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ANALYSIS OF NEWSPAPER COVERAGE OF PSILOCYBIN FROM JANUARY 1, 1989 TO DECEMBER 31, 2019

by

DAX OLIVER

A master's capstone project submitted to the Graduate Faculty in Liberal Studies in partial fulfillment of the requirements for the degree of Master of Arts, The City University of New York

2020

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Analysis of Newspaper Coverage of Psilocybin from January 1, 1989 to December 31, 2019

by

Dax Oliver

This manuscript has been read and accepted for the Graduate Faculty in Liberal Studies in satisfaction of the thesis requirement for the degree of Master of Arts.

Date	[enter full name here without titles] Thesis Advisor
Date	[enter full name here without titles] Executive Officer

THE CITY UNIVERSITY OF NEW YORK

ABSTRACT

Analysis of Newspaper Coverage of Psilocybin from January 1, 1989 to December 31, 2019

by

Dax Oliver

Advisor: Matthew Gold

Psilocybin is a medicine that has shown the potential to deeply change the treatment of depression and anxiety (Daniel and Haberman) (Johns Hopkins). However, psilocybin is not merely a medical issue but a social and political one as well. In the 1960s, public fear about the effects of psilocybin resulted in severe legal restrictions on its use, even for medical research (Pollan 217). Today, many psilocybin advocates hope that it will avoid that fate (Haberman). Measuring public sentiment therefore seems crucial for this community to navigate the social and legal landscape.

Some studies have examined newspaper coverage to help gauge public sentiment about other psychoactive compounds (McGinty et al.) (Zhang et al.), but there seems to be no similar published work yet on psilocybin. Building on these previous studies, I read and hand-coded every article (a total of 534) mentioning psilocybin from four regional American newspapers between January 1, 1989 and December 31, 2019. Three main issues were examined: 1) Has sentiment about psilocybin changed? 2) Has the number of articles mentioning psilocybin changed? 3) Has there been a change in the use of different terms for psilocybin?

My hand-coded data seemed to indicate that sentiment in these four newspapers has fluctuated throughout the 30-year period, with a recent significant rise in positivity in only one newspaper. The number of articles mentioning psilocybin significantly increased in just one newspaper. The only term for psilocybin with a significant change in use was “hallucinogenic mushrooms,” which saw a decrease. These results could be a warning to psilocybin advocates about the risk of negative social and political sentiment eventually growing again, though this is not conclusive. More investigation of this issue is recommended.

The results of my study are presented in a website at the URL:
https://www.daxoliver.com/tallpear/abstract.

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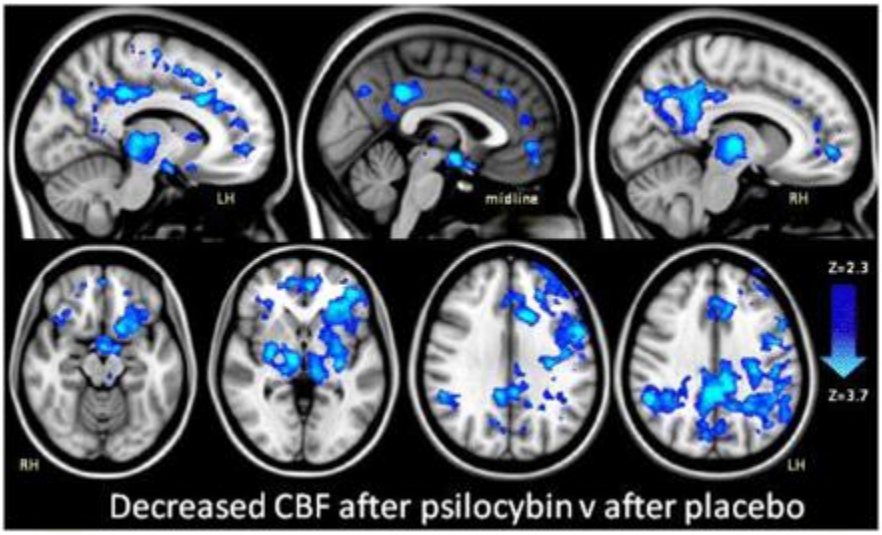

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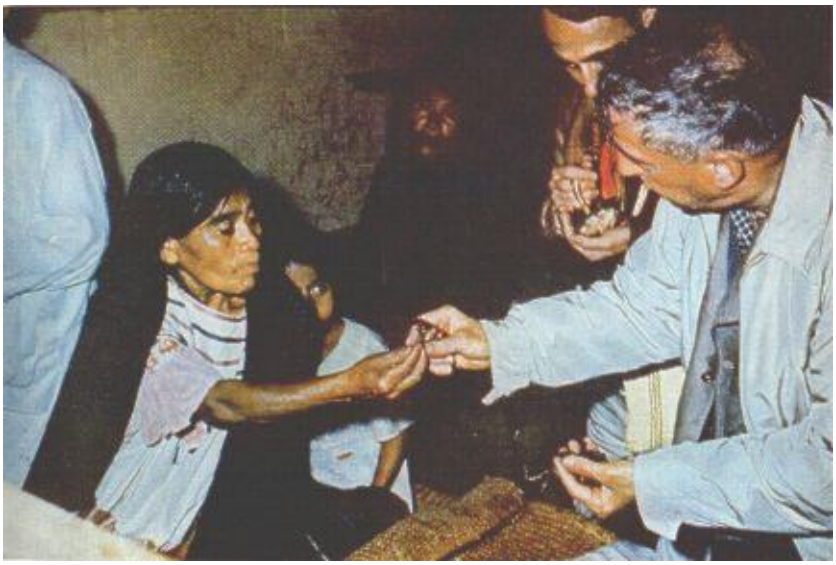

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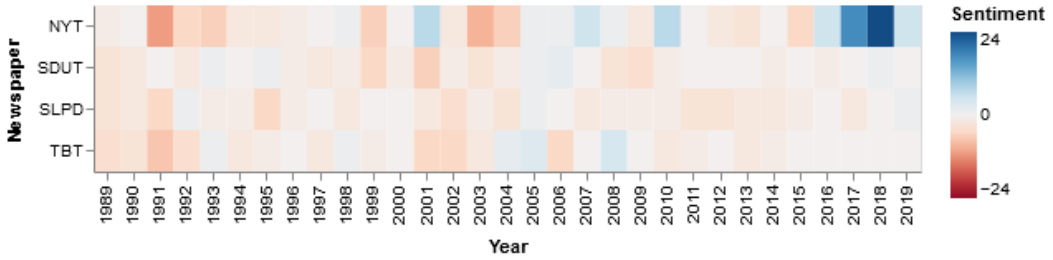

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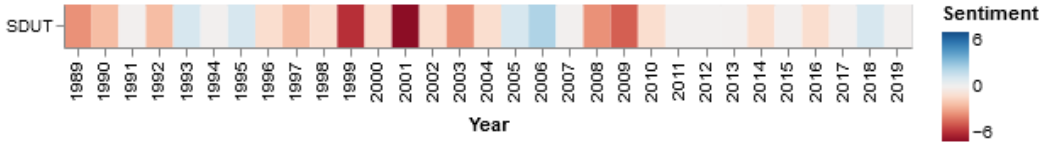

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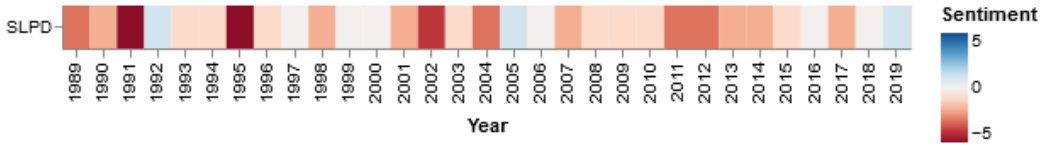

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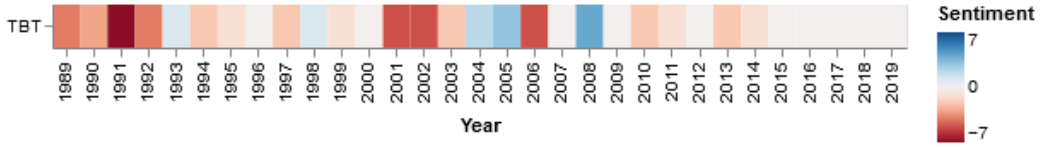

