

Pathological Science

Irving Langmuir

Nobel Prize

Chemistry 1932



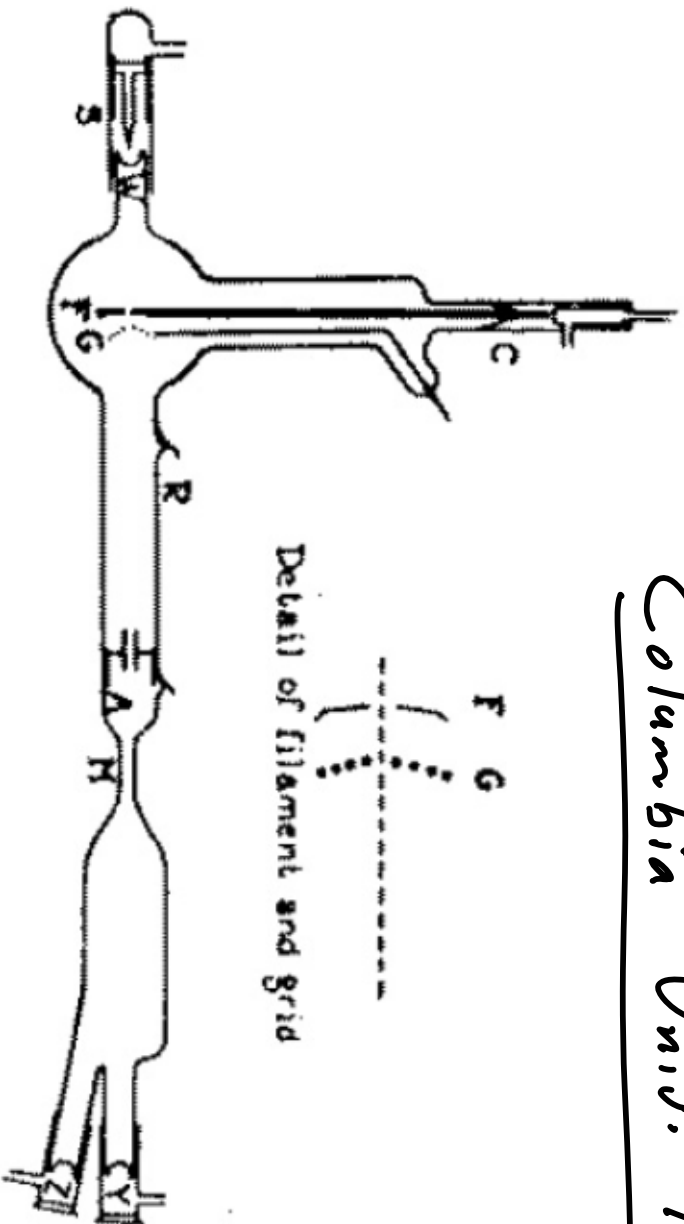
One of the first things I did with every graduate student who worked with me is to convince them how difficult it was to keep oneself from unconscious bias. ² --Michael Withersell, head of [Fermi National Accelerator Laboratory](#)

