SONIC WARFARE TO VISUAL REPRESENTATION: A STUDY OF SELF THROUGH THE ARTISTIC LENS OF ATTENTION DEFICIT/ HYPERACTIVITY AND OBSESSIVE-COMPULSIVE DISORDER

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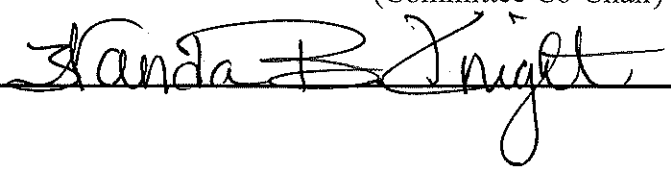

Abstract

Noise is common in educational settings such as classrooms. However, for individuals who suffer from medical conditions such as Obsessive Compulsive Disorder (OCD), Attention-Deficit/Hyperactivity (ADHD) and misophonia, ensuing noises can wreak havoc on anxiety levels and mental states, not to mention interfere with instructional time and student learning objectives. For two weeks, I recorded specific noises on a chart divided into thirty-minute intervals. This study identifies both specific noises as well as their numeric frequencies as they occur within the prearranged time intervals within a classroom setting. To delineate the data in an artistic fashion, I painted the collected data on a 30 x 40 canvas with 160 grids. Each grid contains a specific symbol, which correlates to each noise disturbance, including periods of no distractions. Through both numeric and visual analysis of the collected data, this study reveals student tapping as the most-recurrent noise, followed by, surprisingly, no data, or no noise distractions for me, the art teacher. Additionally, the data suggests that students are less prone to produce noise distractions following periods of recess or physical activity. Time of day also plays a significant role in the variance of noise production. Afternoon, or specifically, 2:00 p.m. – 2:30 p.m., is the most noise offensive block of time, likely as both students and teachers increasingly anticipate the end of the school day. These findings imply that the strategic scheduling of physical activity within education settings is essential. Furthermore, the data also suggests the need for schools to have useful building materials that can serve as effective sound barriers.

Keywords: misophonia, sound study, creative delineation

Table of Contents

Tables

Figures

Problem Statement and Purpose of a Study of Self through the Artistic Lens of Attention Deficit/Hyperactivity and Obsessive-Compulsive Disorder

As an artist and educator diagnosed with Attention-Deficit/Hyperactivity and Obsessive-Compulsive Disorder, I often examine my professional atmosphere with a focus on the various environmental conditions I endure. While I believe I function best when environmental conditions meet my personal demands of minimal distractions, coupled with high levels of structure, I have never formally gathered and analyzed data to evaluate these beliefs. Thus, the purpose of this action research is to personally identify and visually represent what I consider to be, ideal conditions, and the best methods through which to achieve them, in order to create a more focused professional teaching and learning environment. As such, I pose the following questions: What insights can I gain from tracking and identifying rhythmic noises that distract me, as an art teacher, throughout a two-week period of my professional teaching day. Furthermore, how might the collected data become a visual representation of the overall study? Such findings will not only benefit me, but also, other teachers, who may want to track and identify distractions, which limit their daily focus in their professional teaching environment.

Presently, and for the past twenty years, distressing rhythmic noises created by students negatively affects my professional teaching day. For example, my levels of anxiety increase when students' noises interrupt my lessons, as I must repeat directions, ultimately losing valuable educational time. Trying to encourage middle school students from producing such diversions continues to plague my career as an educator. This research study involved self-inquiry into my personal awareness of what I perceived to be rhythmic noise disturbances, and how I exhibited the data visually through an artistic process of painting.

The purpose of this action research is to identify my personal and ideal conditions for a productive, creative, and focused teaching and learning environment. Since repetitive noises and other sonic distractions typically create personal, negative physiological responses such as, physical agitation, increased heart rate, and abrupt, and verbal responses. The goal is to identify these distractions in order to know how to manage my reaction in the future. In order for the data to be relevant to my self-identity as an artist, I also delineated the data through artistic visualization. As such, the data has both numerical value and a clear artistic equivalency through

the creation of the cumulative visual piece. This study and its results are a self-evaluation and reflection of teaching, explicitly, through my world muddled by audible distractions.

Significance of Study

Being able to function at competent levels throughout my professional teaching day is essential to my success as an educator. In recent years, there has been an increase in mental health diagnoses among children, adolescents, and adults. The Diagnostic and Statistical Manual of Mental Disorders (DSM) includes Obsessive Compulsive Disorder (OCD) and Attention Deficit Hyperactivity Disorder (ADHD) as two examples of such diagnoses. In fact, "The World Health Organization (WHO) (2002) ranks OCD in the top 10 most debilitating illnesses in the world" (Jassi et al., 2016, p. 601). As these disorders affect people of all ages, large group settings, such as schools, can be particularly difficult for those suffering from various conditions. However, schools and classroom management styles have not changed in order to account for the significant limitations in order to decrease the negative side effects of such afflictions. Affected teachers can find classroom noise disruptions to be distracting and, thus, limit personal focus. In order to combat this issue, educators must "facilitate and encourage communication between students by providing a supportive and structured classroom environment" (Chaturvedi, et al, 2014, p. 74). Thus, identification is an important step to resolving or minimizing the issue. There is a social lack of recognition regarding levels of distractions that various people find acceptable and tolerable in order to be productive. Therefore, "altering the structure of the classroom … [can lead to] a change in the distribution of behaviors … and … increase the variety of appropriate and engaged behaviors" (Simonsen et al., 2008, p. 364).

In this study, I identified rhythmic noises created by student behaviors as well as other rhythmic noises that limit my overall focus. The study will aid me in better recognizing and minimizing future disturbances that adversely influence my teaching and learning environment. The ultimate goal of the study is to enhance teacher experiences within the professional teaching environment, as well as increase focus through the establishment of identifiable promising practices as determined through the collected and delineated data.

Noises expose themselves to people everywhere. Imagine, however, being unable to focus on simple tasks that require concentration because of these noises. For many, acoustical distractions are a real problem. Studies show that in educational settings, there are "empirical

reasons to predict that classroom noise … will influence learning and performance in different ways" (Dockrell, 2006, p. 516). Some of these influences are negative ones that are likely preventable. In order to prevent such offenses, the teacher must better understand them, in which case, the teacher may be better able to tolerate the noise disturbances.

People suffering from OCD and ADHD are often victims of noise violations in public places. They frequently suffer from "physiological responses … [such as] increased heart rate, diffuse anxiety, and so on …" (Cefalu, 2018, p. 47). Experiencing such responses often results in a lack of focus. A temporary loss of focus may not seem so terrible to some individuals. Refocus and get back on-task. However, refocusing is not easy for those with OCD and ADHD. One of the most common public places that people are required to be is in schools. Therefore, noise distractions become a magnified problem as a "person may struggle to concentrate in class" (Jassi et al., 2016, p. 601). The resulting lack of concentration may affect both students and teachers, ultimately limiting the goals, that each strives to attain.

As victims of illnesses such as OCD and/or ADHD, people often find that their symptoms "manifest [themselves] in the school environment in a variety of ways" (Jassi, et al., 2016, p. 601). When disruptions occur in the classroom and beyond, teachers must manage the task of mustering their deep levels of focus. Distractions and disturbances can easily break the concentration necessary to adhere, effectively, to the teaching and learning environment. Studies indicate, "Performance on the non-verbal [tasks] ... showed the predicted pattern of interference by the distracting babble stimulus" (Dockrell, 2006, p. 523). Thus, the pause in continuous work limits abilities and, ultimately, forces teachers with OCD and ADHD to "complete fewer items, thereby supporting the [negative] impact of noise" on such individuals (Dockrell, 2006, p. 524). Likely, the break in the individual thought process also stunts their creativity at that moment. People who suffer from the negative effects of noise are often preemptive and thus suffer from negative and debilitating forms of anticipation in an attempt to ward off the audible distractions. In fact, recent studies show that individuals who "engage in more global, inclusive, and flexible thinking ... are … more creative than prevention-focused individuals" (Baas, De Dreu, & Nustad, 2011, p. 794). Therefore, people who expect disturbing noises will likely suffer a lack of personal creativity.

