

# SOUND IN THE MACHINE

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The Swaying Car Door

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## SUMMARY

The sound of a closing car door is no coincidence. It's a carefully constructed sound intended to communicate 'luxury,' 'safety,' and 'quality' to the consumer. Its affect is the goal of all marketing efforts: the creation of an emotional will to purchase.

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## The Swaying Car Door



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By Brian Snead

### TRANSCRIPT

[sample (Crystal Sounds-squeaky door 9) CLK door close]

It's rather intuitive that the sounds made by a car indicate what shape it's in. An article in Popular Mechanics calls a moving car a "complex symphony of sound, most of it reassuring--tires humming, engine rumbling, tailpipes roaring...every now and then a dissonant note creep[ing] into the mix" (Allen). Part of getting to know a car is listening to both the dissonant and consonant notes. You learn what the engine sounds like at different speeds, what the wheels, locks, windows and wipers sound like as well as all the other creaks and ticks and thuds. And you especially notice them when they change because that's when they're really saying something about the state of the machinery.

But, there's an entire class of sounds that doesn't really have much to do with the machinery or the operation of the car, but has everything to do with our perception of how fast or well-built or safe or expensive the car is. The sound of an engine and the amount of cabin noise are probably the most obvious, with certain classes of automobiles having a kind of sonic fingerprint. This fingerprint is also made up of the sounds of electric locks, windows, seats and just about any other component. Every sound is capable of communicating values about the automobile and so must be shaped to communicate the right values.

The sound of the door as it closes is believed to be an especially important communicator of value in an automobile. It is believed, in fact, to be crucial in shaping our perception of the car itself (Parizet et al 12). Now, whether or not it actually is crucial hasn't stopped car companies from sinking a lot of money into research and development. Car door sound is routinely mentioned as "an important [misspoke: "obvious"] subjective parameter for vehicle evaluation" (LMS 2) especially when "making a sale" (Geise et al). Obviously few buyers would be interested in a car with a grinding, clanking door, because it's an unpleasant sound.

But, what really makes the sound of a door important is how buyers associate it with certain values. Just try this out. You're shopping for a new car. You've got cash to blow, I don't know, but you're in the dealership showroom. You walk right up to the flashiest, baddest-looking model in the place and think you'll take a seat inside.

[sample (Volvo –fast) Airborne Sound]

Do you get an image of the car? Listen to the sound of that door.

[sample (Volvo –slow) Airborne Sound]

If so, you must have imagined something like a Ferrari Scaglietti, a high-performance exotic coupe that goes for about \$260,000.

[sample (Volvo –fast) Airborne Sound]

No?

Even if the car you imagined was somewhat more modest, at least picture yourself opening the door of that Ferrari and hearing:

[sample (Volvo –fast) Airborne Sound]

That wouldn't do at all, would it? That sound and a \$260,000 automobile just don't go together. We would expect everything about a Ferrari to communicate performance and craftsmanship, but this sound

[sample (Volvo –slow) Airborne Sound]

doesn't.

If a Ferrari were to have a door that sounded like that, it would threaten to devalue the entire automobile. Quality is what we perceive as quality. It has to be said, the sound of a closing car door is "objectively not related to the intrinsic qualities of the vehicle" (LMS 2). It has nothing to do with how well the door functions or how safe or how well-built the car is or anything. Car doors are hollow. Pretty much what you see is what you get: an inner and an outer piece of metal, with the window and locking mechanisms and a side-impact beam inside. In other words, empty space, noisy components and surface area for vibrations—all in all, a perfect formula for noise. Noise which the car buyer doesn't like to begin with, but that he also associates with a cheap and poorly-built automobile.

Much research has shown that buyers associate "the image of a car [with] the sound of the car" and that they can differentiate between cheap and luxury just by the sound of the door (Kuwano et al. 5). With this find, it became obvious to automakers that buyers knew what a

luxury door sounded like. It meant that they had particular thoughts and emotions associated with that sound. And to tap into those emotions, all that was necessary was for designers to make economy car doors sound like luxury car doors. A typical closing sound lasts only 1.8 seconds, but in that time 15 mechanical events relating to the “motion of the internal parts of the lock and the contacting of the door to the rubber seals” can be identified (LMS 2). That may sound like a lot, but it comes down to making only a few simple changes to the door and the locking mechanism.

[sample (Silverado door) Snead]

Although it is a nearly-hollow metal box with some noisy components inside, a door “can emphasize the impression of [either] a solid, rockproof car body or can draw the attention to a rather cheap, flimsy vehicle” (LMS 2). It can “emphasize” because it has so much surface area. It acts like an extremely large speaker. But I’ll address that in a minute when I talk about the locking mechanism. Most of all, the door should be made to sound bass heavy because that is what we associate with “solid,” in contrast to higher frequencies, with which we associate ‘flimsy,’ ‘weak,’ ‘fragile,’ or ‘delicate.’ Because it’s a car door, it should sound like it will keep the people inside from getting squashed in an accident, even though the sound is really no indication of whether or not it can. The sound of a “solid” door gives the impression that it can take a punch

[sample: (punch) mw1500],

whereas a “flimsy” door sounds like it would just be crushed

[sample: (can crush) Benboncan].

