

One of the clearest illustrations of distraction in the sonic domain is the phenomenon of earworms. These are not restricted to music, though reports of musical earworms—experiencing the inability to get a tune out of the head, often over a period of time—suggest that they are the most disturbing form of involuntary perception. The characteristics of earworms, namely that they arrive unbidden, the length of their residence in the mind is indeterminate, they are not simply caused by familiarity with a particular musical syntax or style, and that passive acceptance is the best way to overcome them, are also those of distraction in general, with one omission: Distractions also include all forms of nonmusical noise and uncanny auditory objects that interrupt musical attention and disappear as fast as they emerged.

In the specifically musical domain, distraction operates in various ways, the scopes of which can be described in the following terms: the role of music during activities such as driving (music as a potential distracter), music as itself a distraction (ranging from entertainment spectacles to pain management); and listening in a distracted manner (such as variable attention or Muzak). Music also has the potential to generate extreme cognitive distractions in the form of trance, absorption, and other dissociative states. Performers are trained to filter out distractions when performing, including external distractions from the audience and internal distractions that might arise in their minds (performance anxiety is a pathological response to the threat of distraction).

Listeners, under advisement from the analytic philosophy of music, often impose upon themselves a regime of “music appreciation,” according to which the most successful and productive way of listening to music is to concentrate on the relation of each moment to the larger whole, and to shut out distractions from this task. Contemporary musical cultures, reflecting wider global and technological change, also afford listeners the possibility both of embracing the paradigm shift toward the fragmentation of listeners’ attention and of giving a greater value to the moment-by-moment evolution of music in performance.

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**See Also:** Attention; Driving While Listening to Music; Music Cognition; Noise Versus Music; Physiological Responses, Peripheral.

#### Further Readings

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## Dopamine

See Neurotransmitters

## Driving While Listening to Music

Does listening to music affect driving performance and vehicular control? If it does, then are all music styles similar, or are there differential effects based on structural features within the music itself? To many—the drivers themselves, driving instructors, and, unfortunately, researchers of traffic psychology and music psychology—driving while listening to background music (also referred to as “in-car listening”) may seem trivial and hardly worth talking about. Yet, the extent to which it has become a fundamental component of the driving experience is evident for anywhere between 72 and 100 percent of drivers worldwide.

From the millennium onward, the most popular location reported for music listening is the automobile.

#### The Pleasures and Perils of In-Car Music

Caren Oblad was perhaps the first music psychologist to look at the relationship between music, driver, and the automobile. She presumed that individuals have specific expectations when they play music in the car; it is not necessarily the music that drivers want to listen to, but rather that they wish to spend time in the car with music in the background. As there seem to be countless beliefs about the power of music in all aspects of human activity, drivers feel that music will undoubtedly enhance vehicular control and that music selections can match the mood of the journey or relax drivers. Moreover, there has been much research that lists music as

an effective method for maintaining alertness to counter monotony and sleepiness while driving. To this end, music compilations for driving have become popular and even endorsed by insurance companies. Auto enthusiasts recommend tracks via the Internet bulletin boards, car magazines, and auto clubs.

Sociologists and social anthropologists long ago brought out that cars most certainly elicit a range of feelings, from the “pleasure of driving” to the “thrill of speed.” Further, that drivers envisage “feeling secure” and “protected.” When drivers like the track they listen to, they feel “inside the music” and perceive the driving experience as “impenetrable.” Therefore, the last thing one would think about is how safe is it to listen or sing to music while driving an automobile?

Yet, a host of studies have found that fine-tuning radio controls, swapping cassette tapes,



*Road trippers belt out songs as they drive to Siesta Key, Florida, for a Sunday evening drumming circle, April 16, 2006. While many studies cite music as an effective method for maintaining alertness to counter monotony and sleepiness while driving, a host of other studies have found that activities such as CD changing and scrolling through playlists while driving have been linked to distraction.*

inserting CDs, and scrolling through playlists have all been linked to eyes gazing away from the forward road with one hand on the steering wheel. During the five seconds needed to change a CD, the car will travel 156 meters (ca. 500 feet) with the driver essentially unaware of the road environment. Such shifting attention to the entertainment and audio controls denotes neglecting primary tasks, such as lane keeping and/or watching for other vehicles. Finally, involvement with music devices has been found to generate driver distraction similar to the use of mobile phones. Regrettably, among 91 percent of drivers, such behaviors occur several times per trip, with as many as seven transactions per hour.

