in this view. He states, "A psychotherapeutic treatment as an interactive process on the macro level

modifies the brain structures involved—top-down. The altered neuronal structure, however, in turn enables the patient’s interactions with the environment to change—bottom-up, and so on” (Fuchs 2021:189). With psychedelic-facilitated plasticity mediating this relational process, it would appear that psychotherapeutic interventions could be more effective in stimulating changes in one’s thought-patterns, conception of self, or identity. Along with agency, autonomy should be prioritized in such a relationship, as well. Timothy Leary offered some practical wisdom along these lines in the protocol for his Concord Prison Experiment, wherein he (Timothy et al. 1965:63) encouraged participants, “to plan and initiate their own personality change programs.” However, a commitment to agency and autonomy of the whole person may not be enough—even with a well-meaning psychiatrist in assistance.

Given the indeterminacy of psychedelic-induced neuroplasticity, the capacity for individuals to make changes in their lives, realize insights they learned through their protocol of psychedelic-assisted psychotherapy, or maintain significant shifts in self-understanding is mediated by the social environment. Therefore, it is likely that the efficacy of psychedelic medicines will be distributed unequally along existing social divisions, even assuming equitable access. Moreover, the vulnerability intrinsic to psychedelic-facilitated plasticity can magnify the consequences of harmful interactions or existing inequities, putting some individuals at relatively greater risk. While further research should be done to determine the generalizability of psychedelics’ efficacy across diverse populations and contexts, the dual aspects of

plasticity should lead us to be skeptical about the potential for transformative healing to occur for individuals living in states of strain or deprivation.

The implications of neuroplasticity as a mechanism for experience to shape neuronal connections should redirect our attention beyond the brain in the search for the origins of and solutions to mental health issues. Although psychedelics may be agents of plasticity, the psychedelic experience provides an *opportunity* to initiate neuroplastic change through intentional interactions that are mediated by the resources and social opportunities available in one's environment. If the psychedelic science movement wants to make good on its revolutionary promise, it will have to remain steady in its commitment to both the subjective experiences of people and the recognition of the importance setting plays in the acute psychedelic experience and its integration.

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Appendix A

IRB APPROVAL LETTER



Institutional Review Board
210H Hallihan Hall
Newark, DE 19716
Phone: 302-831-2137
Fax: 302-831-2828

DATE: July 14, 2021

TO: Logan Neitzke-Spruill, MA
FROM: University of Delaware IRB

STUDY TITLE: [1771887-1] Psychedelic Science: Understanding the revitalization of
psychedelic research and its implications for science and society

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS

EFFECTIVE DATE: July 14, 2021

REVIEW CATEGORY: Exemption category # (2)

Thank you for your New Project submission to the University of Delaware Institutional Review Board (UD IRB). According to the pertinent regulations, the UD IRB has determined this project is EXEMPT from most federal policy requirements for the protection of human subjects. The privacy of subjects and the confidentiality of participants must be safeguarded as prescribed in the reviewed protocol form.

This exempt determination is valid for the research study as described by the documents in this submission. Proposed revisions to previously approved procedures and documents that may affect this exempt determination must be reviewed and approved by this office prior to initiation. The UD amendment form must be used to request the review of changes that may substantially change the study design or data collected.

Unanticipated problems and serious adverse events involving risk to participants must be reported to this office in a timely fashion according with the UD requirements for reportable events.

A copy of this correspondence will be kept on file by our office. If you have any questions, please contact the UD IRB Office at (302) 831-2137 or via email at hsrh-research@udel.edu. Please include the study title and reference number in all correspondence with this office.

INSTITUTIONAL REVIEW BOARD

www.udel.edu

Appendix B

INTERVIEW GUIDE

Part 1 – Participant Background

- Please tell me a little bit about your work as a scientist/scholar/therapist. What is your disciplinary background?
 - o Walk me through how you found your way to your discipline.
 - o How did you come to study psychedelics?
 - o Who would you say has been most influential on your thinking in terms of how you approach your work as a scholar? Why?
 - o How did you get involved with ----?
 - o Please describe your most current projects.
 - o Describe to me your most recent work day in as much detail as possible.
 - o Do you have any particular career aspirations or goals for your projects? What motivates your research?
 - o What types of things do you consider most important when developing a research question/project? Can you give me a specific example from one of your studies?
- From where do you receive support for your research, if at all?
- What would you consider to be your most impactful/important piece of research/writing? Why?