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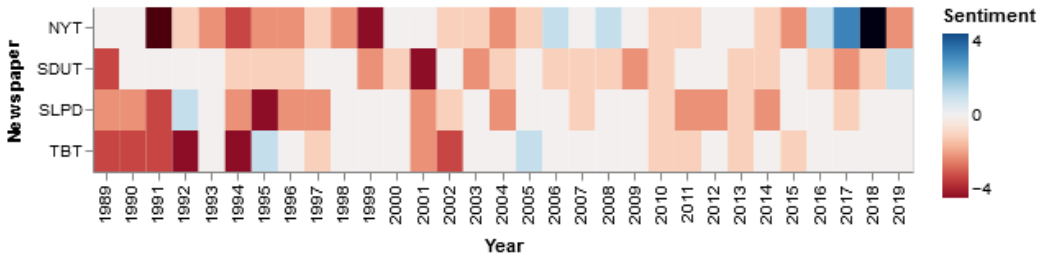

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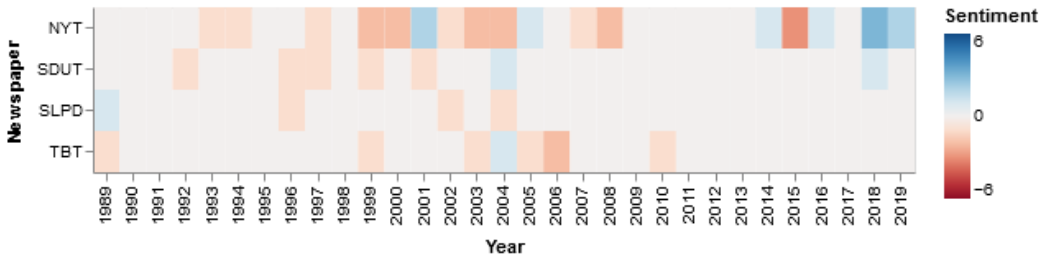

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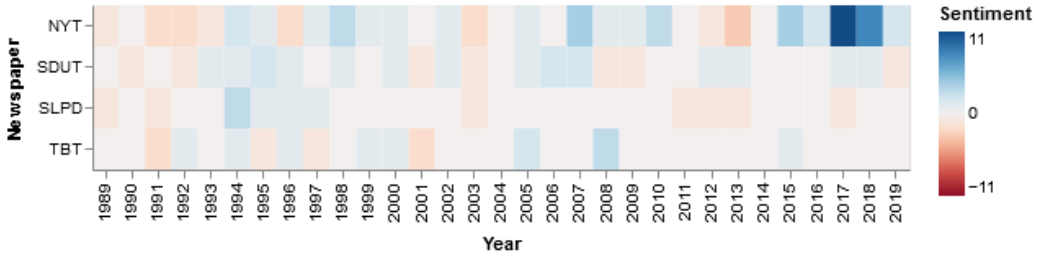

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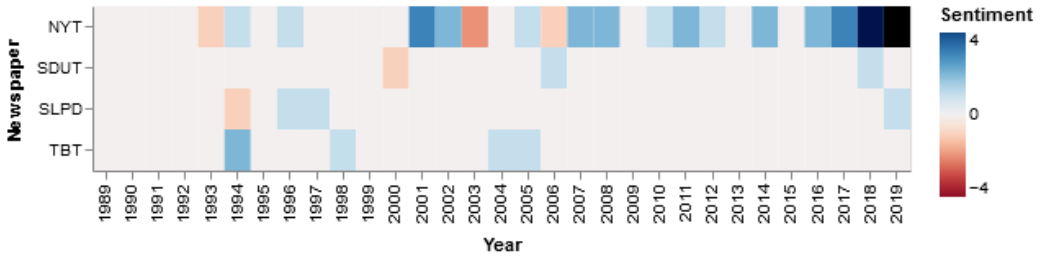

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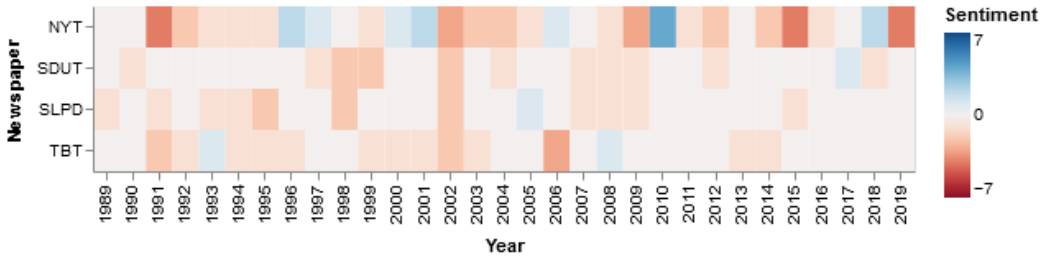

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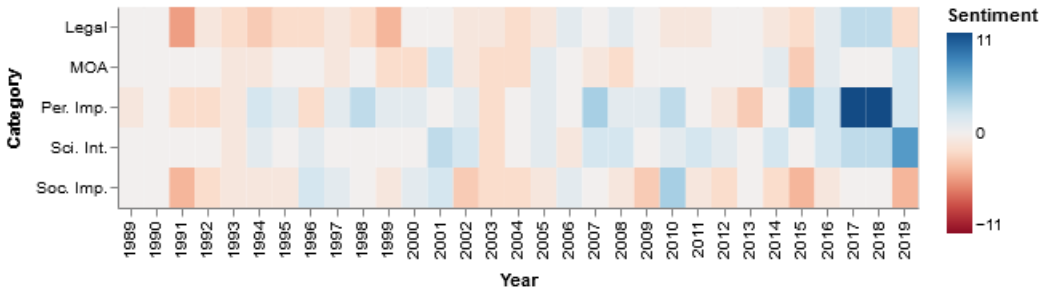

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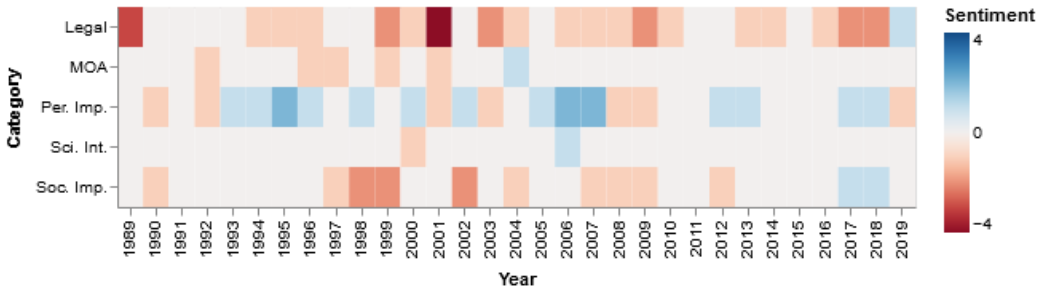

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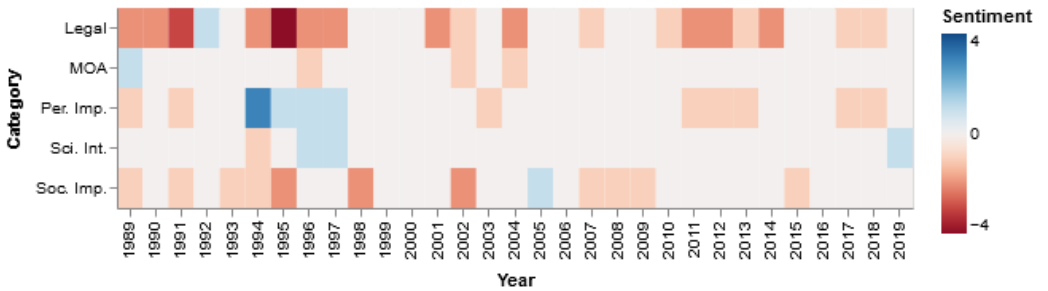

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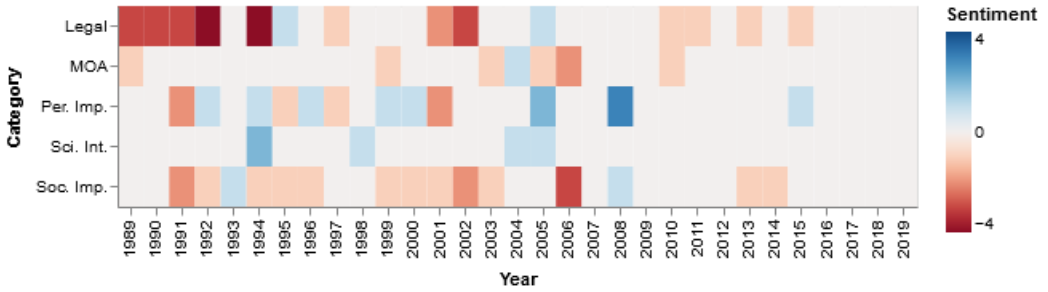