### The (III) Effects of Music on Driving

There is a lack of research and information on the frequency of music-related automobile accidents. However, anecdotes with photos are available over the Internet (Car-Accidents.com). Among the vignettes with pictures is a distracted driver who was looking at the CD player in an Olds 88 and subsequently rammed a GM Chevy van; a distracted driver who was reaching for a CD in a sun visor wallet and subsequently wrapped the car around a light pole; a distracted driver who was looking for a CD in an Audi TT and subsequently drove under an 18-wheeler trailer while braking at 140 kph; a distracted driver who was looking down at the stereo to increase the volume while entering a curve at 140 kph and subsequently ran onto the road shoulder, then lost control, flipping and rolling 7 or 8 times side-to-side before landing in a ditch; and a distracted driver who was looking down at the passenger seat while reaching for favorite a CD and subsequently veered off a mountain road, rolling front-to-back 250 feet down the mountain. Unfortunately, collisions linking "structural interference" with music devices have been known for some time. In fact, several meta-analyses found that adjusting the radio controls, swapping tape cassettes and compact discs, or searching through MP3 files are all forms of distraction that can result in a near-crash or crash with odds estimated at 0.6 percent to 2.3 percent.

However, the decrement of vehicular performance also occurs from "capacity interference" to central attention. Yet sadly, little information

is available in reference to the music itself. As stated above, traffic researchers and accident investigators are not mindful of risks associated with music. Further, many high-profile studies have disregarded music as a risk factor altogether (for example, the American *100-Car Naturalistic Driving Study*). Therefore, whether listening to music is a contributing factor to distraction is relatively unknown. But yet, any competing stimulus or activity that interferes with processes that have detrimental effects on driver awareness, road position, speed maintenance, control, reaction times, or negotiation of gaps in traffic should be treated as a risk factor for distraction.

If safe and effective driving necessitates the detection of auditory information embedded in a background of continuously changing sounds, then surely the presence of music in vehicles along with road noise must be considered. For example, when listening to music masks the sounds of external warning signals (sirens/horns), vehicle-design critical warning signals (beeps/buzzes), and self-monitoring sounds (engine revs), then driving with music should be appraised. Nevertheless, there are also widely spread popular beliefs about music listening and/or singing as being the most valid activity a driver can engage in while on the road, causing "little to no risk" compared to all other activities that might lead to distraction. Hence, it would seem that both traffic researchers and the drivers themselves underestimate in-car distraction from activities that may be widely acceptable but not necessarily safe—such as simply listening to music.

### Music as a Background for Vehicular Performance

What is in the music that makes in-car listening a risk factor? First, most drivers aged 16 to 30 years choose to travel with pop, rock, dance, hip-hop, house, and rap styles. These are highly energetic, aggressive, fast-paced musics. In general, young drivers also tend to play their preferred musics at strong intensity levels—about 120 to 130 decibels (dB). Further, 70 percent of young drivers treat their car as a personal karaoke booth (referred to as "car-aoke"); many admit to embarrassing musical tastes that they indulge only in the car, whereby male motorists sing "chick hits" and female drivers belt out macho metal rock classics.



Many young drivers who listen to songs sing aloud or tap along to the rhythm. There is also the phenomenon of drivers practicing air guitar riffs along with a host of the greatest guitarists who ever lived (and many who have already “left the building”). Drivers are not aware that as they get drawn in by a song, they move from an extra-personal space involving driving tasks to a more personal space of active music listening.

Second, there is an issue of music complexity. That is, the greater the structural complexity of the music, the larger the effects on the critical tasks necessary to safely operate a motor vehicle. For example, studies have found that momentary peaks in loud music disrupt vestibulo-ocular control; such interference decreases the window of drivers’ responses to unexpected red rear brake lights and subsequently increases reaction times for peripheral signals during high-demand driving. Further, the pace of background music alters perception of passing landscapes and increases acceleration, cruising speed, and traffic violations.

Concerns about in-car listening have attracted only a few serious empirical explorations. A. B. Unal and colleagues explored music as stimuli that mediate mental effort and cognitive load. Two studies explored interactions between processing styles and characteristic driving behavior mediated by music variegated by mood valence and energy level: one by C. Pecher and colleagues and the other by M. van der Zwaag and colleagues.