Pathological Science

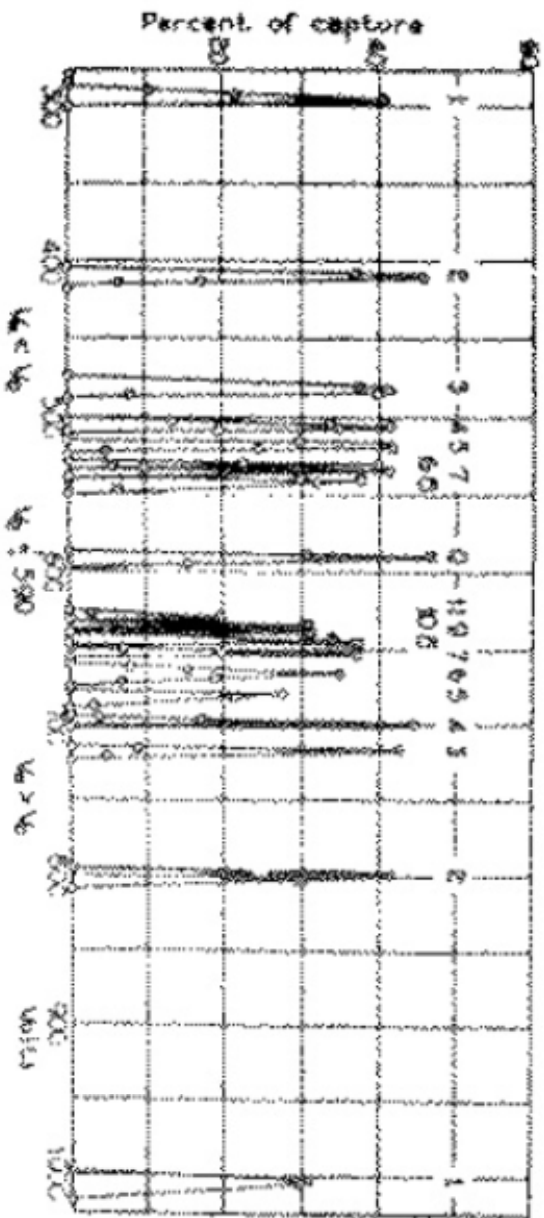
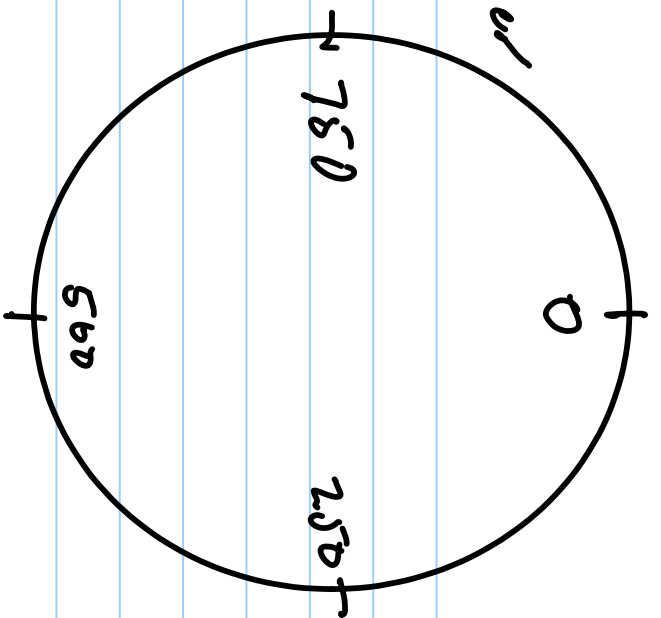
1. Not a fraud
2. Characterized by belief
3. Subjective & selective results
4. Often exotic explanations

