Playing Dumb on Climate Change

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- "Correlation and causation"

Correlation is defined to show how strongly two variables are related, and causation means the occurrence of variable A leads to the change of B.

Correlation could be measured by correlation coefficient "r" where $-1 < r < 1$. If r is negative, A and B are negative correlated, in other words, increment of A implies decrement of B. Reversely, A and B are positive related if r is positive.

Correlation between two variables is easy to be measured, and it is the imperative condition to find whether causation exists. Correlation never implies causation, in some cases, coincidence leads to correlation, that means A and B might have similar trend but they are not related at all.

There are couple of relation patterns between two variables which are measured correlated:

direct causation (A causes B); reverse causation (B causes A); explicitly (A, B both cause C); indirect causation (A causes C which causes B).

The article mentioned "correlation is not necessarily causation", of which as far as I thought, is correct. Since further studies other than significant test, effect size should be conducted before concluding cause-effect relation between A and B. One approach to test a causation is Controlled Study with experiment group and controlled group.

- "95 percent confidence limit"

I think this term is same thing as 95 percent confidence level. The confidence level represents the frequency of possible confidence intervals that contain the true population parameter. So far, for all the things I learned, the confidence level is utilized as the threshold of whether accepting the null hypothesis based on whether the confidence contains sample statistics. The number 95 is flexible, in some fields, where preciseness is emphasized, it might rise to 99, and in some cases, 90 is acceptable, for example, in this article, author argues that for some environmental issue, the confidence level of testing should not be strictly as high as 95.

Author interpreted this term in words "accept a causal claim only if they can show the odds of the relationship's occurring by chance are no more than one in 20". I think this interpretation is true, though I'm not sure it there exists hypothesis test that could testify the causation directly.

- "Type one and Type two error"

Type one error is falsely rejected a true null hypothesis.

Type two error is failed to rejected an incorrect null hypothesis.

This form could convey the underlying meaning of Type one and Type two.

	H0 is actually true	H0 is actually false
Rejected H0	Type one	Correct
Failed to reject H0	Correct	Type two

Tradeoff exists between these two type of error.

To avoid type one error, we might rise the confidence level, which makes unlikely to reject the null, even if the null is false.

In the article, it said "the fear of Type one error asks us to play dumb". In this part, the null hypothesis the author based on might be statement indicating two environmental factors do not have causation. The fear of Type one error makes us hardly reject the null, and therefore missed some causes and effects among them.