# Havana Syndrome, Cognitive Warfare, and Psychogenic Symptoms of Neurotoxins

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## Abstract

With President Biden's signing of the Havana Bill on October 8th, in 2021, the nation was faced with an unprecedented confirmation of the deployment and usage of 'cognitive weapons' on its citizens. This paper details the potential hidden aspects of these 'weapons', and the theory that they are likely less harmful than anticipated. However, they do possess the potential to be exponentially harmful to the entire nation if they become weaponized further. A proposal/theory for a potential nation-state actor plan is also included with potential mass-population targets being in the tens of millions. An alternative hypothesis for the weapon used which caused acquired neurotoxicity is also introduced with findings.

## The Havana Syndrome

In the fall of 2016, US diplomats working in Havana, Cuba began presenting with unusual neurological symptoms that the available medical experts and US security medical teams found difficult to diagnose. The complications were a range of sensory and auditory stimuli, nausea, dizziness, and tinnitus. Other notable cognitive impairments were observed by both family and medical examiners. Amidst a marked peak in these symptoms, personnel reported a prolonged 'piercing' acoustic sound that seemed to change in intensity when the

personnel would move only a few meters away from the area. An iPhone recording of the sound, which some described as "piercing white noise", was thought to have been the source of these symptoms. (Tumolo, 2019)

The US intelligence research teams found little available explanation for the cause of the sound, and medical experts testified that no known sonic device is capable of causing the symptoms that were being observed in the diplomats.

The peaks of these neurological symptoms and the exposure to the loud sounds seem to be correlated. Initial symptoms reported by in-depth medical examinations and by Canadian team led by Doctor Alon Friedman, PhD., of 26 exposed individuals, were cognitive impairment, visual impairment, audio-vestibular impairment (tinnitus, sensitivity to sound, feeling off balance), and generally reduced well-being. (Alon 2019)

The most consistent finding in the vestibular assessment was the presence of low-threshold, high-amplitude cervical and/or ocular vestibular evoked myogenic potentials. This was found in 33-66% of exposed individuals. Both auditory and vestibular assessments were consistent with brain-stem dysfunction. A significant difference in white matter integrity between non-exposed and exposed groups was indicated. Decreased fiber density was observed, predominantly along the right crus of the fornix, past the hippocampal commissure, and projecting into the hippocampus, as well as in the splenium of the corpus callosum. Further, a leaky blood-brain barrier (BBB) was found in the right hemisphere and included the right basal forebrain, anterior insula, posterior orbital, superior frontal, and superior occipital gyri in most of the exposed individuals. Paroxysmal slow-wave events (PSWEs) were significantly more common in those exposed, and were diffusely distributed in both hemispheres, more prominently on the right.

Organophosphorus warfare agents are commonly available, and historically, several nerve agents of the G- (tabun (GA), sarin (GB), “chlorosarin” (GC) and soman (GD)), and V-series (VE, VR, VS and VX) have been deployed in warfare, acts of terrorism, and high-profile assassinations. (Naughton, 2016)

Key findings from all research into Havana syndrome point to the acute exposure of cholinesterase inhibitors (Grange-Messent, 1999). Mass-spectrometry confirmed the presence of cholinesterase-inhibiting insecticides, including Temephos, an organophosphorus used in

Cuba against mosquito larvae,[15] and 3- phenoxybenzoic acid (3-PBA), a common pyrethroid (insecticidal) metabolite. (Alon 2019)

Cuba has a well-known history of taking aggressive action against mosquito larvae to combat the Zika virus. This overexposure to insecticides, however, may be more than a coincidence. A foreign intelligence operative, for example, could have very well introduced severely toxic quantities of the same substance over a short period of time just before the auditory 'weapon' was employed on the diplomats. The auditory weapon, being the only perceptible and significant violation of the diplomat's environment, is then believed to be the *source* of the neurological symptoms.