Davis-Barnes Effect

Columbia Univ. 1929

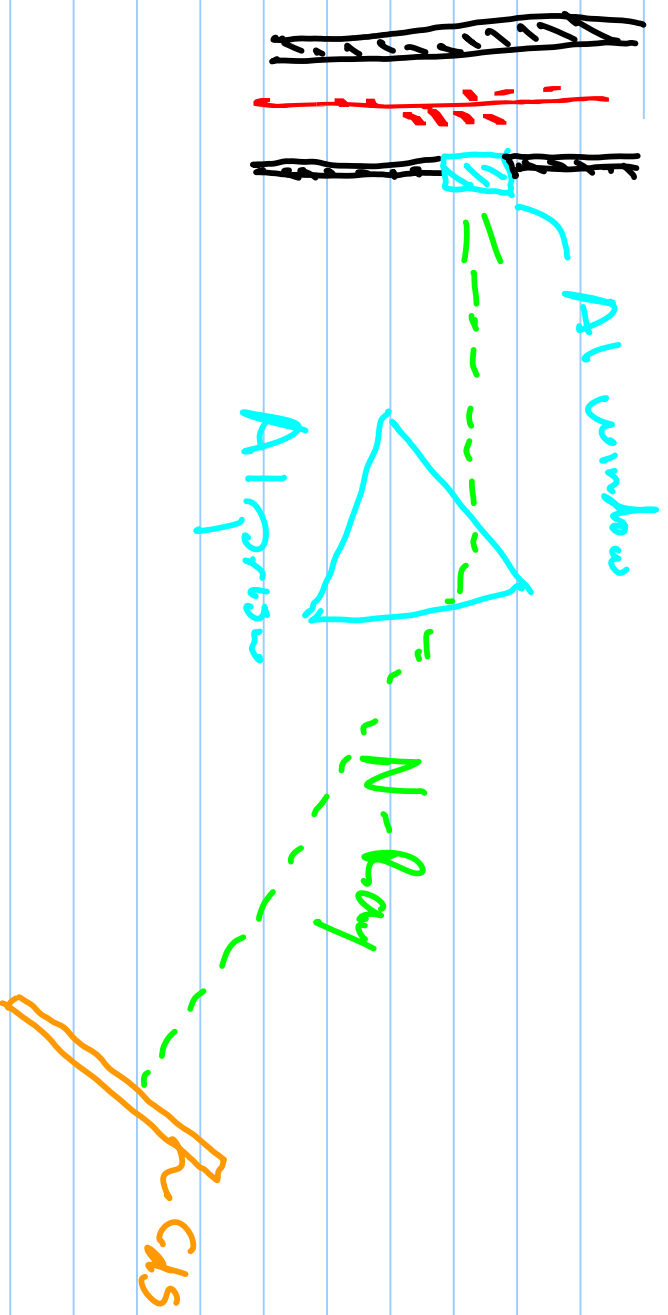


Voltmeter

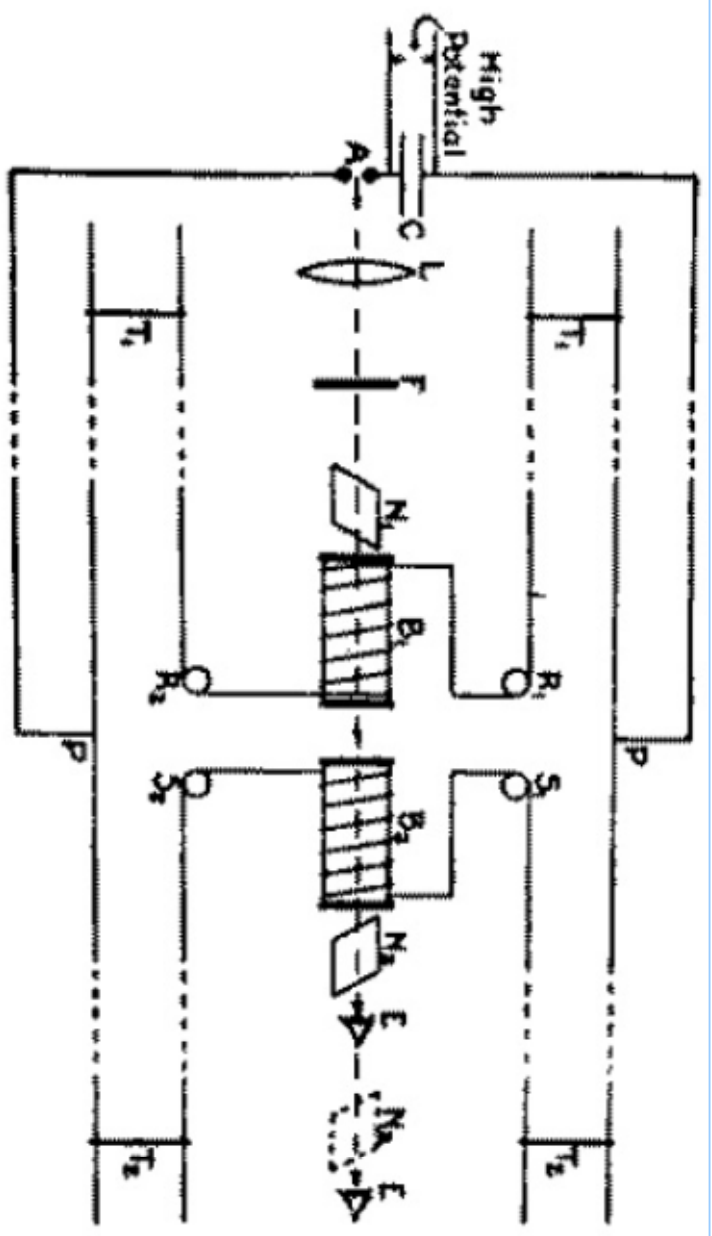


Blondlot and N-rays

1905



Allison Effect



The Nature of Visual Observations at Low Light Intensities

We were led to conclude from visual observations that the minima reported by Allison in his magneto-optic method were reproducible. Our conclusions¹ are certainly wrong as we have not been able by any purely objective method to check these results. In order to clear up the

964

LETTERS TO THE EDITOR

tensities that the problem is worthy of serious consideration. In addition to the magneto-optic effect, we may list the numerous *N*-ray experiments,² the Davis and Barnes³ experiments on the capture of electrons by α -particles, and the Pokrovskii⁴ experiments on the emission of α -particles from lead by x-ray excitation.

In all of these cases the experimenters have been convinced that their observations are real and that their eyes cannot deceive them. This effect might be explained as arising from slight movement of the eye so that the light falls upon a less sensitive region of the retina. To the observer this would appear to be a change of intensity. There may also be some question as to the nerve centers which respond to low order stimuli and the possibility that such centers may be lacking in the usual power of discrimination. However, an element of suggestibility or hypnotism must also be present. Thus there were regions on the scale where we were never able to observe minima although we had expected to find them. Our initial readings appeared to set a pattern which was then reproducible. The observer had no knowledge as to the scale reading, so apparent reproducibility was due either to coincidence and would have

