Shake It Up. Baby!

Hammering definitely shakes things up! It pushes some atoms this way, others that way. The atomic jumble ruins the magnetic pattern by producing random magnetic directions that cancel each other out. But you don't need a hammer to shake things up. A simple back and forth shake gets the same results.

Materials
- Iron filings
- A compass
- A magnet
- A small plastic vial

To Do
Fill a small vial with iron filings. Gently circle the vial with a compass. Does the compass needle react to the filings?
Hold the vial still. Stroke a strong magnet down the side of the vial in one direction. (Remember: back-and-forth movements will undo the magnetic fields that they produce.)
After several dozen strokes, circle the vial once more with the compass. Does the needle now react to the filings? Can you guess what happened?
Put a cap on the vial and shake up the filings. Once more, try the compass test. What happens now? Can you explain what you see (or don’t see)?

The Science
At first, the filings were not magnetized. However, after the magnet stroked the vial, the filings took on magnetic properties. The filings' field was strong enough to be detected by the compass. When the vial's contents were shaken, the individual filings moved about. At an atomic level, their tiny magnetic fields were no longer aligned. This field hodgepodge cancelled itself out and, as a result, the filings lost their magnetic properties.