Data Visualization Methodology

The purpose of this self-exploration into personal awareness and insight to rhythmic noise disturbances that substantially erode focus is to inform me of specific times, triggers, and possible unearthed disturbances that ultimately derail my professional focus on students and disrupts the learning and teaching environment. The data collected correlated to a visual representation of critical information in an aesthetic art form. Currently, there is a growing community of *data artists* (Utrist, 2014). Data artists are creating conceptual works using information collected by mobile apps, GPS trackers, scientists, and more. "Data artists generally fall into two groups: those who work with large bodies of scientific data and those who are influenced by self-tracking" (Urist, 2014, para. 2). For this study, I will consider myself a *data artist*, who falls into the category of self-tracking.

There are growing numbers of artists, engineers, journalists, and scientists who create art to make sense of data. One particular individual whose work has inspired me is Nathalie Miebach. Miebach utilizes scientific data related to astronomy, ecology, and meteorology and transforms the data into visual representations such as sculptural weavings. Her art visually converts data into a three-dimensional space.

> By utilizing artistic process and everyday materials, I am questioning and expanding boundaries through which science data has been traditionally visually translated (ex: graphs, diagrams), while at the same time provoking expectations of what kind of visual vocabulary is considered to be in the domain of 'science' or 'art'. (Miebach, n.d., para. 2)

Likewise, through my project, I hope to encourage others to revisit their current ideas regarding the visual representation of data.

Research Design for Data Collection

I used one qualitative source for data collection as well as observational notes. I utilized a personal chart for data collection and created a visual representation that corresponds with the observed data. The action research project occurred throughout a two-week period, specifically from 7:00 a.m.-3:00 p.m. Monday through Friday. The hours selected are those of my professional teaching day, which are the hours during which I work. The study required me to

collect data on a personal chart, every 30 minutes. I recorded the disturbances of each noise with an initial in the corresponding time of occurrence (see Appendix A).

This use of a chart enabled me to record personal responses to rhythmic disturbances that upset my ideal teaching and learning environment. At the end of my professional teaching day, 3:00 p.m., I entered the responses on my chart into an Excel document for formal evaluation of the data. I also utilized a daily self-reflection process to analyze the distractions, specific to how, why, and when they occurred. In conjunction with the Excel document and personal charting sheet, I transferred my responses to create a visual representation of the data in the form of art. I then transferred each rhythmic disturbance into a visual pattern in order to differentiate between the varieties of noise disturbances (see Appendix B). This procedure directly transformed the numeric data from Excel's spreadsheet into a visual representation of the data that ultimately serves as a culminating visual analysis of the effects of ADHD and OCD concerning my teaching environment.

I conducted my action research project for a two-week period from 7:00 a.m.-3:00 p.m., Monday through Friday. The study took place at Gerald Huesken Middle School located in Lancaster, Pa. The school contains grades seven and eight. I recorded data in the form of rhythmic noise disturbances on a personal chart every 30 minutes for ten days. The hours selected are those of my professional teaching day, which includes teaching time, professional duties, and prep periods at Gerald Huesken Middle School. Throughout my professional teaching day, I encounter approximately 211 students within my classroom for structured teaching time. The average class size of students was roughly 17 students per class.

The personal chart I utilized consisted of one hundred and sixty blocks, with each block corresponding to the various chunks of time during each day. Throughout the length of the study, I recorded rhythmic disturbances that upset my ideal teaching and learning environment. I created a chart, on which I was able to note all noise occurrences, within each of the given periods. Collecting and organizing the data allowed me to detect the individual types of noise occurrences as well as the time of day the noises occurred by frequency.

In conjunction with the data collection chart, I also reflected on the day, as a whole, by writing a summary of the day and the sum of its distractions. My writings were useful at the end of the research study, when I could reflect on how the disturbances affected not only my ideal

teaching environment, but also my physical and emotional state as it related to my professional work environment.

Researcher's Role

Acting as a participant researcher "involves recording and reflecting on observations and interactions in which the participant-observers' role is frequently a part of the situation" (Keifer-Boyd, 2014, p. 247). As such, I observed my reactions to student noise and other environmental rhythmic disturbances. As both the researcher and teacher, I assumed the role of participant observer, "recording and reflecting on observations and interactions in which the participant observer role is frequently part of the action" (Keifer-Boyd, 2013, p. 247). As the researcher, I witnessed the students' rhythmic noise making disturbances, and as the teacher, I identified, corrected and deterred the rhythmic disturbances by students. The primary indicator of data was the chart that I used to record responses for every 30-minute interval for two weeks (Table 1). At the end of the two-week data collection period, I transferred the data and assigned each disturbance a symbol or shape to create a visual representation of the data in an art form. This representation is both a visual and numerical delineation of the collected data.

	Talk	Hum	Whistle	Slurp	Squeak	Sniff	Drum	Click	Tap	Ding	Crack	No Data		Totals	%
7:00-7:30	0	0	0	0	3	0	0	0	0	0	0	7	7:00-7:30	3	1.3%
7:30-8:00	0	1	0	0	1	2	0	2	4	0	0	3	7:30-8:00	10	4.4%
8:00-8:30	1	2	1	0	7	0	5	2	4	0	1	0	8:00-8:30	23	10.2%
8:30-9:00	2	2	1	0	2	0	3	1	2	0	0	3	8:30-9:00	13	5.8%
9:00-9:30	1	1	1	0	1	0	3	0	8	0	3	2	9:00-9:30	18	8.0%
9:30-10:00	6	0	0	0	3	0	1	5	2	0	2	2	9:30-10:00	19	8.4%
10:00-10:30	1	0	0	0	0	0	2	3	5	0	0	2	10:00-10:30	11	4.9%
10:30-11:00	2	0	1	0	1	0	3	3	6	0	0	2	10:30-11:00	16	7.1%
11:00-11:30	0	1	1	0	5	2	3	1	4	0	0	2	11:00-11:30	17	7.6%
11:30-12:00	0	1	0	0	2	1	3	2	4	0	0	3	11:30-12:00	13	5.8%
12:00-12:30	3	1	1	0	1	0	0	0	1	0	0	6	12:00-12:30	7	3.1%
12:30-1:00	0	0	0	4	0	0	0	0	0	3	0	5	12:30-1:00	7	3.1%
1:00-1:30	0	0	1	0	0	1	1	6	14	0	0	0	1:00-1:30	23	10.2%
1:30-2:00	3	3	0	0	1	0	2	2	5	0	0	0	1:30-2:00	16	7.1%
2:00-2:30	0	0	1	0	2	0	10	2	7	0	2	0	2:00-2:30	24	10.7%
2:20-3:00	0	0	0	0	0	0	0	1	4	0	0	7	2:20-3:00	5	2.2%

Table 1. Total Number and Percentage of Noises by Time of Day

As I investigated my learning and teaching environment, I relied strongly on personally charted information as a primary indicator of data. The approach was a self-study; therefore, data was self-reported; data was a result of selective memory, in which I possibly did not recall an event or disturbance accurately. For this study, I delineated my rhythmic disturbances as noise patterns as they distracted me throughout my professional teaching day. This study does not analyze the impact of noise violations such as the school loudspeaker, but rather my understanding of disturbances that possessed rhythmic noise patterns as they distracted me. In addition, the study did not evaluate individual student behaviors that may cause interruptions. The study also did not analyze an entire class period comprised of 44 minutes because I had set a time limit to 30-minute intervals.

