

# The Science of Sound/Audio

## How sound and smell can create perfect harmony

Sound and vision are not the only senses that work together – new studies show that even sound and smell can form an unlikely pairing

- Cassie Barton
- [The Guardian](#), Monday 22 October 2012 15.00 EDT
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What does that scent sound like? New research is helping to redefine our understanding of the senses. Photomontage: The Guardian/Getty Images

A few years ago, on work experience at Oxford University's [psychology](#) department, I found myself roped in to participate in an experiment by a research team led by [Professor Charles Spence](#). Sitting in a tiny room in the warren of labs and offices, I was shown a rack of bottles of scent and a simple computer program that let me play the sound of musical instruments at different pitches. My task was to sniff each of the scents, and pick the sound that fitted best with each smell.

Puzzled, I inhaled my first sample – sweet and slightly sickly, like bubble gum. Deep blaring brass seemed instinctively wrong, so I tried out higher and purer sounds and eventually settled on a high piano note. An hour later, I left not much the wiser about what was going on. Only later did I find out that the team was covering new ground **in a field known as crossmodal perception**.

When we think about how our senses work, we imagine them operating individually: you sniff a flower, and the smell is delivered uninterrupted from nose to brain. However, it is more complicated than that. Our senses mingle more often than we realise, collaborating to help us make sense of the world more easily. For example, we call dull thuds "heavy" and associate them with large objects, even though the sound itself has no size or weight. This would have helped our ancestors decide whether to run away from predators based on how big they sounded, without stopping to look them over. Most evidence for crossmodal perception comes from studies into sound and vision, which isn't surprising considering how often we use them together. But research that shows other senses crossing over is emerging all the time, and it seems that even sound and smell sometimes form an unlikely pairing.

Two New York researchers, Daniel Wesson and Donald Wilson, were confronted with this fact when they began investigating an "enigmatic" area of the brain known as the olfactory tubercle. Originally, they only intended to measure how olfactory tubercle cells in mice responded to smell. But during testing, Wesson noticed that every time he clunked his coffee mug down next to the experiment, the mouse cells jumped in activity. In fact, the olfactory tubercle is physiologically well-placed to receive both smell and sound information from the outside world; and so Wesson and Wilson broadened their investigation.

They found that among individual cells, most responded to odour but a significant number were also active when a tone was played. Some cells even behaved differently when smell and sound were presented together, by either increasing or suppressing their activity. As Wesson and Wilson point out, there may be some evolutionary sense behind the phenomenon – the sound of movement accompanied by an unfamiliar smell could alert you to the presence of a predator.

Of course, mice are not people, and a handful of firing cells don't always add up to a conscious experience. But Charles Spence and Anne-Sylvie Crisinel have been carrying out experiments such as the one in which I participated at Oxford University, which seem to show that sounds and smells cross over in human perception, too. Recently, they delved into the world of wine-tasting, using a kit designed to help novices learn about the basic smells found in wine. Participants in their experiment were asked to sniff different samples, and then match them to an appropriate musical instrument and pitch. There were interesting consistencies in the smells people picked. Piano was often paired with fruity scents and with smells that participants said were less complex. Musky and unpleasant smells, meanwhile, sounded like brass.

Further research found that listening to different sounds can alter your perceptions. Studying taste this time, the team ordered some cinder toffee made by [Heston Blumenthal's Fat Duck restaurant](#) and put together "soundscapes" corresponding to bitterness and sweetness. Participants tasted identical pieces of toffee while listening to

each soundscape, and found the toffee more bitter or sweeter, depending on which soundtrack they were listening to.

Studies like this are helping psychologists redefine our understanding of the senses, and how the brain integrates them to its advantage. And just imagine the possible creative collaborations between musicians and [chefs](#): sound-enhanced wining and dining could be imminent. You might one day be routinely ordering a coffee with a soundtrack to bring out your favourite aromas. Best not to mention all this to Starbucks.

## Branding: How AT&T Created Its New Sonic Identity

Sonic branding expert Joel Beckerman was tasked with designing sounds to signify “safe,” “connected,” and “possibility” on AT&T phones. Here’s how he went about it.