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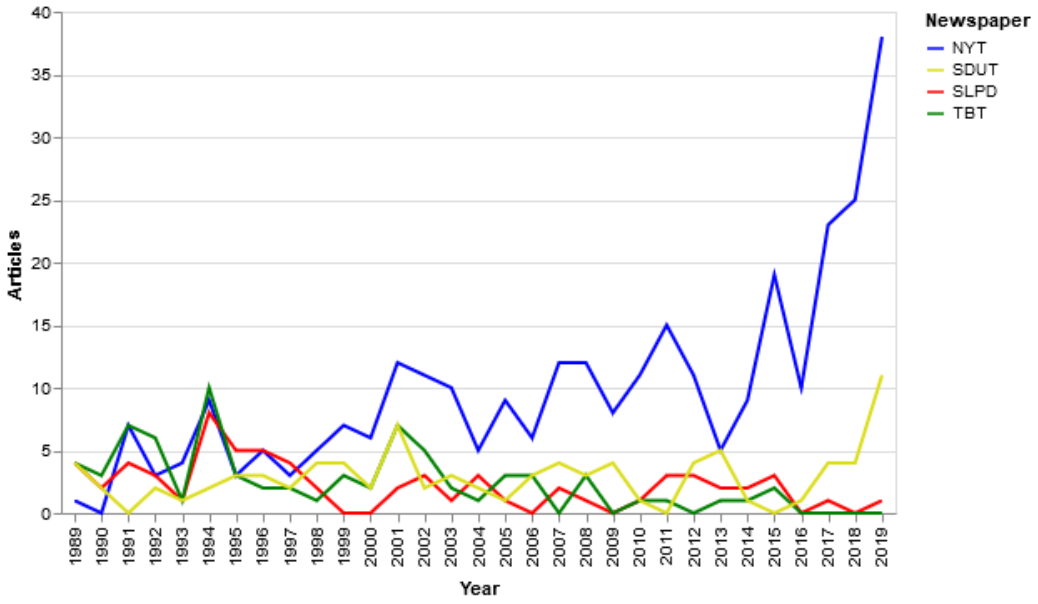

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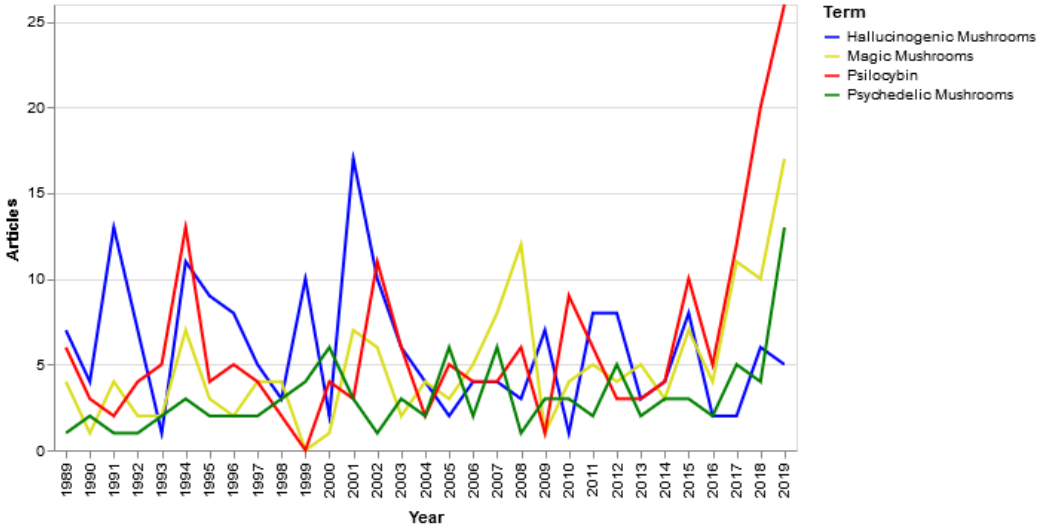

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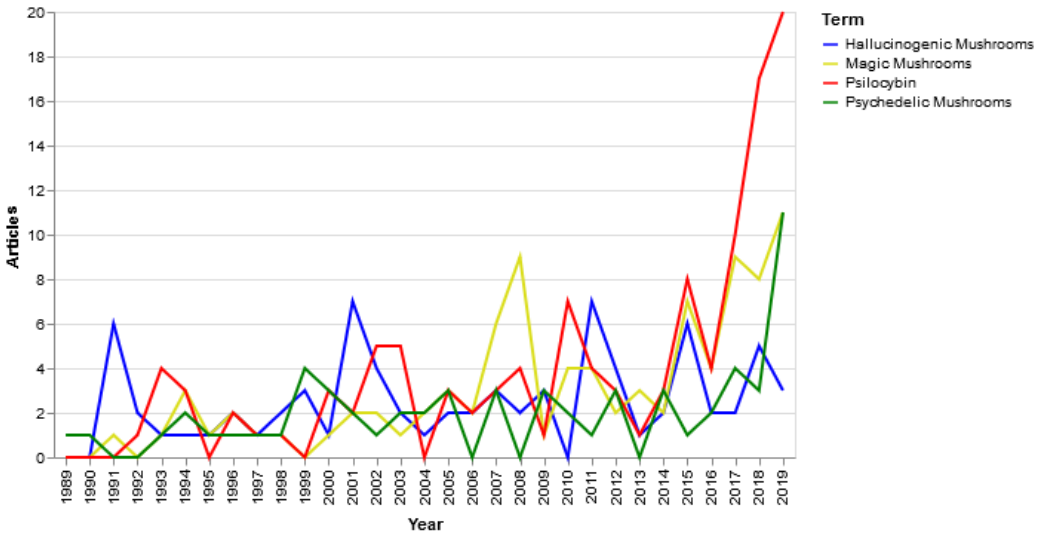

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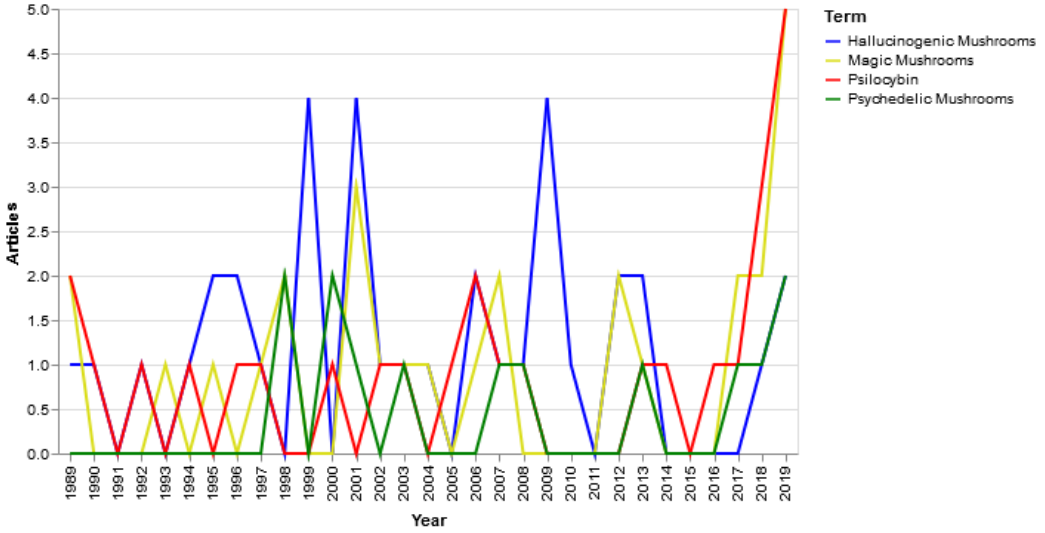

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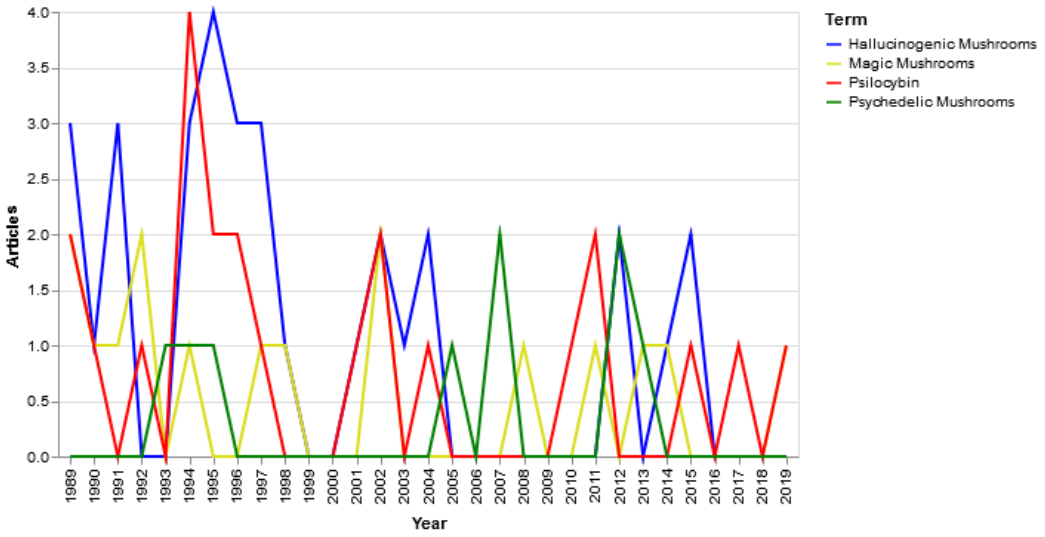