Analysis and Discussion

Through the process of analyzing not only the numerical data but also my personal, written reflections, I began to realize that the various disturbances correlate with not only specific times of day, but also to times following student physical activity, such as recess. In short, when students were able to experience releases of physical energy, their restlessness decreased in the classes following such activity, and conversely, their restlessness increased when I required them to sit still. Research has “observed that children were less fidgety, less

listless, and more focused, and more on task when they had recess compared to when they did not" (Rasberry et al, 2011, p. 16). Rasberry also notes that overall classroom behavior was significantly better for students who had recess every day for at least 15 minutes (Rasberry et al., 2011, p. 16).

Many middle school teachers are aware of the symptoms of chaotic student behaviors, while in class. Some typical manifestations of such behaviors include continuous movement, constant chattering, physically tapping either objects or their body parts. Many middle school students also display short attention spans, likely because of their restlessness. This behavior frequently results in noises that are disturbing and rhythmic. In one Swedish study, teachers refer to "chattering, inattentiveness, hindering other students, being noisy and late arrival [to class]" as being the most troublesome behaviors found in the classroom (Thornberg, 2006, p. 90).

Furthermore, "movement also serves to relieve stress, which is especially good for adolescents, who often experience additional stress from hormonal imbalances" (Wells, 2012, p. 2). Thus, through the collection of the noise occurrences in conjunction with the time of day at which they occurred, I was able to delineate the most offensive and troublesome times of day as well as which particular noises negatively affected my day the most. Ultimately, through analysis, I was able to develop strategies to decrease my stress in order to improve my day.

Analysis by the Time of Day

Teaching middle school students and being a part of an establishment that provides a recess for students may have affected my research. For example, the time at which students produced the least amount of disturbances occurred from 12:00 p.m. -12:30 p.m. (Table 1 and Figure 1). This particular group of students entered my class immediately after a 20-minute recess. This time-period only produced 3% of the total noises collected. I recorded only seven total noises during this timeframe, and they included humming, talking, whistling, squeaking and tapping. Tapping, alone comprised one of the seven disturbances and since it relates to body movement, the decrease in occurrences may have been due to the students' physical activity before class. The periods between 9:30 a.m. -10:00 a.m. and 11:00 a.m.-11:30 a.m. produced the third and fourth highest percentages of noise totals at 8.4% and 7.5%, respectively. Together, these two timeframes totaled 36 disturbing noises. Consistently, these times are before recess for these groups of students.

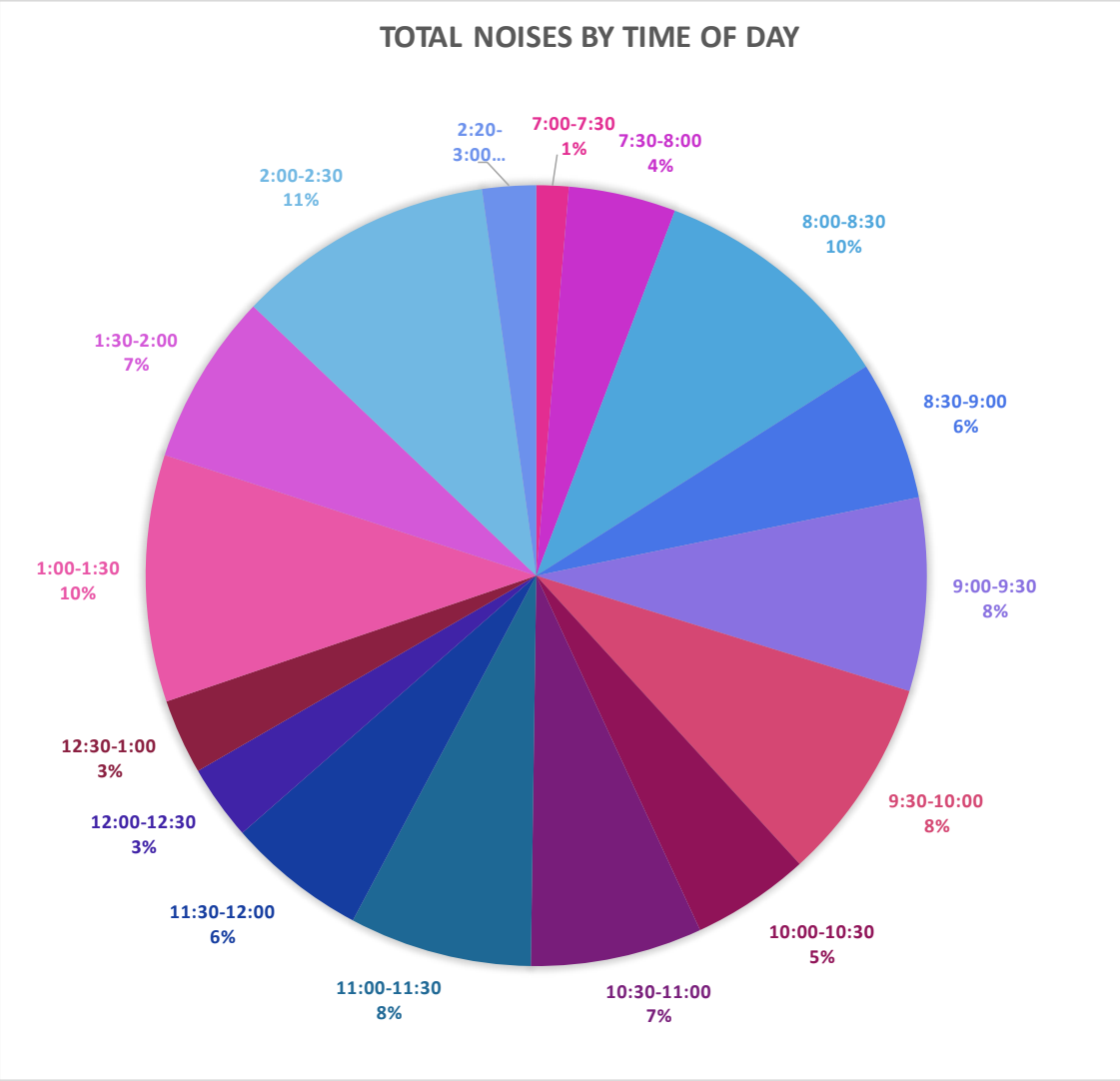

Figure 1. Graph of Total Noise Percentage by Time of Day

Research also supports that "Children are less fidgety and more on-task when they have recess, and children with ADHD (attention deficit/hyperactivity syndrome) are among those who benefit the most" (Jarrett, 2009, p. 67). As an educator living with ADHD and OCD, I agree with the research that physical movement aids in keeping students' attention and results in less fidgety movements during periods of required immobility.

Research proposes that student both alertness and attentiveness are affected by the time of day. According to Ammons (1995):

> One-fifth of elementary school students are most alert in the early morning, one-third only after 10:00 to 10:30 a.m., and another one-third not until the afternoon. By the time

> students reach middle school, their ideal times are usually late morning or afternoon. (p. 20)

The timeframe of 8:00 a.m. -8:30 a.m., tied for the second highest of the total noises, at 10.2% by the time of day. This time resulted in 23 noise incidents. As research suggests, middle school students may not be as alert during this time; therefore, they may not be producing distractions. While looking at this specific time and class, and comparing it to the school schedule, I concluded that this timeframe would be the first time of the day that these students transition to unified arts classes from their core classes. I attributed the significant percentage of noises made during this time to the transition of classes as well as excitement and/or anticipation of the class. Art, as a class, is likely less structured than the core classes, thus allowing for more creativity and movement in general. Such characteristics might enhance student physical responses, likely giving rise to the occurrences of distractions. Furthermore, not all times of the day and particular classes will elicit identical results, as student population makeup and personality disparities will also play a role in such variations.

