A THERMODYNAMIC APPROACH TO SOME PARANORMAL PHENOMENA

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ABSTRACT

Calculations are made of the energy changes involved in (1) the atmospheric cooling accompanying some paranormal phenomena, and (2) the paranormal bending of metal objects. They are based on arbitrary but plausible assumptions. For case (1) it is found that if the random kinetic (thermal) energy abstracted from 30 cubic metres of air in cooling it by 10°C were converted to directed kinetic energy, it would suffice to accelerate an 80-kg object from rest to 360 km/h. For case (2) it is shown that the thermal energy involved is so small that one cannot even make a guess as to its possible origin.

It is emphasised that such calculations cannot give any clue as to mechanisms, and that entropy considerations indicate that in terms of classical physics machines would be required to bring about the observed thermal changes.

Since at least some of the phenomena termed paranormal are objective (leaving an undetermined part as subjective) it is relevant to enquire into their accessibility to normal considerations of physics. A remarkable example of applying basic physical measurements to paranormal phenomena was provided by W. J. Crawford, a lecturer in Mechanical Engineering, who in the course of a very large number of séances measured meticulously the weight changes, pressures exerted and other parameters relating to the medium, to the levitated objects, and to the sitters (Crawford, 1916). Perhaps because I have no special training for investigating séances but only a long and varied experience as an experimenter I found Crawford's account very impressive. I refer to it here because he did not raise the question of whence came the mechanical energy involved in the phenomena which he measured, but it was his book that induced me to consider that problem. The conclusions from my investigations certainly cannot provide any explanations, but they may help to set frameworks into which any explanations put forward in the future must be fitted. Here I will confine my physical analyses to two types of phenomena. Also, I hope that my rather primitive analyses will stimulate some professional physicists to refine and extend my studies.

SPONTANEOUS COOLING

Very many reporters of spontaneous paranormal phenomena such as poltergeist manifestations and ghostly apparitions have noted that these are accompanied by a marked drop in atmospheric temperature. This has been reported as sensed by observers and participants, and in some instances it has been recorded by thermometers. It is appropriate, therefore, to enquire how much energy is involved and whether merely from a quantitative point of view that amount of energy would suffice to produce the observed phenomena.

Suppose that a volume V litres of air of density d grams per litre is cooled through ΔT deg. K and that the specific heat of air at constant pressure is C_p

joules per degree per gram. For the present we neglect heat flow from solid objects such as people and furniture and parts of a building, because this is slow on the time-scale of the phenomena concerned here.

The enthalpy loss of the air is

$$\Delta H = C_p \times V \times d \times \Delta T \text{ J}$$

To calculate this, we use the following data and assume a space of 3 m x 3 m x 3 m in which the phenomena take place, so that

$$\text{Volume of air } V = (3\text{m})^3 = 27 \text{ m}^3 \approx 3 \times 10^4 \text{ litres}$$

$$\text{Density of air } d = 1.16 \approx 1.2 \text{ g per litre}$$

$$\text{Mass of air } V \times d = 3 \times 10^4 \times 1.2 \approx 4 \times 10^4 \text{ g}$$

$$C_p = 1.007 \approx 1.0 \text{ J per g per deg.}$$

Assume $\Delta T = 10$ deg.

$$\therefore \Delta H = 1 \times 4 \times 10^4 \times 10 = 4 \times 10^5 \text{ J} = 4 \times 10^8 \text{ g.(m/s)}^2$$

If this energy is converted entirely into the kinetic energy E of an object of mass M kg moving at v metres per second,

$$E = \tfrac{1}{2} M v^2 = 4 \times 10^5 \text{ kg.(m/s)}^2$$

$$\therefore M v^2 = 8 \times 10^5 \text{ kg.(m/s)}^2$$

This is the kinetic energy of an 80-kg object moving at 100 metres per second, which is equivalent to 360 km per hour.

The calculation shows that purely quantitatively the reduction of the temperature of the air accompanying paranormal phenomena would be adequate to supply the kinetic energy involved in such phenomena.

What is not touched upon by this calculation is, first, the problem of whether, and if so how, the random thermal motion of molecules could be converted to the directed motion of a flying object, which would involve a considerable decrease of entropy and therefore the expenditure of work; and second, the mechanism, equivalent to that of a refrigerator, whereby material is cooled below the temperature of its surroundings.

However, as stated in my introduction, I am not concerned here with mechanism, but only with the question of energy equivalence.

Metal Bending

There are persons who have the ability to bend hard objects, usually of metal, which are difficult or impossible to bend by the strength of normal human hands; these persons include my wife, but not me. It is found that when objects are made to bend by rubbing or stroking them with fingers, the region which is rubbed becomes hot just before the metal becomes flexible. The hot metal does not damage the skin of the rubbing fingers so its temperature must be less than say, 80°C, very far below the melting-point of any metal of concern in this context.

Assume that the zone of the object to be bent which is rubbed and becomes flexible is a circular rod of diameter $2r$ cm and length a cm, so that the volume $V = \pi r^2 a$ cm^3. If the specific heat of the metal is C joules per deg. per gram

and its density is d grams per cubic cm, then for a temperature rise ΔT the quantity of heat ΔH required is

$$\Delta H = C \times V \times d \times \Delta T$$

Assume that we are dealing with a rod of copper for which

$C = 0.38$ joules per deg. per gram and $d = 9$ grams per cubic cm.

The rod is rubbed over a region, the bending locus, with radius, $r = 0.2$ cm and length, $a = 2$ cm, and we assume that $\Delta T = 50$ deg.K. Then

$$\Delta H = 0.38 \times \pi \times 0.04 \times 2 \times 9 \times 50 = \sim 40 \text{ J}$$

This is a relatively small quantity of energy and we can consider several sources whence it might originate.

Suppose that this quantity of heat had come by conduction from the unrubbed part of the object and suppose that the mass of this is one hundred times greater than that of the bending locus, then the temperature decrease in the unrubbed part would be $\Delta T/100$, i.e. 0.5 deg., which would not be noticed by the hand holding the object. Therefore this is a possible source of the heat. However, according to normal physics, the establishment of a temperature difference between different regions of the same object would require work to be done by some kind of engine, because it would involve a decrease of entropy.

If the heat had come by conduction from the rubbing finger it would have been cooled markedly, but such a cooling sensation has not been reported.

The surmise that the heat was produced by friction is not sensible because the rubbing is always very light, and is usually a stroking rather than a rubbing, which could not generate the heat required.

Although the quantity of heat involved in the phenomenon is thus known, at least three essentially important features remain mysterious: (1) the origin of the heat which produces the temperature rise; (2) the mechanism whereby it is concentrated at the bending locus; and (3) the mechanism whereby a relatively trivial mechanical interference and an associated relatively small temperature change produce a drastic change in the mechanical properties in a small region of a solid.

However, as in the first example, I have quantified tentatively a paranormal phenomenon, and this may eventually be useful.

General Caveat

Of course, my whole enterprise may turn out to be only the equivalent of analysing the pigments used by Rembrandt in the hope that this knowledge would help us to understand the emotional appeal of his painting; in other words, a valid undertaking, but rather beside the point.

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REFERENCE

Crawford, W. J. (1916) *The Reality of Psychic Phenomena.* London.