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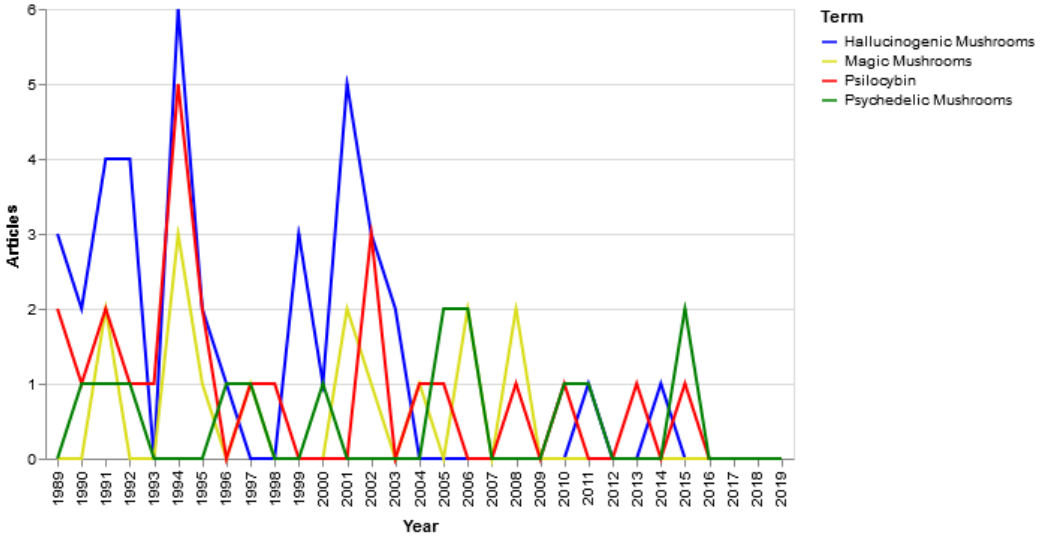

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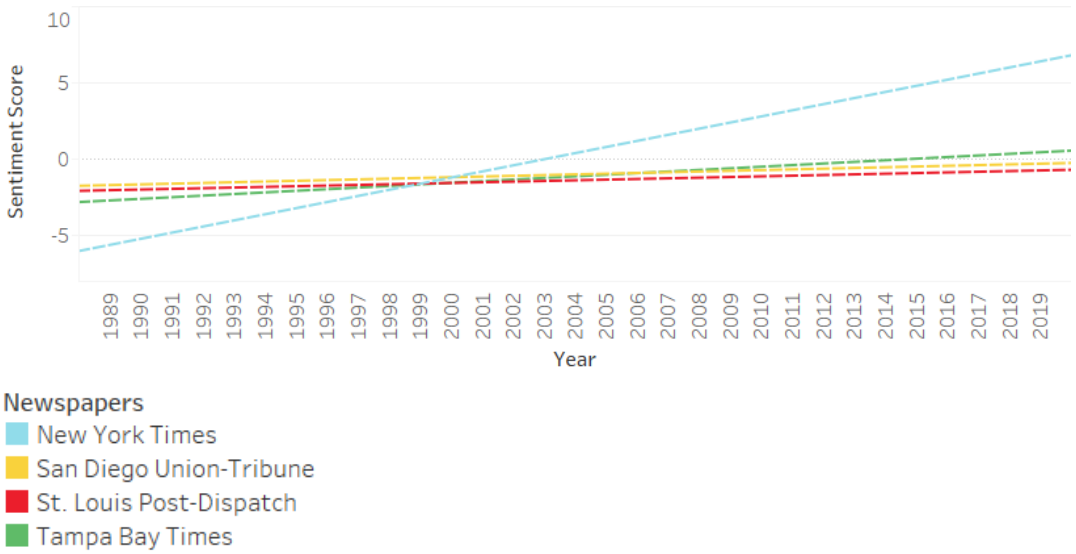

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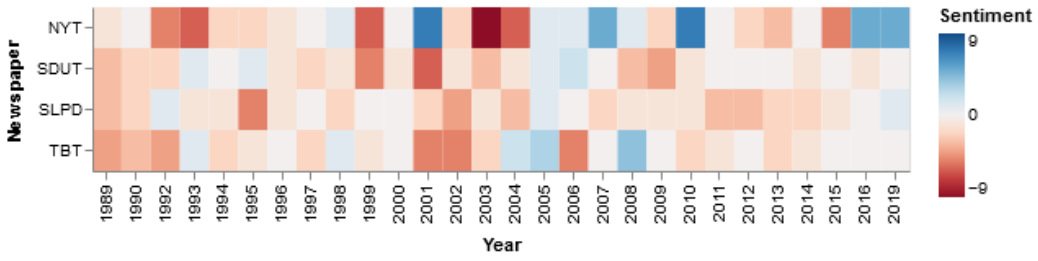

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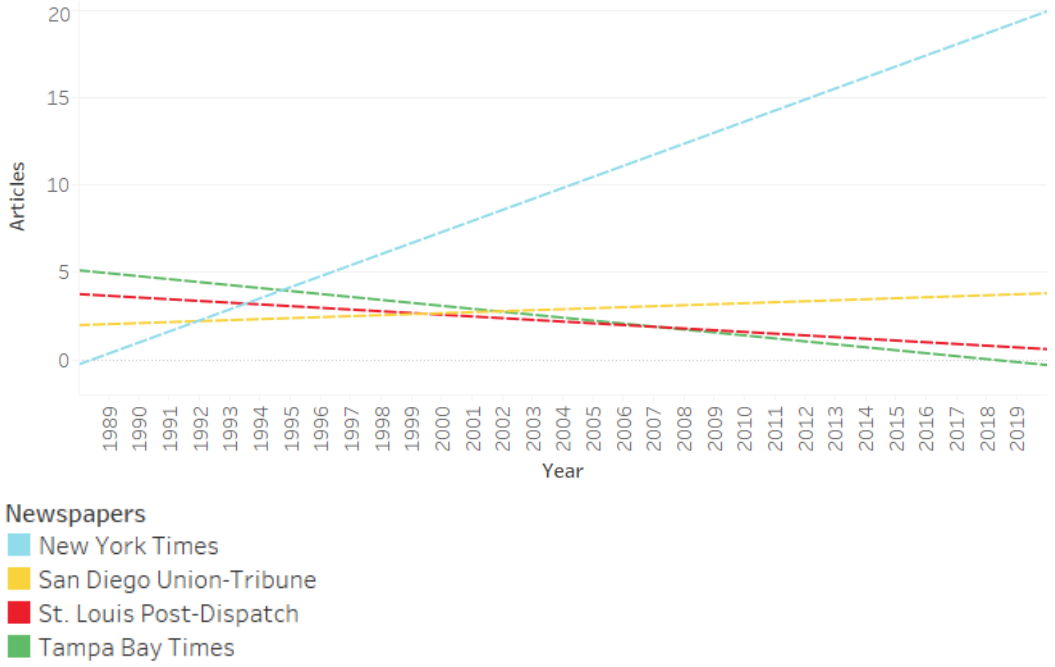

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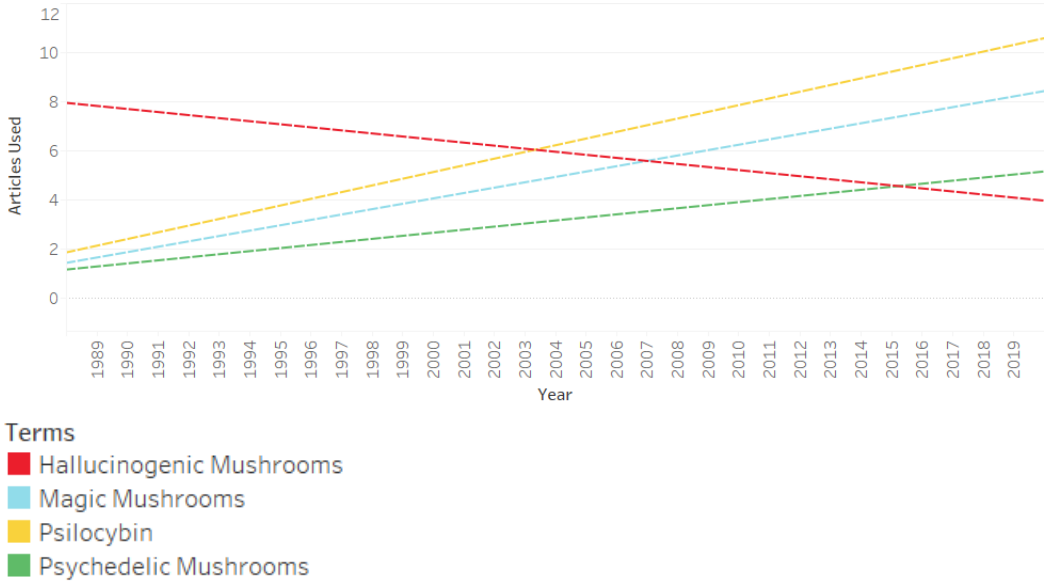

