

The Scientific Attitude of Cold Fusion:  
Errors made by Stanley Pons and Martin Fleischmann

Nuclear Fusion, a process where two or more atomic nuclei combine and release massive amounts of energy, was known since the 1920's. In 1929, Robert Atkinson, a Welsh physicist, and Fritz Houtermans, a Dutch-German physicist, measured the masses of light elements to predict the amount of energy that could be released should they fuse together. In 1932, Mark Oliphant successfully fused hydrogen isotopes in a lab. And later on, Hans Bethe would work out the cycle of nuclear fusion in stars. Since nuclear fusion was known to only happen at extremely high temperatures, however, it was incredibly difficult to use the energy this process released. Many people at the time speculated whether there was a way to achieve nuclear fusion at lower temperatures, to get clean energy easier. They thought it might be possible by catalytically fusing hydrogen absorbed in a metal catalyst. In spring 1989, Stanley Pons, an American electrochemist from the University of Utah, and Martin Fleischmann, a British chemist from the University of Southampton, announced their discovery of a way to achieve a sustained nuclear fusion reaction at or near room temperature, something they dubbed "cold fusion" via press conference. The implications of this was enormous—it would mean a clean and a cheap abundant source of worldwide energy.

There are two parts to the scientific attitude: any theory made must be based on observations of the natural world or of data, and one must be willing to change their theory if evidence contradicts it. One can see an incorrect application of the scientific attitude in the nature of Pons and Fleischmann's announcement. An announcement via press conference instead of a thorough peer-reviewed journal shows that perhaps the two did not want to see any contradictory evidence from their peers. This wasn't helped at all by the two's refusal to share the details of their experiment until April of 1989, when Fleischmann and Pons published a "preliminary note" in the Journal of Electroanalytical Chemistry, which showed a Gamma peak without its corresponding Compton edge—showing that the two had made a mistake in their calculations. They vehemently denied the mistake, outright breaking a law of the Scientific Attitude. Instead of changing their theory and admitting to their mistake, they were too mired in media attention to back out, so instead they doubled down.

When Pons and Fleischmann announced their findings, their fellow scientists were immediately skeptical, no doubt due to the nature of the press conference announcement. Scientists could

not replicate Pons and Fleischmann's results, and weren't helped by the two's refusal to share the details of the experiment, so the two were spectacularly rejected. The actions of the other scientists—immediately testing the two's results and trying to replicate them—show the Scientific Attitude in action. Scientific warrant is a concept related to scientific attitude, in that both are enforced by a community, and one of the key parts of it is replicability—whether the results of an experiment can be replicated many times by different people. When that isn't possible—like here—the results are examined further, to see if a mistake somehow happened. Another showing of the scientific attitude can be seen in the complete rejection of Pons and Fleischmann's results after their “preliminary note” filled with errors—since that is one of the two rules of the scientific attitude. Contrary evidence was shown, so the theory was shot down.

These days, cold fusion is seen as a sort of topic non grata in the scientific community. Many scientists were very embarrassed about the whole debacle, but perhaps they should have celebrated the event as a victory for the scientific attitude. This whole debacle shows clearly how people follow and don't follow the scientific attitude. It's followed when people test theories and try to replicate results over and over again, scrapping old theories proven wrong by contrary evidence and moving on to a different theory. When it's not followed, it leads to lies, accidental ones especially, hiding experiments, shying away from peer review, and overall an air of shiftiness. One might feel a little bad for Pons and Fleischmann—after all, the “discovery” they had made was a very hot topic at the time, and perhaps they were a little too excited to look through their calculations thoroughly. Then, once they realized the errors in their calculations, they were mired in too much media attention for comfort. Ultimately, the two left the United States to resettle in southern France. It's what happens when a scientist forgets all about the scientific attitude.