It’s gotta also sound good...subjectively good. This involves manipulating the door and locking materials for pitch, texture and volume. But the easiest element to take care of is pitch. ~~Cheaper sounding doors have a lot of energy above 1,000 Hz (LMS 2).~~

Here’s the passenger door of a 2000 Mazda Protégé:

[sample Snead]

It has a lot of high pitch energy and because of it, doesn’t particularly sound like the door of an expensive car. But all anyone has to do to change that is to dampen out those high frequencies, which in turn emphasizes the bass frequencies. It’s actually pretty simple. One example is described in US Patent 6135541. It covers a “system for tuning and damping acoustic vibrations in car doors” (Geise et al.). The “system” is just a beam that touches all surfaces of the inner door. The door can’t vibrate as freely, changing the sound it makes.

Although it's claimed that this particular system actually raises the pitch of the door, just about every other solution I've come across is an attempt to lower the pitch. So, back to the Protégé door for a quick demonstration of the difference cutting out higher frequencies can make:

[sample Snead]

Now, here it is with everything higher than 1,000 Hz chopped off.

[sample Snead].

That to me already sounds more like the door of a luxury car.

[samples: Snead].

Although I changed the sound rather rudely with a computer program, an engineer could do a way better job just by placing dampers at appropriate places in the door, tailoring the ratio of high frequencies to low ones.

[sample (1996 Blazer) BLASTWAVEFX]

If the door is the amplifier for noise, the locking mechanism is the real noise maker. The majority of the patents I found addressing car door sound are actually design tweaks for the locking mechanism, not the door (Arabia and Perkins; Delgado; Graute; Styck). Listen to the noise created by the locking mechanism as the door shuts:

[sample- Angus]

It's that rattle sound. Here it is again:

[sample: Angus]

Here I've slowed the sample down by 25 percent to make it easier to pick out.

[sample: Angus]

Now here it is 50% slower:

[sample Angus]

And now at 75% slower:

[sample: Angus]

Though at 75 percent the sample rate of the recording device is producing audible artifacts, you can really hear how noisy this locking mechanism is

[sample: Angus]

And finally, back to the original speed

[sample: Angus]

Eliminating sounds from a locking mechanism is more involved than doing the same thing to a door. The door basically just has to sit or hang in position. The locking mechanism has to complete a variety of internal operations while absorbing the force of the closing door. Though considerable noise can be eliminated in the design of the mechanism, key gains are made, like the door, through dampers. Like so many other sounds of a car, a “good” car door sound is a construct. Even a luxury car door is a door consisting of a few mechanisms and a lot of empty space. It makes a sound when it closes. But, with no attention paid to the sound, it can be noisy and unpleasant.

All that needs to be done is to control the random noise of the locking mechanism and the amplifying effects of the large surface area of the inner door. And these “simple and cheap measures” (LMS 2) cost only about \$3 per vehicle (Malen). By making the sound of the door of a cheap car sound like that of a more expensive car raises the subjective value of the entire car. It impresses the buyer and makes him think he’s getting an even better deal. When that happens, the \$3 investment to change the sound of the economy car door pays off in a very big way.

Or at least that’s the idea. Of all of the studies I’ve read on this topic, I’ve only found researchers assuming that car door sound is “one of the main factors to determine the impression of the car” (Kuwano et al. 1) and that “improvement of vehicle door closure sound quality is one of the major customer wants” (Zhang and Young). I wish I had been able to find something that actually measured the effect on buying patterns. But it seems reasonable enough to me that buyers would react at least subconsciously, if not emotionally.

Few things sound like they actually do. The sounds made by technology are more a story about what it should sound like than what it actually does. The sound of a closing car door is no coincidence. It’s a carefully constructed sound intended to communicate ‘luxury,’ ‘safety,’ and ‘quality’ to the consumer. Its affect is the goal of all marketing efforts: the creation of an emotional will to purchase.

I’ll leave you with this: because drivers don’t get the sensation of a “real” car in a hybrid electric car, speakers are now being placed in the cab to play synthetic engine noise for the driver. And, because it’s synthetic, the noise piped into a Prius can be made to sound like a

Lamborghini (Winters). How much would such a system increase the subjective value of the automobile? And what is a “high quality closing sound” (Geise et al.) of a car door worth?

That question may seem so trivial that we’d just prefer to ignore it. And that’s when rhetoric works best, when no one would ever suspect that the car door sways the buyer.

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