## Hypothesis for Implications of Cognitive Warfare

If an enemy operative were to stage several events with this audio-laser, while utilizing locally prevalent insecticides, the only evidence being shown to a public would be this audio weapon. The recordings of this will continue to be shown online as the 'source' of the neurological damage, but not the 'cause' – like listening to a recording of a gunshot. However, if the American public were made to believe that listening to the *recording* of the sound is safe, it would become a sound that a whole nation would soon recognize. The enemy only needed to weaponize a neurotoxin in a few key areas that are sure to gain press coverage for the nation to be saturated with the sound on social media and news networks. The gates of the White House were recently 'attacked' with this sound, and several people suffered neurological symptoms.

However, if a group of people were exposed to this deafening sound in their everyday lives, they would not only *recognize* the sound, but they would know and believe that there are *severe* neurological symptoms to follow it.

This has the potential to create psychogenic illness in a limitless number of our population. If, for instance, the national emergency alert system was overridden, the sound could be played on every mobile device in the country. If a Long-Range Acoustic Device (L-RAD) were used, large crowds could be targeted. Psychogenic illness does not mean that the symptoms aren't clinically relevant or measurable. The expectation of severe neurological symptoms, the 'proof' that the citizen saw on the news, and the 'proof' that will inevitably

show in the people around someone, has the potential to become a serious psychological warfare attack.

## Psychogenic Illness

The term "psychogenic" was first introduced by Sommer in 1894 to refer to disorders that have a psychological origin (Thomas & Jankovic, 2010). Over the years, different terms such as hysteria, nonorganic, and functional disorders have been used to describe psychogenic disorder, which have often overlapped in clinical manifestations between psychiatry, neurology, and other fields of medicine. Thomas & Jankovic (2010) defines psychogenic illness, also known as somatoform disorder, as a condition in which a person experiences physical symptoms caused by psychological factors, rather than an underlying medical condition. Examples of these symptoms include pain, weakness, dizziness among others. The exact cause of psychogenic illness is not well established. However, studies have suggested that suggestion is one of the contributing factors to the development of psychogenic illness (Colloca, 2016).

## Psychogenic Theories

In a study on the psychogenic explanation of physical illnesses, Wilshire & Ward (2016) explores the key suggestions of various psychogenic theories. In this study, Wilshire & Ward (2016) found that psychogenic theories propose that psychological factors play a primary role in the development or maintenance of psychogenic illness. However, establishing causation in the absence of experimental control is challenging. This is because of the need to rule out other potential causes and to distinguish between causation and modulation. One argument in support of psychogenic illness models is that psychological distress often manifests as physical complaints (Wilshire & Ward, 2016). However, the causal relationship between these psychological and somatic phenomena is unclear, and only a small proportion of severely psychologically distressed people develop chronic, debilitating physical illnesses. Two psychological variables that may help explain these inconsistencies are conversion and somatization. Conversion refers to the process of psychological tension or conflict being converted into physical signs and symptoms (Hurwitz, 2004). On the other hand, Hurwitz (2004) defines somatization as the tendency to experience or express

psychological distress through physical symptoms. The relationship between psychological distress and physical symptoms may be more complex than previously thought, with a *bidirectional* relationship between them.

Wilshire & Ward (2016) offers that psychogenic illness models further propose that psychological factors such as chronic pain, gastrointestinal disturbances, fatigue, and even sensory disturbances are strongly associated with psychogenic disorder development and maintenance. The neurological domain has referred to these factors with different names such as functional neurological (symptom) disorder, conversion disorder, hysteria, somatoform disorder, and somatic symptom disorder. Among these, psychogenic movement disorders (PMDs) and psychogenic non-epileptic seizures (PNESs) have been extensively studied (Alsaadi & Marquez, 2005). PMDs may take many forms, including limb weakness, hemiparesis, tremor, dystonia, jerks, Parkinsonism, or even complete paralysis. The primary criterion for diagnosis is that the presentation is inconsistent with any well-established neurological movement disorder. However, it is unclear whether additional "positive" diagnostic signs, such as lack of improvement with medication or presence of psychological distress, significantly impact the diagnostic outcome. PMDs can be chronic and intractable, with follow-up studies reporting that anywhere from 20% to 62% of PMD patients were the same or worse at least 6 months later (Wilshire & Ward, 2016).

