tried to quantify its health burden in Europe. It concluded that the 340 million residents of Western Europe—roughly the same population as that of the United States—annually lost a million years of healthy life because of noise. It even argued that 3,000 heart disease deaths were, at their root, the result of excessive noise.

- Death caused by noise

Transition

So we like silence for what it doesn't do—it doesn't wake, annoy, or kill us—but what does it do? When Florence Nightingale attacked noise as a "cruel absence of care," she also insisted on the converse: Quiet is a part of care, as essential for patients as medication or sanitation. It's a strange notion, but one that researchers have begun to bear out as true.

Silence first began to appear in scientific research as a control or baseline, against which scientists compare the effects of noise or music. Researchers have mainly studied it by accident, as physician Luciano Bernardi did in a 2006 study of the physiological effects of music. "We didn't think about the effect of silence," he says. "That was not meant to be studied specifically."

He was in for a quiet surprise. Bernardi observed physiological metrics for two dozen test subjects while they listened to six musical tracks. He found that the impacts of music could be read directly in the bloodstream, via changes in blood pressure, carbon dioxide, and circulation in the brain. (Bernardi and his son are both amateur musicians, and they wanted to explore a shared interest.) "During almost all sorts of music, there was a physiological change compatible with a condition of arousal," he explains.

This effect made sense, given that active listening requires alertness and attention. But the more striking finding appeared between musical tracks. Bernardi and his colleagues discovered that randomly inserted stretches of silence also had a drastic effect, but in the opposite direction. In fact, two-minute silent pauses proved far more relaxing than either "relaxing" music or a longer silence played before the experiment started.

The blank pauses that Bernardi considered irrelevant, in other words, became the most interesting object of study. Silence seemed to be heightened by contrasts, maybe because it gave test subjects a release from careful attention. "Perhaps the arousal is something that concentrates the mind in one direction, so that when there is nothing more arousing, then you have deeper relaxation," he says.

In 2006, Bernardi's paper on the physiological effects of silence was the most-downloaded research in the journal *Heart*. One of his key findings—that silence is heightened by contrasts—is reinforced by neurological research. In 2010, Michael Wehr, who studies sensory processing in the brain at the University of Oregon, observed the brains of mice during short bursts of sound. The onset of a sound prompts a specialized network of neurons in the auditory cortex to light up. But when sounds continue in a relatively constant manner, the neurons largely stop reacting. "What the neurons really do is signal whenever there's a change," Wehr says.

The sudden onset of silence is a type of change too, and this fact led Wehr to a surprise. Before his 2010 study, scientists knew that the brain reacts to the start of silences. (This ability helps us react to dangers, for example, or distinguish words in a sentence.) But Wehr's research extended those findings by showing that, remarkably, the auditory cortex has a separate network of