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.Digital Manifest

I. White Paper (PDF)

II. WARC files

a. Research Study Website

http://www.daxoliver.com/tallpear/abstract

III. Code and other deliverables

a. Zip File of Data Tables

https://github.com/johnwade47/samples

1. Vega_Articles_(Newspaper).csv
2. Vega_Articles_(Term).csv
3. Vega_Sentiment_(Category).csv
4. Vega_Sentiment_(Newspaper).csv

A Note on Technical Specifications

My capstone project is a research study presented via a website. I built the website with a self-modified version of the ResponsiveBlogily theme on a WordPress content management system consisting mostly of HTML, CSS, PHP, and JavaScript code. Data tables are accessible on the website through links that connect to a WordPress media library.

I coded most of the data visualizations on the website with Vega-Lite, which is a data-visualization grammar using JSON syntax that is built on another data-visualization grammar called Vega. Both Vega-Lite and Vega were developed by the University of Washington Interactive Data Lab. Vega largely pulls from the D3.js library. D3.js, in turn, is built using JavaScript. Vega-Lite accesses the data tables from the capstone research through "raw" copies saved on a GitHub repository.

Each Vega-Lite data visualization on the website has a bubble in the upper righthand corner with three grey dots. Clicking on this bubble opens a menu of options for viewers to experiment themselves with my visualization code and data.

Introduction and Description of the Capstone Project

Explain the impetus for the capstone

This capstone began four years ago with my parents. In 2016, I read about medical studies that New York University and Johns Hopkins Medicine had just published about the chemical compound psilocybin in the *Journal of Psychopharmacology* (Ross et al.) (Griffiths et al.). Many previous medical studies, in addition to a vast body of anecdotal evidence, had reported that psilocybin contained the potential to help alleviate depression and anxiety (Grob et al.). In addition, some of those studies and anecdotes had found that people who took psilocybin often reported profound insights into their own mental states, as well as spiritual experiences that made them feel more connected to the world and people around them (Martin and Hevesi).

The studies at New York University and Johns Hopkins Medicine sought to explore these potential effects on patients with late-stage terminal cancer. I thought the results of these studies were remarkable. They found that a single dose of psilocybin, given in a calm and controlled setting with a licensed therapist, had an enormous impact on most of the study's participants. Most of the patients reported significantly reduced depression and anxiety concerning their impending deaths, which were only months away for many of them. Even beyond alleviation of the symptoms of depression and anxiety, many of the patients reported that the experience had been one of the most important of their entire lives.

I wondered if psilocybin would be able to help my mother, who had recently been diagnosed with lung cancer. She wasn't interested when I raised the possibility with her, but the idea lingered in my memory. My father had suffered a massive stroke several years earlier, becoming paralyzed and suffering from severe depression and anxiety, so I also considered if he might benefit from psilocybin like the patients in the NYU and Johns Hopkins studies.

Unfortunately, psilocybin can be difficult to acquire. Unless you are part of a federally approved study, the mere possession of psilocybin is illegal almost everywhere in the United States (as well as much of the rest of the world). This illegality was one of the main reasons why my mother was too nervous to take psilocybin herself or offer it to my father as his caregiver. However, when my mother passed away, I became my father's primary caregiver. I offered him some small doses of psilocybin to see if they might help with the after-effects of his stroke. These doses were only moderately successful, but the occasional positive effects led me to continue reading about psilocybin research.

My interest in the therapeutic potential of psilocybin eventually led me to a group of people on the website Meetup.com. These people regularly met to discuss psilocybin and other chemical compounds loosely gathered under the name "psychedelics." At one of their meetings, a doctor gave a lecture about his research into the psychedelic ketamine. Ketamine can be legally prescribed as a painkiller in the United States and this doctor had often prescribed ketamine for pain. He had begun to notice that his patients who received ketamine sometimes also showed reduced depression and anxiety. He had started studying the psychiatric potential of ketamine and had become so optimistic about its possibilities that he had opened a clinic to provide ketamine therapy.

After hearing this lecture, I thought that perhaps ketamine therapy could help my father. I found a ketamine clinic near my father's home and began taking him there for sessions. The results were often extraordinary. For about a month, he showed noticeably less depression and anxiety. He also reported less pain. In addition, he regained some of his ability to move his paralyzed leg. Unfortunately, most of these effects were only temporary, disappearing after the

first month. However, the results that I saw during that first month of treatment made me think that ketamine might eventually develop into a widely used therapy.

These experiences with my father and ketamine led me to consider if there was some way to create a capstone about ketamine therapy. My MALS course on "Digital Humanities" at the CUNY Graduate Center had shown me how data visualization methods could be used to find quantifiable information about mass media. Professors Matthew Gold and Stephen Brier taught me and my fellow students that we could critically examine texts wherever they occurred in society. During this class I often found myself running newspaper articles through data analysis software just for my own curiosity. Eventually, these experiments dovetailed with my interest in ketamine therapy and I wondered if I could examine how newspapers had been treating the growing use of ketamine therapy for psychological ailments.

There is a tremendous amount of positive thinking among psychedelic advocates that these chemical compounds will now avoid the stigma that they developed in the 1960s. That stigma led to many psychedelics, such as psilocybin, being so severely regulated that they could not be prescribed by doctors for any use. Yet I wondered whether this recent positivity was well-founded. Although I shared much of the optimism of the psychedelic community, I thought there was little hard data about public attitudes toward these compounds. I began to wonder if I could contribute to psychedelic research by using an analysis of newspaper coverage of ketamine therapy as a window into that medicine's reputation among the general American public.

I spent several months conceptualizing the methods of data analysis and visualization that have been used in my submitted capstone. Unfortunately, relatively late in my preparations, I discovered that the research team of Zhang et al. had already published a study examining newspaper coverage of ketamine therapy. Their focus was so similar to mine that I realized it

would be very difficult to do my capstone without copying major portions of their work. Thus, my mind returned to the medicine that had started me down this path in the first place with my parents – psilocybin. There did not seem to be any published studies on newspaper coverage of psilocybin. I decided to perform the research for my capstone very similarly to how I had planned with ketamine, but simply switch the focus to psilocybin. In this way, I was also able to use the study by Zhang et al. as an example that could help me flesh out the processes of my own research. Zhang et al. also pointed me in the direction of work by McGinty et al. that had studied newspaper coverage of opioids.

I felt that building a website would be the best way to present my research. A website would allow me to create data visualizations that could update themselves if I changed any of the data. In addition, a website would be more quickly accessible to the wider psilocybin research and advocacy community.

Describe the aims of the capstone

My capstone research aimed to examine coverage of psilocybin in four regional American newspapers for the 30-year period from January 1, 1989 to December 31, 2019. I sought to answer three questions about newspaper coverage:

1) Has sentiment about psilocybin changed?

2) Has the number of articles mentioning psilocybin changed?

3) Has there been a change in the use of different terms for psilocybin?

It should be stressed that these questions are only about newspaper coverage, not general public sentiment about psilocybin. However, I felt that examining newspaper coverage similarly to Zhang et al. and McGinty et al. could provide an initial step for psilocybin advocates to gain perspective on public sentiment. In addition, I recognized the risk that newspapers might no

longer be a viable way to accurately gauge media opinion. This seemed especially true considering the growth of other media outlets such as cable news, podcasts, and YouTube channels. However, an analysis that took into account the myriad media sources of the modern era seemed far beyond the scope of a capstone project.

I wanted my study to be as rigorous as possible, so that members of the psilocybin community could truly benefit from my research. My hope was that my study would, in a small way at least, inform the actions of both psilocybin researchers and advocates. I also wanted my capstone to provide information to an audience beyond the psilocybin community. I wanted the information on the capstone website to be beneficial to anyone curious about psilocybin. To that end, I provided a concise but thorough explanation of both the science and social/political history of psilocybin in the United States. If I can contribute to anyone learning about psilocybin in more depth, even if they are not interested in the specific results of my study, then I will consider my capstone website to be a success.