## Effect of Suggestion on the Development of Psychogenic Illness

Lindberg (2002) posits that physical symptoms attributed to psychological factors may be brought on or exacerbated by suggestion which is a powerful force in human behavior, and which can influence both conscious and unconscious processes. For example, if a person is repeatedly told that they have a certain condition or that certain symptoms are related to a specific cause, they may begin to experience those symptoms even though there is no medical explanation for them. This is referred to as the nocebo effect which is the opposite of the placebo effect (Faasse & Petrie, 2013). Besides, studies have revealed that highly suggestible people are at a higher risk of developing psychogenic symptoms. This is evident in certain cultural or societal contexts where certain physical symptoms are associated with certain psychological or emotional states, like in the case of conversion disorder whereby, a person may develop physical symptoms when expressing psychological distress (Colloca, 2016). It is important to note that there is a clear distinction between psychogenic illness brought on by suggestion, and from exaggerating symptoms. Although, people with

psychogenic illness experiences the physical symptom, the underlying cause of these symptoms is psychological, but can lead to clinical physiological symptoms.

There are several mechanisms through which suggestion can trigger psychogenic illness. The nocebo effect is the most prominent of these mechanisms. The nocebo effect occurs when negative suggestions or expectations lead to the development or worsening of physical symptoms (Colloca, 2016). In his study, Colloca (2016) further suggests that the nocebo effect can trigger psychogenic illness by influencing the body's physiology through various mechanisms such as the release of stress hormones, changes in the immune system and change in the brain's activity. A variety of factors such as negative verbal suggestions from healthcare providers, *negative media coverage*, and negative expectations from the patients may potentially trigger the nocebo effects. For example, if a person is informed that a certain medication may have certain side effects, he/she may experience the side effects even if the medication is a placebo (Faasse & Petrie, 2013). Considering this, the repetitive exposure, and warnings about the dangers of this ‘weapon’ has to potential to deeply condition the public so that even those who are unaware of Havana Syndrome will be affected by simply seeing the effects develop rapidly among the people in their surroundings.

Classical and operant conditioning is another mechanism for developing psychogenic illness. Classical conditioning occurs when a neutral stimulus like a location or a person is associated with an unpleasant event like pain or discomfort leading to the development of symptoms (Akpan, 2020). Operant conditioning occurs when a certain behavior is reinforced by external factors such as social support, attention, or avoidance of a certain situation leading to the maintenance of symptoms. Classical and operant conditioning, therefore, have the potential to trigger psychogenic illness by shaping the person's behavior and physiology. Suggestion plays a significant role in the development of mass psychogenic illness, also known as mass sociogenic illness or collective hysteria. This phenomenon occurs when a group of individuals’ experience similar physical or psychological symptoms without an explanation of any medical or psychiatric condition (Henton & Iversen, 2012). Akpan (2020) acknowledges that suggestion can contribute to the development of mass psychogenic illness by causing individuals to adopt the symptoms or behaviors of others, leading to a spread of the illness within the group. Social influence and group dynamics can also play a role in the development of mass psychogenic illness, as individuals may feel pressure to conform to the symptoms or behaviors of others in the group. If these attacks continue to occur in high-profile areas, the public will be further conditioned to respond to the sounds.

## Creation of Mass Psychosis and Mass Psychogenic Illness

Spontaneous trance states and heightened receptivity to suggestion can lead to the development of mass psychogenic illness (MPI). A spontaneous trance state is a phenomenon in which an individual enters into a trance-like state without the use of external techniques such as hypnosis (Elkins et al., 1988). A variety of factors can cause this, including stress, anxiety, and social influence. When an individual enters a spontaneous trance state, they are likely to become more susceptible to suggestion which in turn renders them to adopt the symptoms or behaviors of others. This can in turn lead to the spread of MPI within a group, as individuals may begin to experience similar symptoms or behaviors. Elkins et al., (1988) provides that heightened receptivity to suggestion can also contribute to the development of MPI as individuals in such state are more likely to accept and act on suggestions from others, even if those suggestions are not based on reality. A study by Lindberg (2002) suggests that MPI often occur in settings where there's a sense of isolation and stress, like schools, workplace, or closed community. In environments with large crowds, this type of attack is essentially indefensible, and can create a severe threat to life in seconds. A concert's audio system, for example, can be overridden while simultaneously using the L-RAD acoustic device and lead to a deadly and catastrophic situation quickly.