Scientific Practice and Study Design

For Clinical Researchers:

- Participant selection:
 - o How do you go about selecting participants?
 - o What are the criteria you look for generally?
 - o What screening procedures are implemented?
 - o What kinds of expectations do you find participants typically hold when enrolling in your studies?
 - o How deeply do you get to know the participants before they partake in a session?
 - o To what extent do you attempt to ensure that you obtain diverse samples?
- Experimental/Therapeutic design:
 - o What are your primary considerations when designing an experiment? Can you walk me through the study design of one of your recent research projects?
 - o To what extent and how do randomized controlled trials for psychedelics differ from other therapies?

- How do you go about deciding the types of control arms to be used in your experiments? i.e. Placebo vs. active placebo vs. no intervention group?
 - Dose comparisons control?
 - How do you go about randomizing? Stratified vs. Block randomization?
- What would you say are the biggest limits of RCTs, if any?
- To what extent do you conceptualize psychedelics as pharmacological treatment or a catalyst/adjunct to therapy?
- Set and Setting
 - How do you typically administer the drugs to participants in your studies? How was the model for administering these drugs developed? Has it differed in different research projects? Can you describe an example?
 - How important is the subjective experience of the subject to the therapeutic process? How do you capture the subjective experience of the subject as part of your “data”?
 - Describe the role of clinician, therapist, or researcher during the therapeutic/experimental process.
 - Describe the role of the “guides,” if any.
 - What role does the subject play in producing therapeutic efficacy?
 - Would you consider the subject to play an active role in the therapeutic effects in your studies? Can you give me an example of an instance where the subject/patient actively influenced the therapeutic outcome in your research?
 - How do you consider the role of the environment external to the lab in shaping the participants’ experiences?
 - How do personal relationships, home life, neighborhood influence the outcomes you are measuring?

For Non-clinical Researchers:

- What populations/units of analysis do most of your studies deal with?
- How do you incorporate psychedelics into your research agenda?
- What is the role of [X Discipline] in the psychedelic renaissance?
- What types of analysis do you use?

Importance of the research

- What is novel about psychedelics (as a therapy, as a drug in general, as a research topic)?
 - How are psychedelics different from other drug-therapies? How does the treatment model differ from existing practices?
- To what extent and how does the concept of neuroplasticity inform your research or broader understanding of psychedelics? How do you define neuroplasticity?

- In what ways is the psychedelic renaissance indicative of a new paradigm of medicine or for handling drugs as some have claimed?
- To what extent do psychedelics have value outside of narrow medical uses?
- How do you think the findings from psychedelic research extends beyond their clinical applications?
- Do you have any concerns for the psychedelic renaissance?

‘Forbidden Knowledge’

- Drugs are a fairly sensitive topic in the United States, to what extent do you feel limited in the types of questions you can ask based on your current position?
 - o If there are any, what findings that could come of your research would you say might get you in trouble?
- Have you ever received any pushback about the legitimacy of your research into psychedelics?
- How do you avoid controversy?
 - o Do you take any explicit steps to avoid political fallout?
- Currently, are there any topics that you feel are too sensitive to broach with the research you do?
- To what extent would you characterize psychedelics as spiritual?
- To what extent is there a spiritual component to your own investigation of these substances?
- Are you concerned at all that your research may promote psychedelic use?

Drug culture and policy

- Besides the scientific research, what do you think is driving the psychedelic “renaissance”?
- How has social media and the internet influenced the progression of your work, if at all? How about the field as a whole?
- How often would you say you receive media requests?
- Do you think it is a positive development to see celebrities being open about their experiences with psychedelics?
- How important is harm reduction as a complement to the proliferation of your research?
 - o Are you involved at all with such efforts?
- Why do you think there is such a large public interest in psychedelic science?
- Where do you see psychedelic science in the next 10 years? Where do you see your research in the next 10 years?