disappeared when a sufficient number of readings were taken, or was due to some unknown mode of communication between the observer and his partner who recorded the scale readings and operated the trolley settings. In order to eliminate the possibility of inference from the tonal qualities of the voice, we used a system of buzzer signals as a means of communication. This, however, appeared to have no effect upon the reproducibility of the readings. We are inclined to question whether, under the conditions of these experiments, reproducibility has any physical significance when one member of the pair has knowledge of the previous result. Whatever interpretation one cares to make of this statement, it will at least be granted that this is a safe assumption to make in future observations of this character.

W. M. LATIMER
H. A. YOUNG

University of California,
Berkeley, California,
October 12, 1939.

¹ W. M. Latimer and H. A. Young, Phys. Rev. 44, 690 (1933).
² Stradling, J. Frank. Inst. 164, 177 (1908).
³ B. Davis and A. H. Barnes, Phys. Rev. 37, 1368 (1931).
⁴ G. I. Pokrovskii, Phys. Rev. 38, 925 (1931).

Symptoms of Pathological Science:

1. The maximum effect that is observed is produced by a causative agent of barely detectable intensity, and the magnitude of the effect is substantially independent of the intensity of the cause.
2. The effect is of a magnitude that remains close to the limit of detectability; or, many measurements are necessary because of the very low statistical significance of the results.
3. Claims of great accuracy.
4. Fantastic theories contrary to experience.
5. Criticisms are met by ad hoc excuses thought up on the spur of the moment.
6. Ratio of supporters to critics rises up to somewhere near 50% and then falls gradually to oblivion.

Cold Fusion? 1989

- Stanley Pons

- Martin Fleishman



Pathological, Precautionary and Consensus Science - a Death Knell for the Scientific Method?

1. Pathological Science
2. Precautionary Science
3. Consensus Science
4. Scientific Method?