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Samsung phones make Samsung noises. LG phones make LG noises. **But now AT&T wants all of the phones on its plan--no matter their manufacturer--to sound the same.**

Starting in April, the brand began rolling out a sonic makeover. There’s a new AT&T ringtone, a new AT&T startup sound, and a new AT&T ringback tone. Works in progress include a “sound of safe” lets customers know security protection is engaged, a “sound of success” that signifies completion of a task, and a “sound of connect” that tells users their phones have signal. The idea is to remind customers that they’re having an AT&T experience even though they’re using devices from various manufacturers. With the exception of Apple devices, all AT&T phones manufactured after April will include these type of new tones.

A firm called [Man Made Music](#) designed the sounds to match a sonic logo and anthem they also made for AT&T.

Man Made Music founder Joel Beckerman says sound has earned a more important role in branding as it becomes more central to customers’ experiences with devices. “Probably the one example that everybody knows is when you send email from an iPhone, there’s a little sound,” he says. “It’s the same on desktops, same on a laptop, same on iPad.”

The process of designing the same sonic unity for AT&T was more like visual branding design than you’d expect. It started with market comparison analysis, brainstormed possibilities, and a focus group. “We don’t ask people, ‘What do you think of the sounds?’” Beckerman explains. “What we do is put the sounds in the devices, and then ask people, ‘How are the devices to use? Is it fun, is it easy, is it hard? What part of the experience is difficult for you?’ And then we’ll map that against research where people have the devices and there is no sound.” The key is to make sure sounds fit in with what people expect from a brand while also emoting the brand’s personality.

Once the sounds are right, the silence--what Beckerman calls the “white space” of sonic branding--needs to be correctly tuned, too. “[Sound] is the cayenne pepper in the sauce,” he says. “If you put just enough in, then it’s a fantastic experience. If you put in a little too much, then all the sudden the sauce is just awful.”

Joel Beckerman will speak at *Fast Company*’s [Innovation Uncensored](#) conference in San Francisco this week.

## A roaring success: how acoustics make us spend more money on cars

By [Rose Eveleth](#) | November 2, 2012, 5:04 AM PDT

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As automotive engineering has improved, our rides have gotten quieter. Even non-hybrid cars cocoon their drivers in comfortable silence. But some companies are trying to give motorists a little more motor. The new [Ford Focus will have engine noise pumped in when the driver steps on the gas](#). Other cars, like the BMW M5 and Volkswagen's GTI, have done similar things [with mixed results](#). These engine sounds — some real, some recorded — are meant to put the roar back into driving, even when you might not be driving a muscle car. But do they really make a difference to drivers?

"Focus ST drivers want to hear the engine sing when they put their foot on the gas," said Bjoern Boettcher, Ford of Europe's vehicle sound quality expert, in the press release announcing the technology's application to that model. "Our cars are engineered to be quiet inside the cockpit, so we have to pull out a few tricks to give enthusiastic drivers the sound they crave — and that's where our Sound Symposer comes in." The Sound Symposer will provide Focus drivers with a little bit of engine noise when they hit the gas.

Marketers call this kind of auditory salesmanship "sonic branding." It's at work when you hear jingles or classic voices — think McDonald's "ba da ba ba ba," and Geico's trademark Gecko voice (which is really a Cockney accent coming from a lizard). But it's also at work when you hear a Harley Davidson drive by, or a bowl of Rice Krispies snap, crackle and pop. When it comes to cars, sound plays a huge part in the choices people make. The way a car door sounds when it closes, and the engine sounds when you're driving, can make or break a sale, according to sound marketing expert and president of Katz Marketing Solutions, Bob McCurdy. "A second or two of sound can communicate a grand message and can bring to the surface a tremendous amount of emotion," he says.

You might think that you're immune to such marketing tricks. "Don't kid yourself," McCurdy says. While you might not be aware of how sound influences you, everyone takes the sound of a car into account when they decide to buy. "You don't want it to

sound like it's wimpy, you want it to sound like it has getup and go," he says, "so when I step on the gas I can get out of a dangerous situation or I can merge a little bit safer. Even if it's psychological, that's enough to make a difference."