The end of my professional teaching day has proven to be the time that has produced the most noise disturbances. The time between 1:00 p.m.-1:30 p.m. accounted for 10.2% of total noises by time of day, generating 23 rhythmic noise disturbances. Additionally, 2:00 p.m.-2:30 p.m. yielded the highest percentage of the total noises by time of day at 10.6%, producing 24 rhythmic noise disturbances. Coincidentally, the timeframe between the two highest disturbances, 1:30 p.m. – 2:00 p.m., returned only a 7.1% noise total with only 16 rhythmic noise disturbances, five of which were tapping (Table 1 and Figure 1). As I reviewed my reflections from 1:30 p.m.-2:00 p.m., I realized that my schedule hosts a study hall during these 30 minutes and I noted that more students are on their computers during this time and keyboard tapping was a significant factor.

Furthermore, the tapping was more specific to playing educational games on the computer rather than to typical or standard keyboard typing. Repeated tapping of the spacebar also played a role in the rhythmic noise distraction that previously went unnoticed, by me before the study. Another factor when determining the data during this time was the quietness of my study hall. I required students to be silent and not socialize with each other. This requirement

produced a quiet atmosphere that resulted in what seemed like a magnification of the noise, no matter how slight the noise.

During the collection of data, the initials ND (no data) signified times of the day there were no noise disturbances recorded. The data revealed ND to be the second highest percentage by type of noise, second to tapping. ND made up 16% of the total percentage of data collected and accounted for 43 of the 269 total occurrences, which was a surprising discovery as I delineated the data. ND also included times of day throughout my professional teaching day, where I was able to control my environment, such as shutting my door during a prep period or eating lunch in my classroom. The times that boasted the least amount of disturbances were early in the morning and the last portion of the day, likely because of fewer people in the building during these times.

Analysis of Type of Noise

In addition to analyzing the top four disturbances by the time of day, it is essential to note the various types of noise occurrences recorded throughout the study. The most rhythmic disturbance noise recorded was tapping. Tapping included noises produced by body parts, such as feet and hands. Tapping also included noises from objects and art materials students used to tap on a hard surface. Tapping made up 26% of the total noises, precisely 70 occurrences throughout the 10days (Table 2 and Figure 2). Coincidentally, tapping was also at its highest levels of occurrences between the combined times of 1:00 p.m.-2:30 p.m.

	Talk	Hum	Whistle	Slurp	Squeak	Sniff	Drum	Click	Tap	Ding	Crack	No Data
7:00-7:30	1	0	0	0	3	0	0	0	0	0	0	6
7:30-8:00	0	1	0	0	1	2	0	2	4	0	0	3
8:00-8:30	1	2	1	0	7	0	5	2	4	0	1	0
8:30-9:00	2	2	1	0	2	0	3	1	2	0	0	3
9:00-9:30	1	1	1	0	1	0	3	0	8	0	3	2
9:30-10:00	6	0	0	0	3	0	1	5	2	0	2	2
10:00-10:30	1	0	0	0	0	0	2	3	5	0	0	2
10:30-11:00	2	0	1	0	1	0	3	3	6	0	0	2
11:00-11:30	0	1	1	0	5	2	3	1	4	0	0	2
11:30-12:00	0	1	0	0	2	1	3	2	4	0	0	3
12:00-12:30	3	1	1	0	1	0	0	0	1	0	0	6
12:30-1:00	0	0	0	4	0	0	0	0	0	3	0	5
1:00-1:30	0	0	1	0	0	1	1	6	14	0	0	0
1:30-2:00	3	3	0	0	1	0	2	2	5	0	0	0
2:00-2:30	0	0	1	0	2	0	10	2	7	0	2	0
2:20-3:00	0	0	0	0	0	0	0	1	4	0	0	7
	Talk	Hum	Whistle	Slurp	Squeak	Sniff	Drum	Click	Tap	Ding	Crack	No Data
TOTAL	20	12	8	4	29	6	36	30	70	3	8	43
%	7.4%	4.5%	3.0%	1.5%	10.8%	2.2%	13.4%	11.2%	26.0%	1.1%	3.0%	16.0%

Table 2. Total Percentage Breakdown by Type and Number of Noises by Time of Day

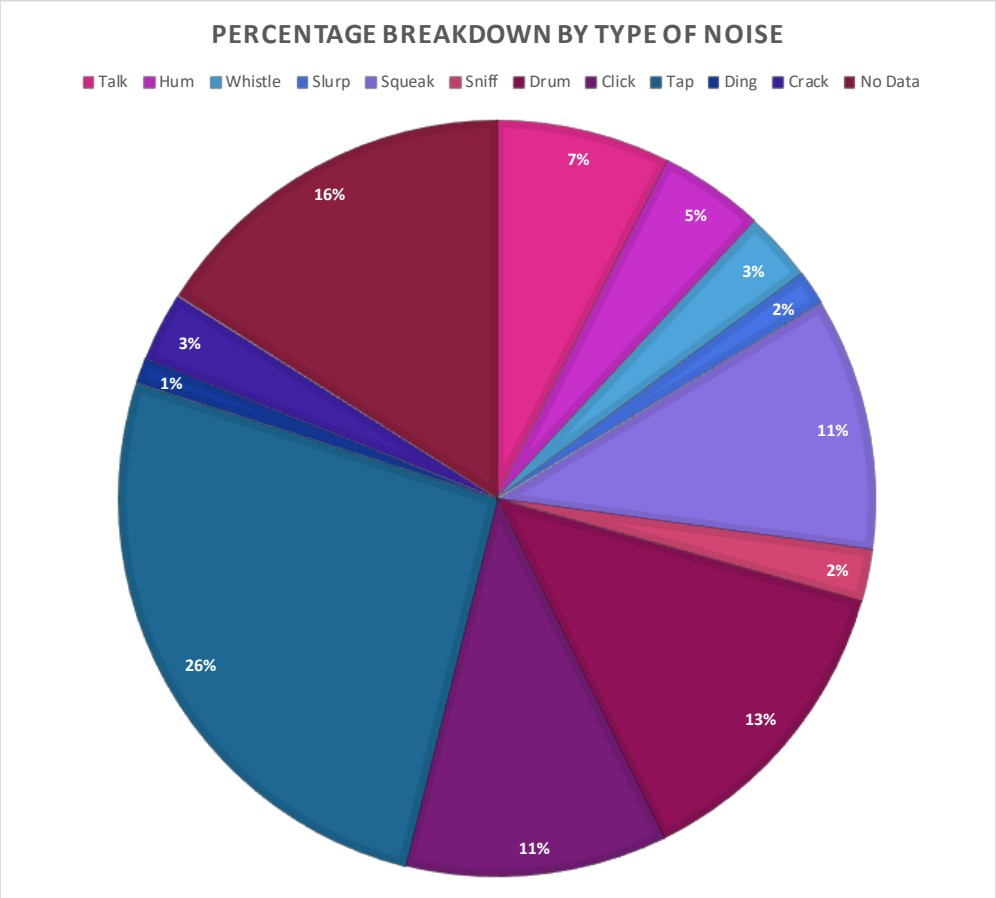

Figure 2. Percentage Breakdown by Type of Noises

The second highest percentage of noise by type was No Data (ND), at 16%. The record of No Data was surprising, because throughout a typical day, various noise incidents caused me to experience high levels of stress. Upon delineation of the data, it was shocking to see that the number of ND, or no noise violations, was very high. Although, with the use of my reflections, I was able to note that there are many times throughout the day in which I control my environment beyond what I previously believed. For example, I am able to shut my classroom door, minimizing unwanted sounds. Additionally, I arrive early to school, frequently before the sounds increase to undesired levels. My arrival time also serves to help limit my anxiety levels during the early part of the day.

