

Correlation of Naturally Occurring Infrasonics and Selected Human Behavior*

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An initial attempt is made to determine whether infrasonic waves generated by storms of distant origin affect local human behavior. Severe storm activity in North America was compared with the automobile accident rate and the rate for absenteeism among school children in the area of Chicago, Illinois during the first 28 days of May 1967. The results suggest that a correlation may exist between the presence of infrasonic disturbances in the Chicago area and changes in selected human behavior. It is urged that more comprehensive studies of this nature be carried out.

IT HAS LONG BEEN KNOWN THAT INTENSE WEATHER PHENOMENA have demonstrable, though subtle, influences upon human behavior.¹⁻³ The literature, since antiquity, is replete with examples dealing with numerous types of effects extending from increased incidence of such catastrophic events as suicide attempts to more gentle effects such as forgetfulness and mild malaise.⁶ Several basic physical phenomena known to attend storm activity have been considered responsible for the observed changes in behavior—among which are changes in barometric pressure, changes in relative humidity, changes in ozone concentrations of the air, and high winds.² More recently, it has been discovered that very-low-frequency sound waves having periods of oscillation in the range 10^2 to 10^{-1} sec are produced during severe storm activity such as high winds and tornadoes, as well as during other naturally occurring phenomena such as earthquakes and volcanic activity.^{7,8} Such naturally produced infrasonic waves travel over great distances through the lower atmosphere, from the point of origin, experiencing little attenuation.⁷ Further, recent experiments with man-made infrasonics have shown that disturbances are produced in normal human behavior similar to those attending severe weather phenomena.⁹⁻¹¹ Thus, the question arises whether the origin of such disturbances is associated with local phenomena such as winds, barometric pressure, ozone concentration, etc., or whether distant phenomena, such as tornadoes, producing low-frequency acoustic waves that propagate over appreciable distances are responsible. This paper reports on an initial attempt at such a determination.

The plan for study involved: (1) locating a high-population-density region that had, for a period of approximately one month, mild or innocuous local weather conditions during a period when severe weather phenomena were abundant elsewhere; (2) obtaining information on such severe weather phenomena on the North American continent that could produce infrasonic waves arriving in the locality of study during the chosen period; (3) obtaining information on selected aspects of human behavior in the locality of study during the chosen period as a function of time; and (4) determining whether a correlation existed between the presence, in the locality of study, of distantly produced infrasonic waves and time-dependent disturbances to behavior in this locality.

The area defined by "Chicago, Illinois," was chosen for the locality of study because of the investigators' ability to obtain the pertinent data for this area. The first 28 days of the month of May 1967 were selected as the period of the study since weather conditions in the immediate area of Chicago, Illinois, were suitably mild¹²—while, at the same time, severe storms occurred in other regions of North America. Weather data were obtained from the U. S. Department of Commerce¹³; and barograph perturbations, which have been shown to be indicators of the presence of infrasonic activity,¹⁰ were examined for the Chicago area.¹⁴ By these methods, which yielded nearly identical results, it was determined that infrasonic waves produced by distant storms (up to 1500 miles away) should have been present in the Chicago area for 13 of the first 28 days of May 1967.

Two types of human activities were selected for correlation with the determined periods of infrasonic disturbances—viz., automobile accidents and absenteeism among school children. It

TABLE I. Correlation coefficients of selected human behavior and periods of infrasonic disturbances.

Behavior	Days of infrasonic disturbances	Days of intense infrasonic disturbances*
Automobile accident rate	0.37	0.49
Rate of absenteeism among school children	0.33	0.50

was felt that these activities, both of which are well-defined events, would most likely be affected by the presence of infrasonic waves. As shown by others,^{10,11} infrasonic waves may produce symptoms that could cause an increase in accident rate. Similarly, nausea, fatigue, and other infrasonic effects could induce individuals to remain at home rather than going to school. To emphasize any infrasonic effects, absenteeism among primary school children was chosen over absenteeism among secondary school students since it was felt that the latter group would be less inclined to absent themselves because of minor symptoms.

Since daily statistics concerning the human behavior of interest to this study are not published, the authors were required to seek this information at the source level, viz., individual accident claims and individual instructor record books. To obtain the automobile accident data, approximately 1000 accident claims were reviewed at the Bloomington, Illinois, office of the State Farm Insurance Company. It is felt that the accident data included for study represent an accurate cross section of all pertinent automobile accidents in the Chicago area during the study period. Data concerning absenteeism among school children were obtained from individual instructor record books located at the office of the Superintendent of School District 111, Oaklawn, Illinois. The record books of two schools—viz., Burbank and Maddock Elementary Schools—with a combined enrollment of approximately 1500 students, were examined. Consecutive absences of three or more days were ignored to eliminate from the data cases of serious illness and thereby emphasizing the mild, short-term absences expected to be caused by minor disturbing effects.

Correlation coefficients relating selected human behavior with days on which infrasonic disturbances were present in the study area were computed using standard methods¹⁵ wherein a given day was scored as 1 or 0, respectively, depending upon the presence or absence of infrasonic disturbances. These results are shown in Table I, which also has separate entries for the four days of strongest infrasonic disturbances.

The weather in the Chicago area during the study period was such that minimal error was introduced by neglecting local conditions. Statistics reported by the State of Illinois Traffic Safety Division indicate that a light rain, such as that which occurred on four days of the study period, does not significantly increase the accident rate.¹⁶ The effect of light precipitation on absenteeism among school children is not known. Judging from the observations made in this study, the effect appears to be insignificant.

It is considered that during the period studied, there were no major road hazards or traffic pattern changes that would have a significant effect on the automobile accident rate. Accident statistics¹⁶ indicate that there exists a significant difference in the urban automobile-accident rate on weekdays as compared with that during the weekend. Since the ratio of weekend days with infrasonic disturbances to weekdays with infrasonic disturbances was approximately the same ratio as all weekends to all weekdays, —viz., 3/10 as compared to 2/7, it was not necessary to distinguish the days of the week during the study of automobile accident rates.

The absence rate among school children of this study appeared to depend on the particular day of the week, i.e., there is an increased absence rate on Mondays and Fridays and a low absence rate on Wednesdays and Thursdays. While this is an intuitively

reasonable absence pattern, it is difficult to determine if this is a normal pattern or if the observed pattern is due to the presence of infrasonic waves, which have an almost identical distribution pattern for this study period, since statistics concerning daily absence rates among school children are not compiled for the study area.

The entries of Table I suggest that a relationship exists between the presence of strong infrasonic waves, generated by natural phenomena, and the frequency of automobile accidents. It further appears that a similar relationship exists between the presence of infrasonic waves and the absence rate of students in elementary schools, although the significance of this relationship cannot be determined without further investigation of the normal daily absence pattern of these students.

Infrasound is an area of acoustics that has thus far been little explored. The need for a detailed study of the importance of parameters such as frequency, intensity, and time duration on biological systems is apparent. Further, little is known of means of protection from infrasonic waves. Such low frequencies require impractical thicknesses of materials for effective insulation.⁹ It is not known whether ear-protecting devices can protect an individual from suffering the effects caused by an infrasonic environment, although here is some indication that audible sounds effectively mask infrasonic effects.⁹

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