Now, it's nearly impossible to quantify just how much this new feature will increase the value of the Ford Focus. The effect is likely to be indirect, says James Kellaris, a professor in the department of marketing at the University of Cincinnati. "Consumers may not rush out to buy specifically to acquire this feature," he says. "The sound feature, however, may increase liking, which precedes and determines purchasing."

While Ford is trying to make its Focus sound like it has a little more oomf, other car companies are tackling sound for a different reason. In hybrid cars, for example, buyers often don't know when the car is turned on or off. Frankie James, the Managing Director at the Advanced Technology Department of General Motors helped design the sounds for their hybrid cars, such as the Volt. They designed sound cues for when the car was on or off.

Integrating sound into vehicles is tricky business. Some companies have been [blasted on the Internet for creating](#) "fake sounding" engine roars. McCurdy doesn't think the authenticity of the sound really matters. "I don't think you or I are going to be an expert enough in engines that we'll be able to know the difference," he says. Neither does Kellaris. "People will not process the sound consciously, critically. It will just be there, telling them: all is well." But James says that sound can be tricky, and doing it badly is worse than not doing it at all. "It's always the case that you don't notice when it's right and you do notice when it's wrong," she says.

And while the engine might sound mightier than it actually is, it's not about portraying what the car can actually do — it's about playing to people's psychology. "Perception is reality in consumer marketing. People do not perceive the world as it is; rather, they perceive it how they perceive it," says Kellaris. If they perceive a powerful engine, they think they've got one, even if it's just a Sound Symposer playing them what they want to hear.

*Image: Ford's 2013 Focus. (Ford)*

## The Search for Sweet Sounds That Sell

Household Products' Clicks and Hums Are No Accident; Light Piano Music When the Dishwasher Is Done?

By ELLEN BYRON

The small sounds consumer products make—whether a snap, click, rustle or pop—can be memorable and deeply satisfying, often suggesting luxury, freshness, effectiveness or security.

**Companies, in their endless drive to motivate customers to buy, are paying more attention to these product noises and going to great lengths to manipulate them. *Sound is emerging as a new branding frontier.***

More companies are discovering that the sound a product makes can convey subtle information about its quality and influence purchasing decisions. WSJ's Ellen Byron reports.

Subtle auditory cues can make a big difference to shoppers choosing from several brands, companies say. Occasionally a product pitches its unusual sound directly: Remember "Snap, Crackle, Pop" for Kellogg's Rice Krispies, and Alka-Seltzer's "Plop Plop Fizz Fizz"? Sound, for the most part, isn't the first thing consumers notice about a product. But when it's good, they quickly come to appreciate it, marketers say.

**"These little touches can really separate you from the other guys,"** says Ted Owen, vice president of global package design at Clinique, an Estée Lauder Cos. line. "We call them the intangibles."

**Last month, Clinique introduced High Impact Extreme Volume mascara, which produces a soft, crisp click when the top is twisted shut. The click reassures users that the package is closed and the liquid mascara won't dry out. But more subtly, Mr. Owen says, the click conveys the elegance of the \$19.50 formula.**

Mr. Owen and his team fiddled with some **40 prototypes of inner parts** of the mascara tube, paying particular attention to the tiny, curved plastic tab, called a "nib," that emits the click when the top twists over it. By adjusting the slope of the curve and a corresponding tab located inside the top, designers could alter the click's tone. A steep curve made a high-pitched click, which the team thought sounded cheap. A flatter curve made a dull sound. **"We sweated that detail,"** Mr. Owen says. **"You have to pay attention to it and manage it through all the materials you consider and all the manufacturing steps to be sure you get it right."**

Getting it wrong can bring major consequences. Hoping to tout its SunChips brand as environmentally friendly, Frito-Lay, part of PepsiCo Inc., **PEP -1.55%** introduced a compostable chip bag in 2010. Consumers found it noisy and complained. Sales fell, and Frito-Lay eventually went back to the old bags. "The packaging of the product is a multisensory experience for our consumers," says a Frito-Lay spokesman.

Illustrations by Serge Bloch; Photos by F. Martin Ramin for The Wall Street Journal

Illustrations by Serge Bloch; Photos by F. Martin Ramin for The Wall Street Journal

Dyson wants its vacuums to have a pleasing, low tone, which it says sounds more upscale.