URL of the capstone

http://www.daxoliver.com/tallpear/abstract

Theoretical Framing and/or Methodology Used

Theoretical framing that informed the capstone

This capstone was a reaction to the tremendous optimism among many psilocybin researchers. As just a few examples of current psilocybin research (in addition to the studies already mentioned above from New York University and Johns Hopkins Medicine), a study at the University of California in Los Angeles has examined whether psilocybin can help the anxiety of patients facing end-stage cancer (Grob et al.). Another peer-reviewed study has examined the effects of psilocybin in the treatment of alcohol addiction (Bogenschutz et al.). Johns Hopkins Medicine is currently conducting many studies about psilocybin's potential, including its impact on depression, anorexia nervosa, nicotine addiction, and Alzheimer's Disease (Johns Hopkins).

Beyond the scientific community, my capstone is also a reaction to the community of psilocybin advocates who hope that it will generally gain a more respectable position in American life. A book about psychedelic research called *How to Change Your Mind* by journalist Michael Pollan was a #1 *New York Times* bestseller in 2018 ("Hardcover Nonfiction"). American companies now openly market psilocybin tours of Jamaica, where possession is legal (Leonhardt). Rick Doblin, founder of the Multidisciplinary Association for Psychedelic Studies, has said: "We are not the counterculture, we *are* the culture" (Schwartz). Matthew Johnson et al. have written about psychedelic research that "science has the potential to facilitate innovative therapeutic breakthroughs by replacing fear and misinformation with scientifically based conclusions and facts" (166).

However, there was a similar level of optimism about the potential of psilocybin in the 1950s and 1960s. In that era, a great deal of research and activism seemed to be leading toward

psilocybin becoming part of the regular fabric of American life. However, psilocybin and other psychedelic compounds soon escaped the rigorous clinical settings (sometimes with the help of researchers themselves, such as Timothy Leary). Psilocybin started being used by a wide swath of the public, particularly among teenagers and young adults. A social and political backlash developed, and the media became filled with lurid stories about the dangers of psychedelic compounds. In reaction to the fears of many Americans about the effects of psychedelics, the federal government classified psilocybin as a "Schedule 1" drug in 1970 (Johnson et al.). This meant that it had no approved medical use in the United States. Not only was it illegal to be taken recreationally, but not even a doctor could prescribe it. Psilocybin remains a Schedule 1 drug to this day.

Therefore, it seems important for the current era's growing body of research and activism to be able to gauge the opinion of the American public about psilocybin. Without that gauge, it seems possible that a social and political backlash could develop once again, removing the chance for millions of Americans to potentially discover new relief from psychological ailments. A study to analyze newspaper coverage of psilocybin over the last 30 years seemed like it could help the psilocybin community in its quest for broader acceptance.

Methodology in dialogue with other scholars

As I discovered, there is already a body of work that has examined newspaper coverage of psychoactive substances in order to help gauge the sentiment of the American public. In particular, my study received much of its inspiration from studies by Zhang et al. about ketamine therapy and McGinty et al. about prescription opioids.

In their analysis of newspaper coverage of opioids in the United States, McGinty et al.

divided the United States into four geographical regions (Northeast, South, Midwest, and West) and chose one newspaper from each region. I followed the same format, choosing the *New York Times* (Northeast), *Tampa Bay Times* (South), *St. Louis Post-Dispatch* (Midwest), and *San Diego Union-Tribune* (West). Examining all of these newspapers in total could potentially mitigate regional differences in sentiment toward psilocybin. Some of these newspapers have absorbed other newspapers over the time period being examined (January 1, 1989 to December 31, 2019). Following the example of McGinty et al., the archives of those absorbed newspapers have been included under the titles of their current publishers.

I chose the four newspapers above because the online media database Nexis Uni (the academic research portal of the LexisNexis database) had archives of their articles over the time period being examined. Sets of articles were created by searching Nexis Uni for every article that mentioned psilocybin. McGinty et al. and Zhang et al. also used aggregated newspaper databases to compile their articles, as opposed to using the databases of the newspapers themselves (LexisNexis in the case of McGinty et al. and newspaperarchive.com in the case of Zhang et al.). In addition, I used Nexis Uni in order to avoid any variations in the quality of databases and search engines administered by the newspapers themselves.

McGinty et al. and Zhang et al. also helped me realize that I would need to have more than one category in which to judge the sentiment of individual newspaper articles. Both of these studies examined several ways in which articles could express sentiment, leading me to create five sentiment categories specific to psilocybin.

Additional remarks on methodology

When creating sets of articles from Nexis Uni, it was necessary to search for a variety of

terms in addition to "psilocybin." Although synthetic psilocybin is available, the compound is often ingested via the mushrooms which naturally contain it. Unlike many other psychoactive substances, psilocybin is therefore frequently referred to by its delivery container (mushrooms), even in journalistic contexts. After extensive reading of psilocybin journalism, the present study chose four search terms for psilocybin: "psilocybin," "magic mushrooms," "hallucinogenic mushrooms," and "psychedelic mushrooms." Searches were made for both plural and singular forms. If other common journalistic terms for psilocybin are discovered which are not represented in the present study, this could be a topic for future research. There are also many slang terms for psilocybin, such as "shrooms" or "boomers." However, most of these slang terms also have other meanings and seemed rarely used by the newspapers in this study unless other terms for psilocybin were also used. For example, a search for "shrooms" in the *New York Times* over the study's time period only found 5 articles using this term for psilocybin, but 25 non-psilocybin uses. Therefore, I did not include these slang terms in my Nexis Uni searches.

There are also a small number of non-psilocybin mushroom species that have hallucinogenic compounds (such as muscimol, which is found in some *Amanita* species). There would therefore seem to be at least some risk that terms such as "hallucinogenic mushrooms" or "psychedelic mushrooms" might refer to these species rather than psilocybin species. For example, 4 out of 308 *New York Times* articles in the Nexis Uni search results referred to these mushrooms and had no references to psilocybin mushrooms. To avoid this problem, I removed articles from the Nexis Uni sets of each newspaper if they only referred to non-psilocybin mushrooms.

I removed duplicate articles from the sets, even if they had different date lines. Nexis Uni has a functionality to filter out duplicate articles, but it was only sporadically successful, so

manual removal of duplicates was also necessary. However, multiple articles about the same news event were included as long as the articles seemed independently written (for example, following new developments in the event or approaching it from a different perspective). I counted the number of articles in which a term occurred, not each individual occurrence of a term. Some articles used more than one term, which is why the overall number of articles in each newspaper's set is lower than the number resulting from adding together the articles in each term category. It is also important to note that many of these articles do not have psilocybin as their central topic. Many journalistic mentions of psilocybin are made only as parts of articles about different topics.

After the searches and data cleaning described above, the final total article set consisted of 534 articles from all four newspapers. Of these, 304 articles were from the *New York Times*, 89 articles were from the *San Diego Union-Tribune*, 67 articles were from the *St. Louis Post-Dispatch*, and 74 articles were from the *Tampa Bay Times*.

Determining the sentiment of articles presented challenges. Nexis Uni, for example, has a feature called "Negative News" that uses algorithms to create a set of only negative articles for a particular search term. However, the Negative News results for psilocybin were often inaccurate. As just one example, the Negative News algorithms chose the *New York Times* article "Cancer Study of Hallucinogen Hints at New Role for Illegal Drug," (Hoffman) which described studies that showed psilocybin could help treat depression and anxiety. Yet an article describing patients using psilocybin to reduce mental illness would seem to be a positive article. I suspect that Negative News chose this article due to its frequent use of words that often have negative connotations such as "depression" and "anxiety." Many more examples of incorrect algorithmic choices could be listed here.

Even if attempts were made to adjust the negative weight of words in order to fit the paradigm of psilocybin, algorithms might still have difficulty with nuances. For example, in a *New York Times* review (Kakutani) of the book *Prozac Nation*, the word "depression" was used with the same definition as the positive article mentioned above, i.e. as a clinical psychological issue. However, in this context, "depression" was a negative word because the review implied that the author used psilocybin as a way to ineffectively escape her depression, not to treat it.

To avoid problems with using algorithms to determine the sentiment of articles, I decided that it was a better option for me to personally read and hand-code every article. Yet there were still significant risks with this option. For example, I was only a single researcher, which could result in significant bias about sentiment. Future studies in this area might be improved by having more than one researcher determine the sentiment of articles. The sentiment analyses of each researcher could then be compared and perhaps averaged. In addition, there is a risk that the same researcher could give different sentiment ratings to an article depending on the condition of their mind at a given moment. A full discussion of the debate between machine and human judgment is beyond the scope of the present study, touching on the fields of philosophy, computer science, and logic.

After settling on personally hand-coding every article, other challenges presented themselves. Take, for example, the *New York Times* article "Ideas Unlimited, Built to Order" (Schiesel). This article praised the pleasant effects that psilocybin could have for its users, which would seem to be positive, but the article also called psilocybin "toxic," which would seem to be negative. In addition, even articles that were clearly determined to be positive or negative might have had different degrees of positivity or negativity. For example, a brief article describing an arrest for psilocybin possession might be negative, but it could be argued that there is more

negative impact from a longer article about a psilocybin arrest that also details the damaging impact of that arrest on the life of the accused. It would therefore seem negligent to treat these two articles identically.