Most recently, W. Brodsky and Z. Slor explored driver-preferred music background as a risk factor for distraction among young-novice drivers. Distraction was assessed by measuring driver deficiencies (i.e., the frequency and severity of deficient driving behavior, including miscalculation, inaccuracy, aggressiveness, and violations) as well as by decreased vehicle performance (i.e., the frequency and severity of prototypical mechanical events). This later study stands alone in rigor and ecological validity, having been recognized as the first within-subjects, on-road, high-dose, double-exposure, clinical-trial investigation of musical stimuli on driver behavior. Brodsky and Slor triangulated data from driver self-report trip diaries, standardized assessments from expert observers accompanying the drivers, and mechanical data recorded from in-vehicle hardware installed

directly onto the controller area network and onboard diagnostics of the vehicle. The study found that young-novice drivers demonstrated significantly increased deficient driving behaviors and mechanical events while driving with their preferred music accompaniment brought from home as compared to trips when the same drivers drove without background music. That is, in-car listening was seen as increasing risks for distraction leading to traffic accidents.

However, the study also explored an alternative music background structurally designed by Brodsky and M. Kisner in an effort to generate moderate levels of perceptual complexity specifically for driver well-being; trips with this later music background demonstrated significantly decreased deficient driving behaviors and mechanical events, thus increasing driver safety.

### Conclusion

In-car listening seems to provide optimal conditions for enjoyment and emotional arousal. Nevertheless, it also provides distraction that can result in driver miscalculation, inaccuracy, driver error, traffic violations, and driver aggressiveness. Clearly, not all music causes the same effects, and some may even contribute toward increased driver safety. The time is ripe to raise public awareness about the possible consequences of background music on driver behavior and vehicular performance. The field of music psychology must share the burden of responsibility in which drivers are educated about choosing music more wisely for driving while listening to background music. Listening to music in the car will not be given up simply because it may place drivers more at risk. However, the car is not in the least similar to any other music listening context that one might experience—in an automobile, the effects of music on the listener can be fatal. Truly, cars are here to stay, and in-car listening will always be part of the everyday driving experience.

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**See Also:** Background Music; Behavioral Measures; Cognitive Constraints; Complexity; Distraction; Everyday Uses of Music.

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## Drugs, Recreational

The phrase "sex, drugs, and rock 'n' roll" may have been synonymous with the 1960s; however, the marriage of drugs and music goes back to ancient times. Throughout the centuries drugs and music have been used for celebrations, initiation rites and rituals, and contemplation or meditation. Given that music and drugs serve similar functions, this pairing is not unexpected. In fact, there is a belief that each enhances the other—listening to music enhances the pleasurable experience of the drug, and the drug makes the music come alive. Not only do drugs and music serve a similar function, they have a similar effect on the neurochemistry of the brain, as both stimulate the production of dopamine and other neurotransmitters and hormones. The use of drugs

can influence the creation and performance of music, and music influences the effects of drugs and, in some instances, can lead to sobriety.

### Musical Movements and Their Drugs

While drugs and music have been associated with each other since time immemorial, each new musical movement in modern times has been more strongly associated with one or two substances. The exception is marijuana, which has been associated with every musical movement since the start of the 20th century. Marijuana use among musicians became popular in the speakeasies of the 1920s because it offered a way for musicians to play for hours despite being exhausted. The 1930s saw the introduction of "reefer songs" into the jazz repertoire. Reefer songs depicted the psychological and physiological effects of smoking marijuana. Marijuana was and often still is used to calm nerves before a performance or to facilitate relaxation after an arduous concert tour.

Heroin was introduced into the jazz scene in the 1940s. For jazz musicians, especially those who were culturally isolated as a result of Jim Crow laws, heroin helped to create the illusion of the "cool hipster." Heroin induced a sense of emotional indifference. Young musicians often used heroin as a way to gain entry into the jazz scene as they tried to emulate jazz greats such as Charlie Parker. Initially, heroin use among jazz musicians served two main functions: (1) as a numbing agent against the anger and frustration of discrimination and (2) to bolster self-confidence before a public performance. As time went on, many jazz musicians came to believe that unless they were high, they would not be able to create cutting-edge music or perform at their best.

Amphetamine, also known as speed, became popular with country musicians and early rock 'n' rollers. These musicians were frequently introduced to the "magic" little pills by truckers. According to Harry Shapiro, Johnny Cash was introduced to amphetamines by the drivers who drove the Grand Ole Opry stars. It continues to be the energy behind heavy metal and punk rock. Amphetamines are what gets rockers to gigs and gives them the confidence to tear places apart. They keep the pop and rock tours moving. Musicians who take amphetamines are able to take their shows to new, often chaotic levels. After the