Another particular surprise was the fact that I am not agitated during my lunch duty obligations. Previously, I would have thought that a large crowd of students, together, at a time

when they are free to talk would have been highly troublesome for me. However, according to the data, I was not bothered during this time. This is likely due to the standard noise level that occurs rather than sharp individual noises that break the silence abruptly.

The third highest percentage of noise disturbance was drumming. With 36 occurrences and 13.4% of the noise violations, drumming is similar to tapping, in that students' physical agitation produces it. When compared to the times of day at which drumming occurred, it is not surprising to see that drumming most frequently happened during the peak offensive times of day, previously noted.

Finally, the fourth highest noise occurrence was clicking. Clicking totaled 30 occurrences and 11.2% of the total noise offenses. I would be remiss not to mention, once again, that clicking is also a product of physical activity brought on by student movement, whether it be clicking on keyboards or the clicking of pens (Table 2 and Figure 2). Thus, one may naturally connect the production of various kind of noise in the classroom to student physical movement and perhaps even their frustration as well.

Research Findings

The numeric data delineation of the various noise occurrences appears to coincide with the times of day in which students struggle to maintain stillness, as research also supports. It also aligns with research on physical activity, in particular, the fact that, "exercise improved the performance of adolescents in tasks that involved inhibition, suggesting that exercise aids in the control of attention" (Wells, 2012, p. 12). In short, class times following physical activity will likely result in less commotion. Conversely, lengthy timeframes during which students may not exert physical movement will result in more noise disturbances.

I was surprised to find that No Data (ND) was the second highest finding. Before the study, I thought noises consumed my entire professional teaching day. However, through my reflections, I discovered that most of the noises that caused increased anxiety are individual noises produced in a relatively quiet environment. Equally, I was also surprised to learn that mass noises, where concentration is not at its peak, such as ongoing talking in the lunchroom, has little effect on my anxiety levels. Before the study, I hypothesized that the number of disturbances, during my obligatory cafeteria duty, would be one of the highest recorded rhythmic

noise disturbances. My rationale was simply because of the sheer volume of noise students produced in an uncontrolled environment. However, the data revealed the opposite. There were only seven total disturbances recorded over the entire data collection period during lunchtime. There are several reasons I attributed lunch duty to be an outlier. One such reason is that students are not required to complete work or projects. Thus, my expectation level is at a minimum. As such, I am not highly focused and therefore, not likely to be agitated when, or if, my focus is broken. Secondly, the noise level in the cafeteria is higher than in a much smaller, single classroom. Therefore, the consistent noise level, although louder, is more comfortable for me to tolerate when compared to a quiet environment, in which a single noise often breaks the silence in a classroom.

Upon reflection, I also noted that the most frequent and recorded times of ND coincided with my prep periods, flex periods, and personal lunches. I discovered that not only do I control my environment in the classroom, but I also do it through my professional teaching day when I am not with students. There is a need to find time within the day for a quiet environment that is free of rhythmic disturbances. My schedule allows for sporadic times of the day where I can close my door or remove myself from the audible range of potential disturbances. It is also important to note that some of the data input values were noises produced by adults. Examples of such invasive noises included: slurping, dinging from text messages, and the squeaking of a copier outside my room. During those particular disturbances, I was able to shape my environment by physically removing myself from an audible range of disturbing noises.

Misophonia

One of the most astounding findings of this research is that I likely suffer from a condition called misophonia. “Misophonia is a recently described, poorly understood and neglected condition” (Sanchez et al., 2018, p. 553). People who suffer from misophonia have strong, adverse reactions to repetitive sounds causing irritation, discomfort, and anger.

> The most common ones that trigger such aversive reactions are those elicited by the mouth (chewing gum, or food, popping lips) or the noise (breathing, sniffling, and blowing) or by the fingers (typing, kneading paper, clicking pen, drumming on the table. (Sanchez et al., 2018, p. 553)

These noises provoke physical aggravation, which worsens during times of stress, especially when an individual possesses a comorbid of conditions, such as OCD in addition to misophonia. "The cluster of symptoms does not fit any of the well-known obsessive-compulsive or impulse control disorders, but has been anecdotally referred to as misophonia" (Schroder et al., 2013, p. 1). There are no official criteria for diagnosing misophonia, however,

> It is thought that it results from abnormal functioning within the limbic system (the part of the brain that regulates emotions), the autonomic nervous system (part of the brain that controls our involuntary organ functions such as breathing, and our hearts beating, and the "fight of flight response", and the auditory cortex (the part of the brain that manages hearing and interprets sound. (Lewin et al., 2015, para. 4)

I have always been susceptible to repetitive noise disturbances, often solely blaming my OCD as the culprit. I was utterly unaware that misophonia existed and most likely contributes to my anxiety and lack of focus during episodes in which I am a victim to noise disturbances. As I reviewed my data, I was also surprised to find that a vast majority of noise distractions commonly associated with misophonia, were also noise disturbances I recorded throughout my study. Additionally, "one of the most intriguing factors of misophonia is the great selectivity involving the problem, both for sounds that trigger the hassle as for the people who make the sounds" (Sanchez et al., 2018, p. 557). Likewise, I experienced misophonia throughout my study while monitoring lunches. As I noted previously in my reflections, I did not experience high levels of stress or anxiety while at lunch duty. According to research, "usually pure misophonic subjects do not feel annoyed by loud sounds" (Sanchez et al., 2018, p. 557). Therefore, I consider myself a true misophonic subject since my lack of physical response to a high level of constant noise throughout student lunches correlates with misophonic findings and research.

Artistic Data Visualization Process

As part of the study, I chose to delineate the collected data into an artistic, visual form. Connecting data to visual representations began centuries ago and continues to reveal patterns and communicate ideas. Edward Tuftle (1983), a professor political science at Yale University, published *The Visual Display of Quantitative Information* in 1983, which was considered "groundbreaking work that predated the formal discipline" (Bailey & Pregill, 2014, p. 170). His

ability to merge both quantitative data and art earned him the moniker, "the da Vinci of data" (Bailey & Pregill, 2014, p. 170).

The term *information visualization* refers to an "area of research and development that was originally an outgrowth of the pragmatics of contemporary science and engineering" (Lovejoy, Paul, & Vesna, 2001, p. 123). In the twenty-first century, many artists have turned their focus to art-based data. In fact, museums such as the Whitney Museum of American Art and the San Francisco Museum of Modern Art feature such works (Springer, 2007).

I was inspired to create a visualization of my data by the works of the artist, Nathalie Miebach and data journalist, David McCandless. For me, being able to focus on the visual manifestation of the data helped clarify the outcomes of the data, rather than merely looking at the numeric values. It is likely many other individuals also prefer data visualization, which could explain the high level of interest and popularity in visual graphs and charts throughout the research as a supplemental means of explaining data.

I started with a 30x40-size canvas that I gridded into 160 equal squares. The squares represent my professional teaching day, 7:00 a.m.-3:00 p.m., in half-hour increments for ten days. Each disturbance is designated with its' own symbol or pattern and assigned a color (Figure 3). I carefully analyzed each square of data for noise disturbances. Next, I assigned a background color for each square making sure not to duplicate the colors assigned to each pattern and symbol. I chose my color selection for the entire visual representation by personal preference and personal association to how I interpret and translate color as visual noise disturbances.

I started the painting on canvas by adding acrylic paint to the areas assigned as ND (no data) in lime green and continued to fill the blocks with the selected color. The lime green blocks represent my ideal working conditions in that the students and classroom are quiet and calm (see Appendix D and E). I continued to transfer the noise disturbances designated by symbols and colors to the corresponding time blocks on the canvas (see Appendix F).