To address these problems, I found inspiration in previous studies about media portrayals of psychoactive substances. McGinty et al. and Zhang et al. created different thematic categories in which each article could be assessed. Since their thematic categories were not exactly applicable to psilocybin, I identified five thematic categories to rate sentiment specifically about psilocybin. For each category, I personally gave every article a score of -1 (negative), 0 (neutral), or +1 (positive). I then calculated the total scores in each thematic category for each year for each newspaper. I also added together the scores in each category to provide a single sentiment score for each year.

I used five thematic categories as I classified the 534 articles in my study:

1) Legality: Is using psilocybin seen merely as a criminal act (negative) or only unfortunately illegal (positive)?

2) Mode of Action: Is psilocybin seen as physically damaging (negative) or physically beneficial (positive)?

3) Personal Impact: Is psilocybin seen as psychologically detrimental (negative) or psychologically beneficial (positive) to the user?

4) Scientific Integrity: Is psilocybin research considered pseudoscience (negative) or rigorous and serious (positive)?

5) Social Impact: Is psilocybin seen as detrimental (negative) or beneficial (positive) to society beyond the user?

To further clarify the difference between mode of action and personal impact, mode of

action concerns physical effects of psilocybin while personal impact concerns psychological effects. Returning to the example mentioned above ("Ideas Unlimited, Built to Order" [Schiesel]) I gave a +1 for personal benefit to the praise for psilocybin's pleasant psychological effects, but I gave a -1 for mode of action to the reference to psilocybin as "toxic."

Website building and programming methodology

I presented my study and full capstone in a website built with the content management system WordPress and the WordPress theme ResponsiveBlogily. However, ResponsiveBlogily was not exactly suited for presenting a master's capstone, so I had to personally code substantial changes to the HTML and CSS. I hand-coded most of the website's data visualizations with a JSON grammar called Vega-Lite. I used GitHub to store the data tables that were accessed by the Vega-Lite data visualizations. Code other than HTML and CSS cannot be inserted directly into WordPress, so I needed to insert the Vega-Lite into the ResponsiveBlogily JavaScript files. The few data visualizations not coded in Vega-Lite were built with Tableau software, and the Tableau images were inserted directly into the WordPress text content.

Other works in dialogue with this capstone

Despite the optimism that I presented above, there are some psilocybin advocates today who are worried about a social and political backlash similar to the 1960s. This group seems to think that this backlash might result from a major rise in recreational use of psilocybin and/or efforts to legalize its use without the guidance of trained therapists and doctors. In 2019, the journalist Michael Pollan, who strongly supports allowing regulated psilocybin use in controlled settings, wrote an opinion piece in the N*ew York Times* expressing worry about the city of

Denver's recent decriminalization of psilocybin. Pollan wrote: "Great enthusiasm has been inspired by psychedelic research, and I share it, but we should be mindful of psychedelic history too, in which exuberance about the potential of these medicines gave way to a political backlash that set back research, and access, for more than 30 years. It doesn't have to happen again, but it could." Thomas Insel, the former head of the National Institute of Mental Health, told a conference of psychedelic researchers in 2017: "Don't screw this up… the danger of having someone have a really negative experience and not having put everything in place to be able to help them… can really poison the well here for everybody, so in this stage, early in chapter 1, let's be very mindful of risk" (MAPS).

The results of my study provide at least some support for the warnings of this sector of the psilocybin community. Of the four newspapers that I examined, positivity toward psilocybin only seemed to significantly rise in the *New York Times*. In addition, the total number of articles mentioning psilocybin also only significantly rose in the *New York Times*. In fact one of the other newspapers showed a significant downward trend in psilocybin mentions.

I believe that the tepidness of the other three newspapers toward psilocybin could mean that psilocybin advocates are still a small minority in the United States. Although my study is far from conclusive and much more research of this topic needs to done, I suspect that most of the American public remains unaware of the recent positive research about psilocybin.

Psilocybin can have powerful and destabilizing effects on its users. However, many psilocybin therapists seem to believe that with the right frame of mind, proper setting, and education, these destabilizing experiences can often be beneficial to users. Without these proper safety measures, though, psilocybin use has the potential to be very frightening, both to users and the people around them. If recreational use of psilocybin becomes widespread, then worries

about these difficult experiences (also known as "bad trips") also might become widespread, which could precipitate a legal crackdown.

How this capstone relates to my concentration and courses

My track in the MALS program has been in data visualization. Part of what this track is designed to teach is the creation of visual representations of quantitative data that are not only easy for viewers to understand but also compelling. In addition, MALS data visualization students should be able to use data visualizations to enhance understanding of the textual concepts and research being presented.

My study incorporated three formats of data visualization: heatmaps, line charts, and trend lines. Here are some examples of each visualization from my study:

