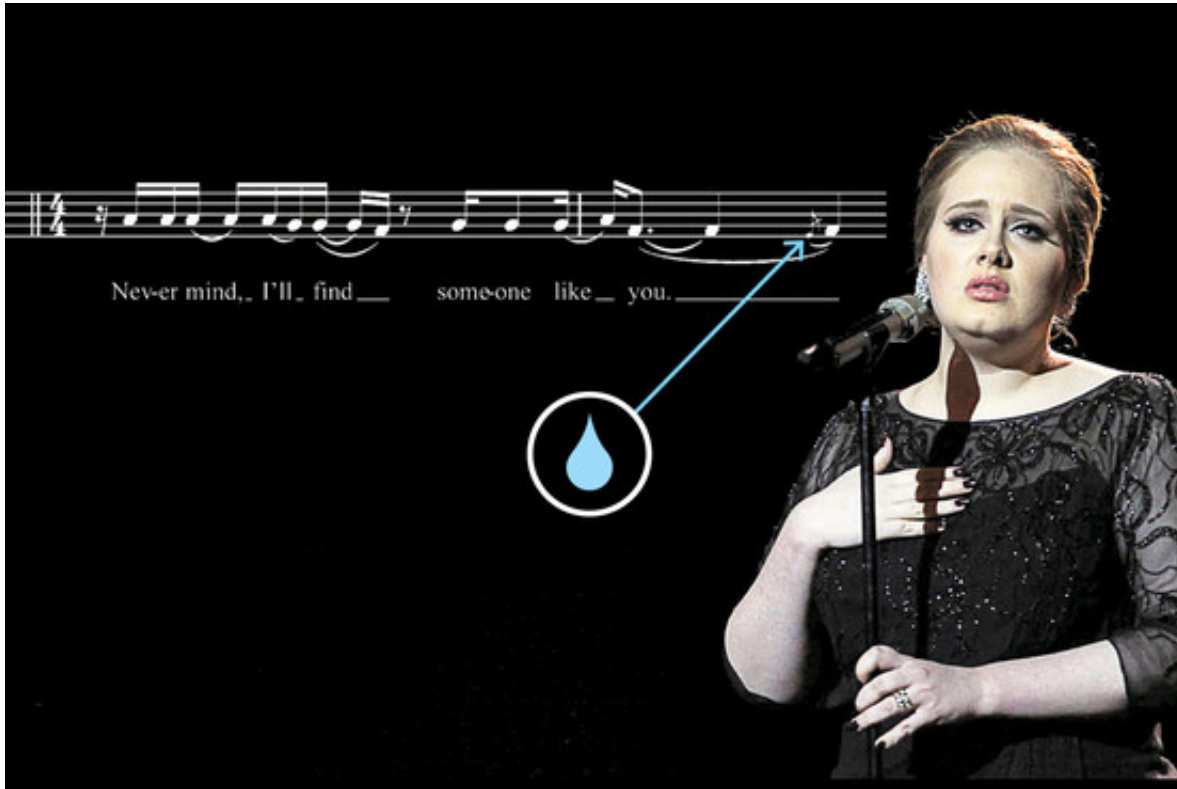


# Anatomy of a Tear-Jerker

By **MICHAEELEEN DOUCLEFF**



*The Wall Street Journal (illustration) Associated Press (photo); Universal Music Publishing (score)*

Adele slightly modulates her pitch at the end of some long notes, adding to the tension.

On Sunday night, the British singer-songwriter Adele is expected to sweep the Grammys. Three of her six nominations are for her rollicking hit "Rolling in the Deep." But it's her ballad "Someone Like You" that has risen to near-iconic status recently, due in large part to its uncanny power to elicit tears and chills from listeners. The song is so famously sob-inducing that "Saturday Night Live" recently ran a skit in which a group of co-workers play the tune so they can all have a good cry together.

What explains the magic of Adele's song? Though personal experience and culture play into individual reactions, researchers have found that certain features of music are consistently associated with producing strong emotions in listeners. Combined with heartfelt lyrics and a powerhouse voice, these structures can send reward signals to our brains that rival any other pleasure.

Twenty years ago, the British psychologist John Sloboda conducted a simple experiment. He asked music lovers to identify passages of songs that reliably set off a physical reaction, such as tears or goose bumps. Participants identified 20 tear-triggering passages, and when Dr. Sloboda analyzed their properties, a trend emerged: 18 contained a musical device called an "appoggiatura."

An appoggiatura is a type of ornamental note that clashes with the melody just enough to create a dissonant sound. "This generates tension in the listener," said Martin Guhn, a psychologist at the University of British Columbia who co-wrote a 2007 study on the subject. "When the notes return to the anticipated melody, the tension

resolves, and it feels good."

Chills often descend on listeners at these moments of resolution. When several appoggiaturas occur next to each other in a melody, it generates a cycle of tension and release. This provokes an even stronger reaction, and that is when the tears start to flow.

"Someone Like You," which Adele wrote with Dan Wilson, is sprinkled with ornamental notes similar to appoggiaturas. In addition, during the chorus, Adele slightly modulates her pitch at the end of long notes right before the accompaniment goes to a new harmony, creating mini-roller coasters of tension and resolution, said Dr. Guhn.

To learn more about the formula for a tear-jerker, a few years ago Dr. Guhn and his colleague Marcel Zentner found musical excerpts—from Mendelssohn's "Trio for Piano" and Barber's "Adagio for Strings," for example—that reliably produce the chills and then measured the physiological reactions (heart rate, sweating, goose bumps) of listeners.

Chill-provoking passages, they found, shared at least four features. They began softly and then suddenly became loud. They included an abrupt entrance of a new "voice," either a new instrument or harmony. And they often involved an expansion of the frequencies played. In one passage from Mozart's Piano Concerto No. 23 (K. 488), for instance, the violins jump up one octave to echo the melody. Finally, all the passages contained unexpected deviations in the melody or the harmony. Music is most likely to tingle the spine, in short, when it includes surprises in volume, timbre and harmonic pattern.

"Someone Like You" is a textbook example. "The song begins with a soft, repetitive pattern," said Dr. Guhn, while Adele keeps the notes within a narrow frequency range. The lyrics are wistful but restrained: "I heard that you're settled down, that you found a girl and you're married now." This all sets up a sentimental and melancholy mood.

When the chorus enters, Adele's voice jumps up an octave, and she belts out notes with increasing volume. The harmony shifts, and the lyrics become more dramatic: "Sometimes it lasts in love, but sometimes it hurts instead."

When the music suddenly breaks from its expected pattern, our sympathetic nervous system goes on high alert; our hearts race and we start to sweat. Depending on the context, we interpret this state of arousal as positive or negative, happy or sad.

If "Someone Like You" produces such intense sadness in listeners, why is it so popular? Last year, Robert Zatorre and his team of neuroscientists at McGill University reported that emotionally intense music releases dopamine in the pleasure and reward centers of the brain, similar to the effects of food, sex and drugs. This makes us feel good and motivates us to repeat the behavior.

Measuring listeners' responses, Dr. Zatorre's team found that the number of goose bumps observed correlated with the amount of dopamine released, even when the music was extremely sad. The results suggest that the more emotions a song provokes—whether depressing or uplifting—the more we crave the song.

With "Someone Like You," Adele and Mr. Wilson not only crafted a perfect tear-jerker but also stumbled upon a formula for commercial success: Unleash the tears and chills with small surprises, a smoky voice and soulful lyrics, and then sit back and let the dopamine keep us coming back for more.