The final visual representation not only served as visual data of how many times per day I was distracted, but it also forced me to take a more in depth look into my mental health by visually examining the various levels of discomfort and anxiety I experienced. The symbols I

assigned to each noise represented my internal reactions to the various rhythmic noise disturbances. For example, a red zigzag line representing tapping. The physicality of the line was a metaphor for how mentally agitated I got when tapping occurred. The striking red line appears controlled on the canvas; however, it represents the loss of emotional and physical control that I experienced when I heard tapping. Tapping was a trigger noise that resonated within my consciousness, which ultimately resulted in a sharp abruptness of thought. My internal turmoil mirrored the chaotic visual effect one might experience at the sight of an uneven zigzag line. As such, the zigzag served as the perfect symbol for such disarray.

A black spiral signified humming for purposes of my visual representation. I choose to express this noise disturbance with a more calming and predictable symbol. Although humming was a disturbance, it elicited a calmer reaction within my emotional and physical state of being. The fluidity of the spiral is less stark and more predictable than that of a zigzag. Therefore, seeing the spiral image elicited a calmer state of mind. While the color black represents a solid state of existence, black is not a color often associated with anger or agitation, such as the color red. Although humming was a recorded disturbance, this particular sound did not provoke an urgent need to control the environment, as did the tapping. Therefore, humming required a more controlled symbol.

The act of physically painting noise disturbances onto a canvas forced me to visualize and accept the emotional and physical torment I had experienced in daily life. Painting each disturbance within a defined box, limited by pre-established stipulations and boundaries, allowed me to catalog my metal disturbances with a certain amount of control. My feelings during painting were contradictory to how I experienced them in real time. As such, the act of creating the painting served as a therapeutic means to take control of the noises, which historically had controlled me. However, as some people well-know, therapy is frequently tricky, and this form was no exception. While representing the disturbances in a visual form on canvas, I experienced undesirable levels of stress. I felt as though I was giving new life to sounds that had long passed. With each brush stroke, I heard a reincarnation of each noise disturbance. The sounds became a reality, present not only in my head, but also in my studio. While this process created anxiety, it also served as a cathartic release, as I took control over each sound, ending its reign of terror

over me. The physical act of painting encouraged me to bring the sonic warfare out of my head and into my own, unrestricted milieu. For the first time, I was in charge of the noise.

The culmination of both frequency of noise distractions, coupled with the type of noise disturbances, produced a seemingly frenzied, visual representation. As the painting evolved, so did the desire to govern each brush stroke and color placement, much like controlling the daily environment I occupy. I always fought the temptation to apply paint recklessly, in parallel to the emotional anxiety I experienced. Maintaining control over my physical environment is imperative to my success as a teacher and artist. However, being able to visualize my manifestations of OCD and ADHD empowered me not only to take control of my own disorder, but also to recognize the effects I may have on my students and, in particular, those students who may also suffer from similar disorders. For the first time, I was able to self-assess the possible negative consequences of my afflictions in the classroom. I realized that I likely lose a fair amount of instructional time because of breaks in my concentration as well as the need to regain control of the classroom. This loss and break in instructional fluidity will likely affect student concentration levels as well. As such, for the first time, I realized that I am not the only victim to noise violations in the classroom.

This artistic visual representation echoes the physical and mental responses I habitually experienced throughout my professional workday. A typical bystander, viewing the visual representation, may interpret the energy derived from the symbols or colors in a positive or uplifting manner. However, a bystander may never recognize the anguish and strife it represents to the artist. My artistic representation is not only a manifestation of the data, but is also a parallel to my different personal states of being, while I am at work. The final visual representation likewise served as a metaphor for the sonic warfare of the silent disability I experience though OCD, ADHD, and misophonia (see Appendix G).

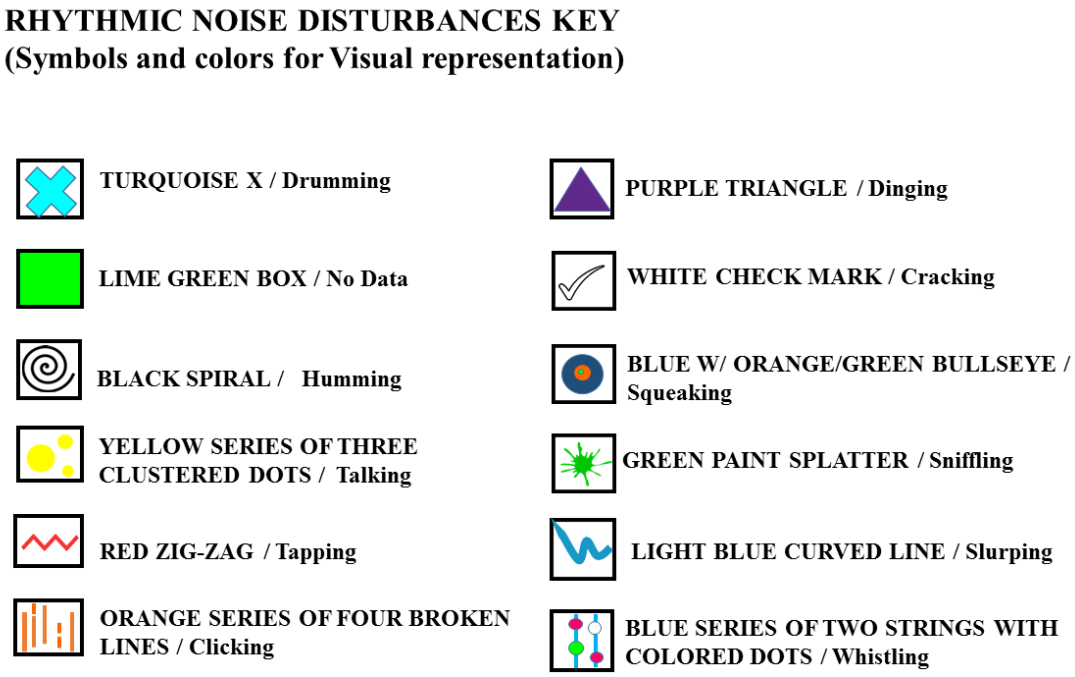

Figure 3. Key Detailing Rhythmic Noise Disturbances as Visual Representations

Recommendations

In order to implement suitable rhythmic noise reductions, it is crucial to identify the sources in specific environments. Recognizing the most offensive noises, as well as the most offensive times of day, are both essential data in order to solve or at least minimize the problem. Additionally, creating an environment that personally benefits the teacher as well as optimizes student learning is also a key factor in finding sonic peace. There may be a variety of ways in which to establish an ideal classroom. Indeed, such defined regulations will vary from teacher to teacher, student to student, and classroom to classroom. Perhaps, one such method is to include student input to create an action plan or an agreed upon set of guidelines about refraining from rhythmic noise disturbances. However, keeping the personal practice in context, "A teacher's tolerance on a given day is variable" (Behnke et al, 1981 p. 151). As such, life experiences will lend themselves to a variance in tolerance levels from day to day. Another proposal research option suggests taking sensory breaks. "Research from the Council for Exceptional recommends taking sensory breaks to help children relieve stress and improve their focus" (Gilfeather, 2019,

p. 55). While the suggestion is for children, it would no doubt serve as a benefit to teachers and other professionals as well.