Heatmaps

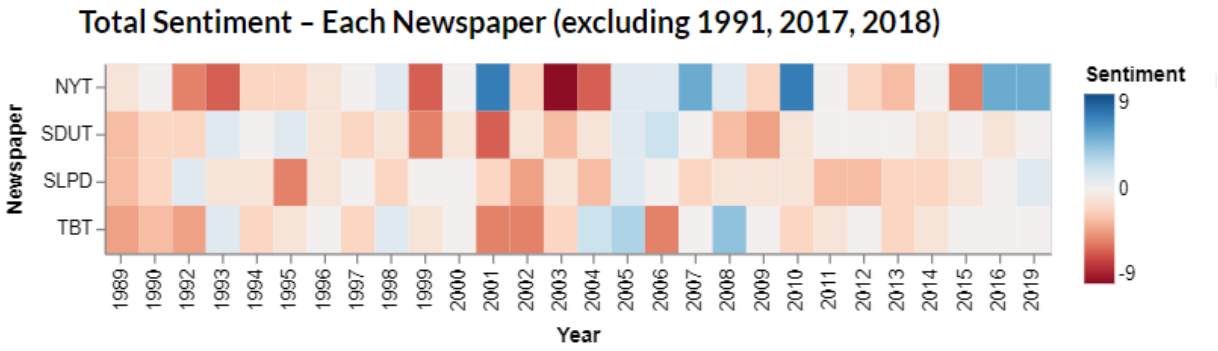

Figure 24: Heatmap showing newspaper sentiment analysis

Line Charts

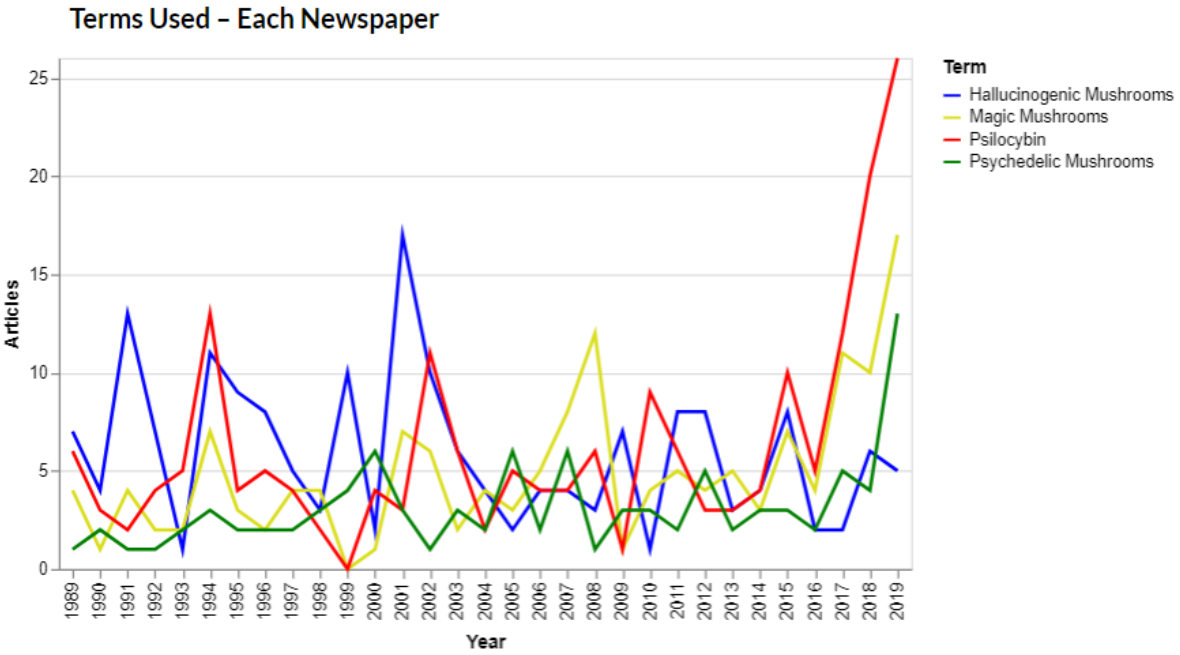

Figure 17: Line chart showing yearly changes in terms used

Trend Lines

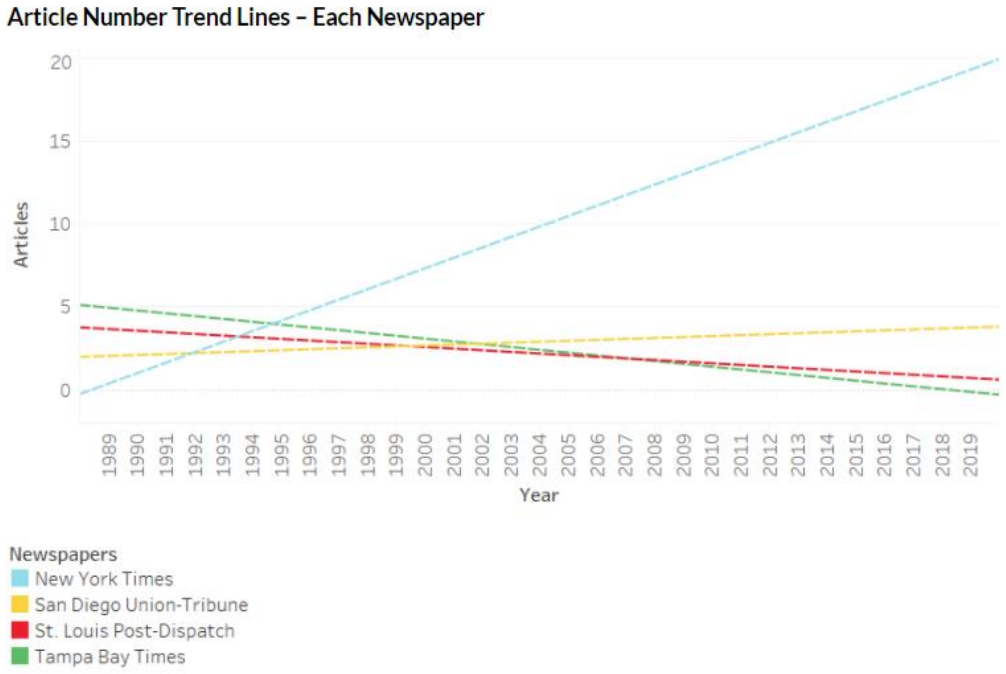

Figure 25: Trend lines showing yearly changes in article numbers

I also incorporated fMRI scans from a study by Carhart-Harris et al., which used visualizations of the human brain to explain data about changes in neural activity:

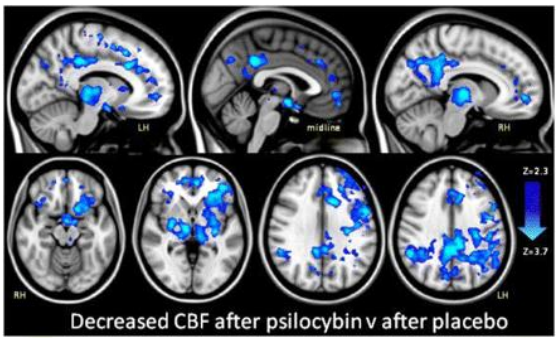

Figure 1: fMRI scans showing psilocybin's effects on human brains

The MALS program first introduced me to the nuances of data visualization though the course "Data Visualization Methods" taught by Lev Manovich. From Manovich, I learned how to build precise visualizations with the software Excel and Tableau. Manovich also focused me on finding ways to make the visualizations compelling and noticeable (to "pop"). When building my capstone, I used Excel and Tableau to experiment with a wide array of visualizations for the data that I collected. After determining which visualizations worked best, I could then code them for the capstone website with Vega-Lite (a JSON grammar).

The next MALS course that influenced my capstone was "Digital Humanities" with Matthew Gold and Stephen Brier. Gold and Brier taught me how to use data analysis tools like Voyant and Palladio to examine text wherever I found it in society. They opened my mind to the possibilities of using text analysis to discover previously unknown facets of a culture. For one project, I performed text analysis of several Annual Reports from the Metropolitan Transit Authority. For another project, I created Palladio data visualizations to explain the development of works by the artist Henry Rollins. It was the combination of text analysis training from "Digital Humanities" with visualization software training from "Data Visualization Methods"

that allowed me to analyze and visualize the data that I collected about newspaper articles for my capstone. Gold and Brier also taught me to relentlessly critique my data analysis methods in an attempt to discover biases and try to mitigate them. Some of the impact of this teaching can be seen in my study's frequent reminders that the results are far from conclusive and that more research is highly recommended.

Another CUNY Graduate Center course that had a strong impact on my capstone was "Data Visualization" in the Computer Science department, taught by Ronak Etemadpour. This is the course that introduced me to Vega-Lite, which was the JSON grammar that I used to code the data visualizations in my capstone website. Etemadpour also gave me the opportunity to create websites to display the data visualizations that she assigned, combining my website coding knowledge of HTML, CSS, and JavaScript with data visualization code from D3.js, Python, and Vega-Lite. This allowed me to eventually build a website to present my capstone research in a format that was functional on both desktop and mobile devices for a variety of web browsers.

Evaluation and Continuation

Evaluation of the capstone

The results of my study surprised me. Having read a great deal about optimism in the psilocybin research and advocacy communities, I was inclined to believe that newspaper coverage of psilocybin would reflect this. However, the results of my study did not support my inclinations. Despite my own hope that psilocybin will someday be allowed a legal and open place in psychiatric therapy, my research has made me realize that this optimism might be premature. Now my hope is that my results will remind the psilocybin medical and advocacy communities that they need to be careful. If they let psilocybin deregulation move too quickly or

unwittingly (or wittingly) help it become a recreational drug, as arguably happened in the 1960s, the results might be unfortunate. Millions of people could lose the chance to improve their mental well-being, a vast body of scientific research could be lost, and a tragic number of people could be imprisoned simply for wanting to become better human beings.

I faced a variety of setbacks during the creation and development of this capstone. For example, I originally wanted to create a capstone around ketamine therapy, which had helped my father deal with his post-stroke ailments. I engaged with a number of ketamine clinics about collaborating. My goal was to create research that combined textual analysis of their websites and patient materials with anonymized medical data that the clinics had collected about their patients. However, all of these attempts fell apart because of the clinics' understandable concerns about protecting the privacy of their patients.

After collaborations with ketamine clinics turned out to not be possible, I decided to focus on newspaper coverage of ketamine. I determined a time frame for articles to examine, developed hypotheses about how particular journalistic terms for ketamine might have changed in popularity, and began compiling some data sets. Then I discovered that Zhang et al. had already done much of this work in their own study. Their process was too similar for me to stake out original research with my capstone. After some initial worries, this problem was resolved when I realized that I could probably switch the focus of my research to psilocybin without losing much of the essence of my original ketamine focus. Discovering the work of Zhang et al. then turned out to be a blessing in disguise, because after reading their study and a similar study by McGinty et al., I realized that my original idea of examining only articles from the *New York Times* would probably be too limited.

Another large challenge came when I discovered that in order to create the multi-dimensional data visualizations that I planned, the Vega-Lite grammar required CSV data tables to be arranged in a very non-standard way. This would require me to personally reconfigure every cell in my data tables to fit Vega-Lite's idiosyncratic method. I briefly considered completely abandoning Vega-Lite and instead using images of my data visualizations built with Tableau software. However, my desire to make my capstone website as dynamic as possible led me back to Vega-Lite, and so I resolved the problem by simply taking the time to personally reconfigure all of my data tables.

Continuation of the capstone

I plan to continue working on my capstone project after submission for my master's degree. There are a number of areas in which it can be expanded and improved. For example, it was beyond the current scope to use political leanings when choosing newspapers (particularly since the political leaning of a newspaper can change dramatically over a 30-year period). If I could devise a rigorous method to include political leanings in an analysis of psilocybin coverage, the results might be more helpful. In addition, it could be revealing to research how psilocybin coverage will change in newspapers for regions where it has been decriminalized, such as Denver and Oakland. It might also be helpful to expand newspaper analysis to psychedelic compounds other than psilocybin. My study was partially inspired by a similar study about the psychedelic ketamine, and it might be helpful to the psychedelic community to gauge newspaper coverage of compounds such as lysergic acid diethylamide (LSD) and *N*,*N*-dimethyltryptamine (DMT). I am also interested in expanding the parameters of this project beyond newspapers. A more accurate study in the modern era would probably include podcasts,

cable news, YouTube channels, social media, and other sources. This was beyond the scope of the present capstone, but it does not seem unfeasible with additional time and patience.

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