## Conclusion

Psychogenic theories suggest that psychological factors manifest as physical symptoms in psychogenic illness. If the hypothesis presented is accurate, we should expect to see repeated events and attacks with the artificial sonic weapon while the victims are unwittingly poisoned with locally prevalent environmental toxins. The repeated display of these attacks will condition the American public to become hyper-responsive to this sound, and to react with a specific set of symptoms and cognitive impairments if the sonic 'weapon' is ever utilized on them, or a crowd.

Understanding the implications of the potential future development of a cognitive weapon, whether the symptoms suffered are neurotoxic or psychogenic, is vital to national security. Further investigation is needed to discover the source of the audio, and potential foreign state actors involved in creating a 'pre-packaged psychogenic neurotoxin' that could engulf our nation in turmoil.

## Disclosures

None

## References

Akpan, B. (2020). Classical and Operant Conditioning—Ivan Pavlov; Burrhus Skinner. In *Science Education in Theory and Practice* (pp. 71-84). Springer, Cham.

Alsaadi, T. M., & Marquez, A. V. (2005). Psychogenic nonepileptic seizures. *American family physician*, *72*(5), 849-856.

Colloca, L. (2016). Nocebo effects: the dilemma of disclosing adverse events. In *Ethics and governance of biomedical research* (pp. 47-55). Springer, Cham.

Dyer Montreal O. Microwave weapon caused syndrome in diplomats in Cuba, US medical team believes. DOI:10.1001/jama.2018.1742.

Elkins, G. R., Gamino, L. A., & Rynearson, R. R. (1988). Mass psychogenic illness, trance states, and suggestion. *American Journal of Clinical Hypnosis*, *30*(4), 267-275.

Faasse, K., & Petrie, K. J. (2013). The nocebo effect: patient expectations and medication side effects. *Postgraduate medical journal*, *89*(1055), 540-546.

Friedman, Alon Ph.D., (2019) Havana Syndrome Among Canadian Diplomats: Brain Imaging Reveals Acquired Neurotoxicity. *MedRxiv [preprint]*

Grange-Messent V, Bouchaud C, Jamme M, Lallement G, Foquin A, Carpentier P. Seizure-related opening of the blood-brain barrier produced by the anticholinesterase compound,1 soman: new ultrastructural observations. 1999; 45: –14. *Cell Mol Biol*

Henton, W. W., & Iversen, I. H. (2012). *Classical conditioning and operant conditioning: A response pattern analysis*. Springer Science & Business Media.

Hurwitz, T. A. (2004). Somatization and conversion disorder. *The Canadian Journal of Psychiatry*, *49*(3), 172-178.

Lindberg, M. A. (2002). The role of suggestions and personality characteristics in producing illness reports and desires for suing the responsible party. *The Journal of Psychology*, *136*(2), 125-140.

Naughton SX, Terry A V. Neurotoxicity in acute and repeated organophosphate exposure.101–2018; 408: 12. *Toxicology*

Thomas, M., & Jankovic, J. (2010). Psychogenic movement disorders. In *Blue Books of Neurology* (Vol. 34, pp. 630-650). Butterworth-Heinemann.

Tumolo, J. 'Sonic Attacks' on U.S. Diplomats in Cuba. Hear J 2019; 72: 22.

Wilshire, C. E., & Ward, T. (2016). Psychogenic explanations of physical illness: time to examine the evidence. *Perspectives on Psychological Science*, *11*(5), 606-631.