The disorder, misophonia, is a relatively new diagnosed condition in which people have adverse reactions to the sounds around them. Due to its' recent discovery, few people are aware of the signs and symptoms. Therefore, educating students, teachers, and others about the disorder may serve as a preventative measure for the resulting symptoms. Modeling the qualities and behaviors, one would hope their students possess a professional practice all educators should implement. In doing so, not only will teachers demonstrate desired and acceptable noise levels, however, they may also establish classroom patterns, which students will then put into practice. Knowing that students in the classroom are attempting to limit noise violations will likely increase one's tolerance and coping levels as well. Ultimately, implementation of desired behaviors, education, and communication between students and teacher may also create a classroom environment free of rhythmic disturbances.

This study does recognize the lack of relevant literature on the condition and diagnosis of misophonia. "Misophonia is completely absent in the psychiatric literature, [as only] two case reports have been described" (Schroder et al, 2013, p. 3). Currently, "there are no evidence-based treatments for misophonia" (Lewin, 2015, para 8). Researchers with clinical experience on misophonia as well as case studies produce the sole means of current recommendations. Learning to live with the distress and learning new ways to reduce the triggering sounds may be the core component for treatment. "For Children it is recommended that distress tolerance skills be taught" (Lewin, 2015, para 10). Adults, like myself, may take agency over their triggers and leave the room or audit the noise in other ways.

Utilization of data derived from this study can serve as a benefit to specific and well-structured educational settings. For example, standardized testing regulations limit student behaviors. As such, students may perform better if administrators offer the test at times that benefit specific age groups. Per data from this particular study, students should take tests, such as the PSSA, following a recess. Regardless of testing, adolescent students should experience a recess and, thus, physical movement as a means of increasing attention and focus.

Furthermore, the data also suggests that students should also take-tests after lunch. Testing at these times would likely result in less student noise production as well as a decrease in

physical restlessness. Consequently, the decrease in noises and movement would surely benefit test takers as well as the teacher giving the test by allowing for a peaceful and quiet testing environment.

One final recommendation based on evidence is the importance of building structures and materials, particularly in public settings. Since such structures exist to meet the educational needs of the public, using quality materials to serve as barriers between rooms and spacious areas, is also critical in minimizing acoustical distractions. As schools face building issues due to aging construction, knowing the importance of effective sound management can reduce the number of distracted students and teachers. Building structure, as it relates to sound management, can ultimately influence the quality of public education, while simultaneously decreasing anxiety levels. Educating other teachers and administrators on the importance of noise management is undoubtedly one final piece of sound advice.

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Appendix A

Personal Data Collection Chart

	7:00-7:30	7:30-8:00	8:00-8:30	8:30-9:00	9:00-9:30	9:30-10:00	10:00-10:30	10:30-11:00	11:00-11:30	11:30-12:00	12:00-12:30	12:30-1:00	1:00-1:30	1:30-2:00	2:00-2:30	2:30-3:00
M																
Tu																
W																
Th																
F																

TALK –Talking

D –Drumming

CRACK –Cracking

H –Humming

CLICK –Clicking

SLURP –Slurping

SNIFF -Sniffing

DING –Dinging

TAP -Tapping

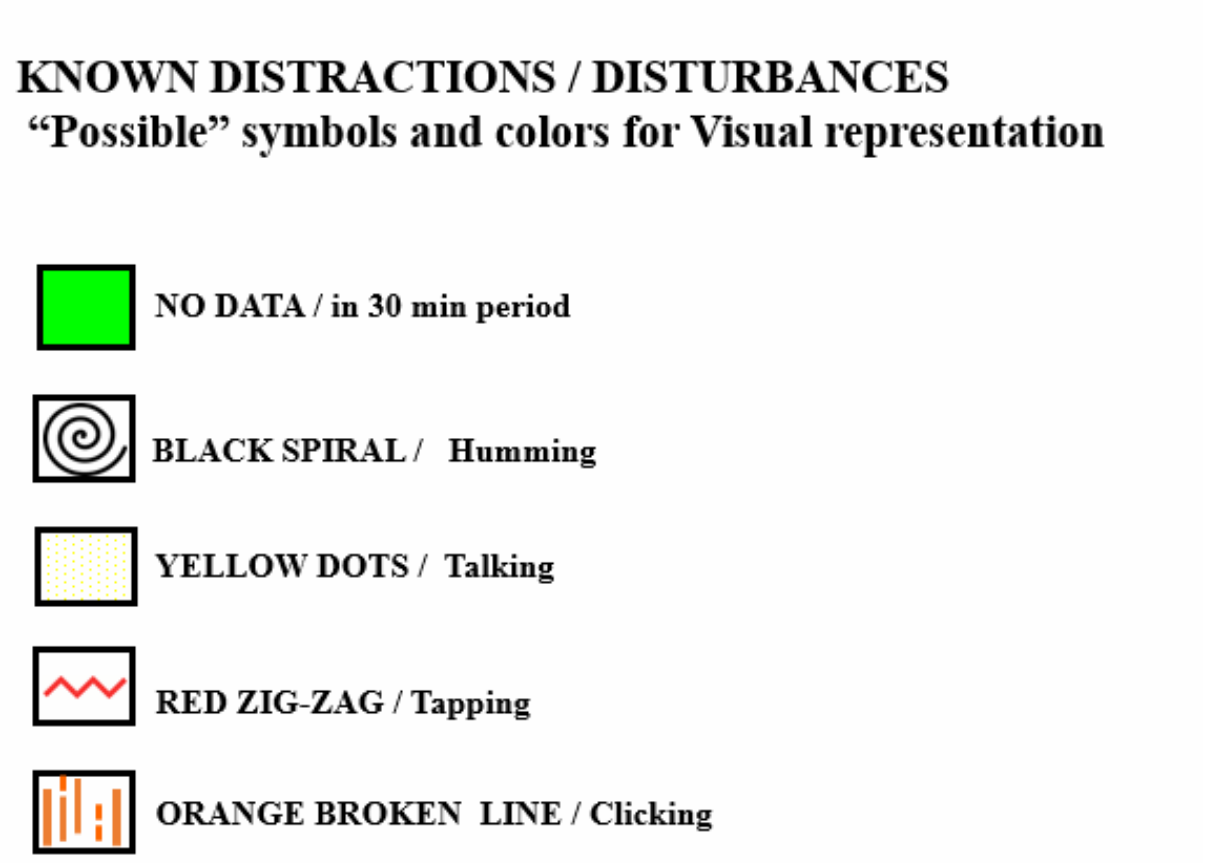
W –Whistling

ND -No Data

SQ -Squeaking

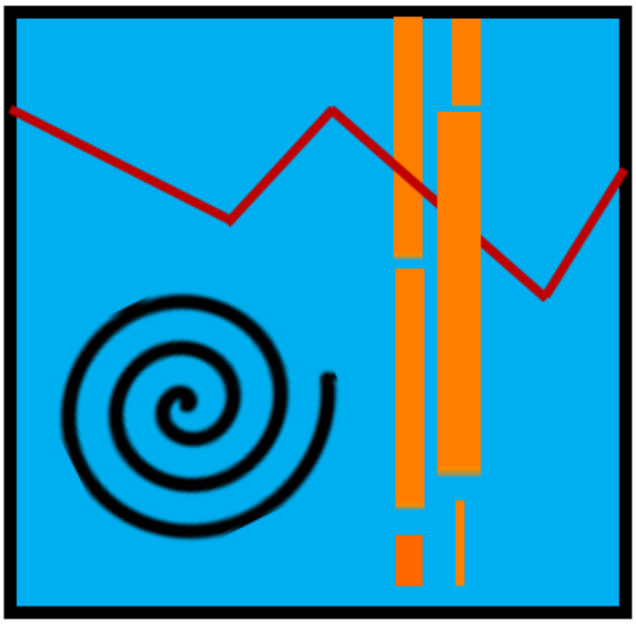
Appendix B

Visual Response Key



Appendix C

Visual Data Representation / "Possible" Example



"Possible" VISUAL REPRESENTATION

RED ZIG-ZAG=One Tapping disturbance

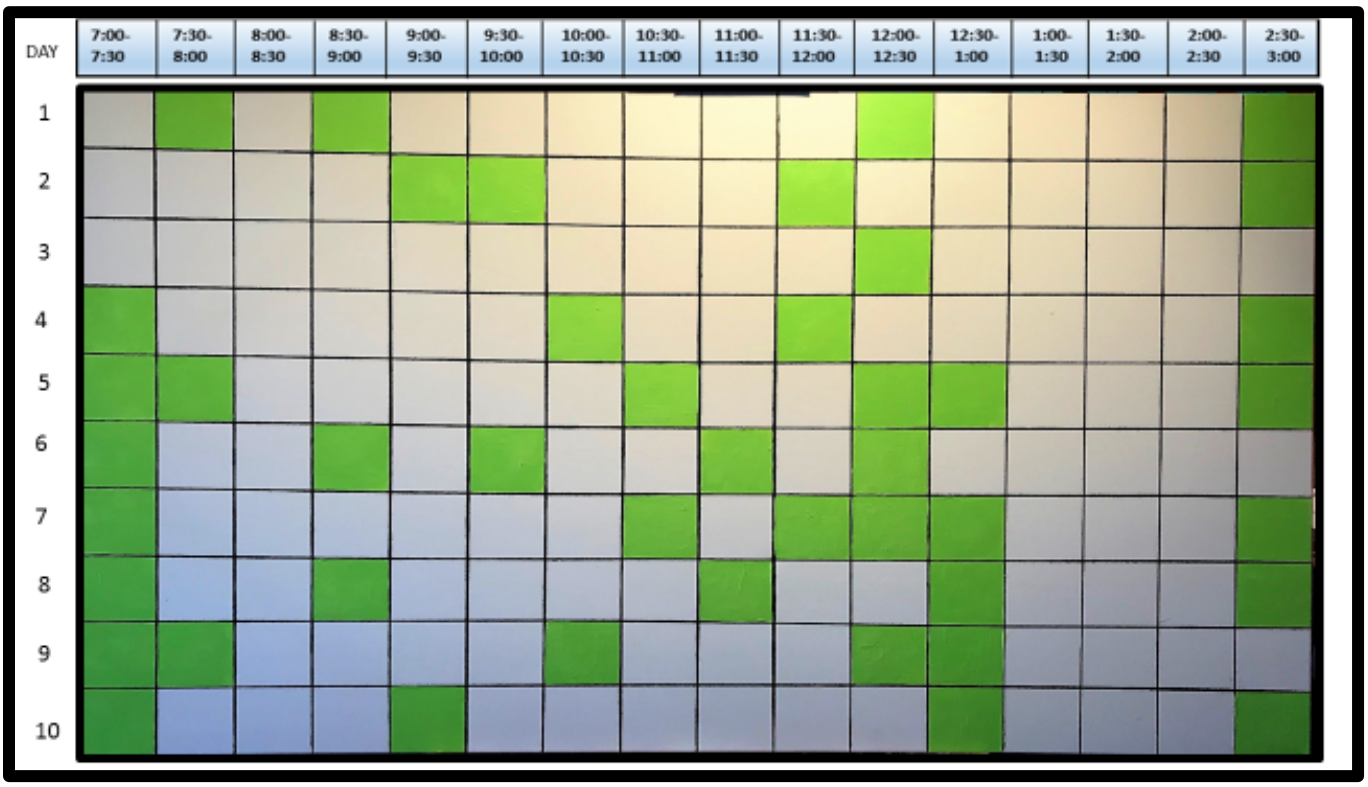
BLACK SPIRAL=One Humming disturbance

ORANGE BROKEN LINES= Two Clicking Disturbances

BLUE BACKGROUND= Artist Choice

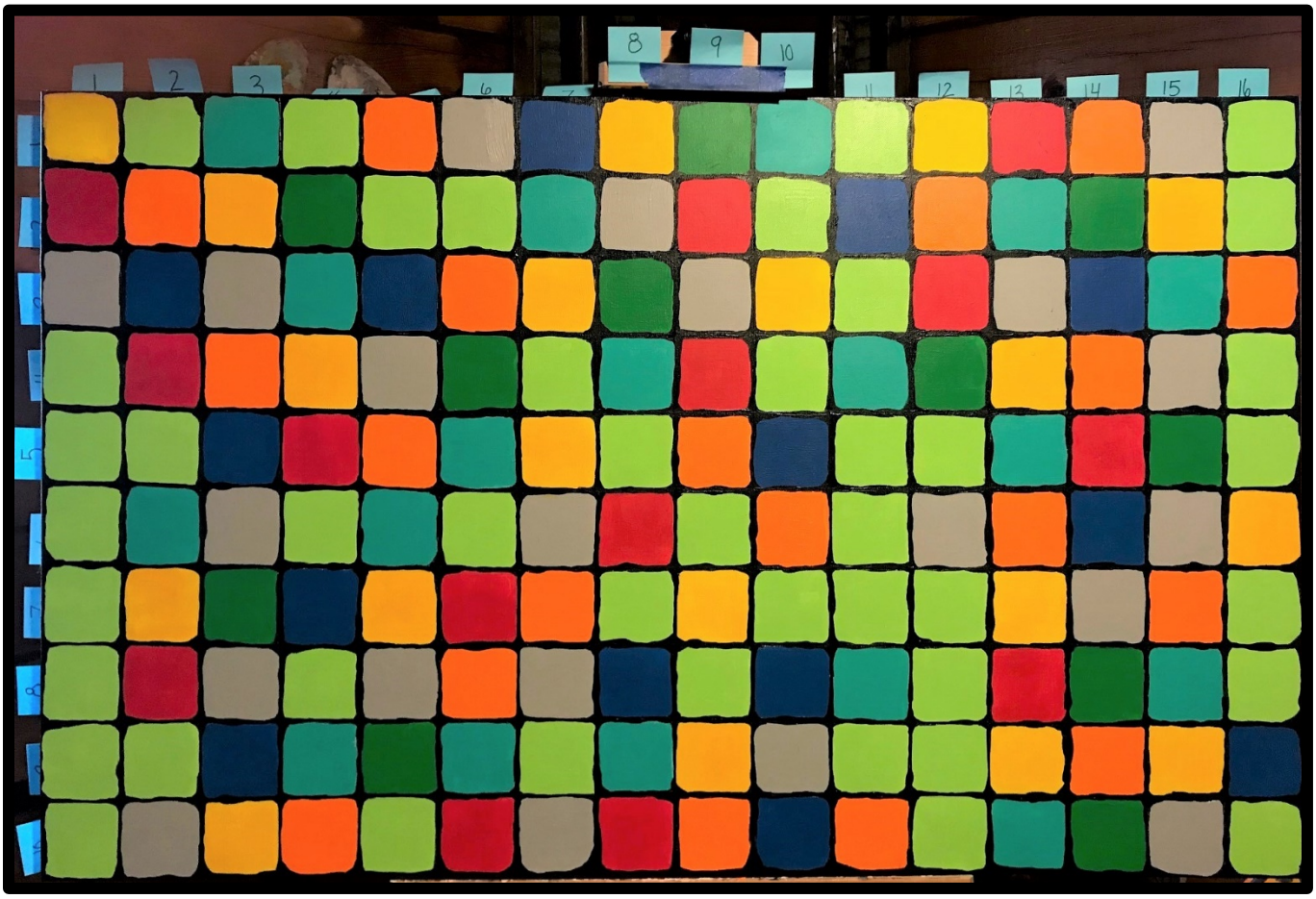
Appendix D

No Data Assigned Painted Squares



Appendix E

Painted Blocks



Appendix F

Disturbances

Appendix G

Final Visual Representation