Illustrations by Serge Bloch; Photos by F. Martin Ramin for The Wall Street Journal

Snapple says the pop a consumer hears when unscrewing the top from a new bottle is a cue that it is fresh.

Even product sounds that happen just once may be treated with reverence. Snapple, owned by Dr Pepper Snapple Group Inc., says the pop a consumer hears when unscrewing the top from a new bottle of Snapple is a cue that it is fresh. The company calls it the "Snapple Pop" and says it builds anticipation and offers a sense of security, because the consumer knows the drink hasn't been opened before or tampered with.

Snapple was so confident about the pop's safety message that in 2009 it eliminated the plastic wrapping that encircled the lid. It saved on packaging costs and eliminated an estimated 180 million linear feet of plastic waste, the company says. "We were a lot more comfortable making that decision because we knew there was this iconic pop," says Andrew Springate, senior vice president of marketing.

Discussions of sound in corporate meetings brings linguistic challenges. "We're not quite as bad as when you go to the mechanic to try to describe a car problem," says Lisa King, vice president of Insights & Innovation at [Newell Rubbermaid Inc., NWL 0.00%](#) maker of Sharpie markers.

Company executives call the sound a Sharpie marker makes as it moves across the paper the "scritch-scratch." When they consider making a product innovation, they check for the "scritch-scratch." "It's part of the experience of using that marker," Ms. King says. "The sound of your product can be as distinctive as the look."

Despite the growing attention, it's still rare for ads to boast about product sounds. In May, [Volkswagen VOW3.XE +4.57%](#) introduced a commercial praising the "thunk" of the door on the Jetta. (A guy shuts his car door, and the thunk makes things—a football, a kite, a doll, a cat—fall out of a tree.) "We were looking for a metaphor to convey quality and well-built," says Tim Mahoney, Volkswagen of America's chief marketing officer.

Some annoying product sounds are overdue for an update. [General Electric Co.'s GE -1.97%](#) appliance division is overhauling the abrasive buzzers, dings and beeps that clothes dryers, ovens and microwaves have been making for decades.

GE worked with a sound designer who composed a "soundtrack" for each of its four major brands. Instead of beeps, rings and buzzes, the appliances play snippets of their song. Turn on a machine and hear the music crescendo; turn it off, and the same snippet decrescendos. For time-sensitive alerts, like a timer, the music becomes increasingly urgent.

Each brand's music is meant to appeal to the target customer. Hotpoint, a budget-friendly line, will have a grunge-rock tune. The Monogram line, GE's priciest, will feature light piano music. "This is more Aaron Copland," says David Bingham, GE Appliances' senior interaction designer. "Very forward-looking and elegant-feeling."

As home-appliance design becomes more minimal, GE says, elements like sound are more important. The new sounds are set to hit the market in two or three years.

Some products strive for silence. Tampax Radiant, the tampon line Procter & Gamble Co. PG -1.55% launched in April, has a textured plastic wrapper that won't make loud crinkling sounds.

The wrapper is targeted at women, especially teens, who say they want more privacy in public restrooms. "They are trying to keep the secret and the wrapper wasn't able to do that," says Alex Albacarys, associate director for global Tampax research and development. "On this wrapper we took it to the next level in terms of sound avoidance."

P&G researchers measured the noise of the new wrapper in the company's sound laboratory and found there was a 25% decibel reduction with the Radiant compared with Tampax Pearl, which was previously P&G's quietest tampon wrapper.

Household brand Method Products puts its bottles to a "trigger tester" to be sure they can withstand some 10,000 sprays without emitting what Don Frey, Method's vice president of product development, calls "chatter."

In recent months, Method has been evaluating new packaging suppliers and bottle nozzles to keep up with growing sales. A squeaking or chattering nozzle usually indicates a mechanism that isn't put together well. "It creates images in consumers' minds of how well it's going to work, and how well it's made," Mr. Frey says.

Dyson, the appliance maker, has been paying more attention to machine noise in recent years. Globally, the company wants its vacuums to have a pleasing, low tone, which it says sounds more upscale.

In the U.S., Dyson says consumers have been fairly tolerant of loud vacuum cleaner noise, but there are signs they are becoming more sensitive. In March, Dyson



introduced the DC-39, its quietest full-size vacuum available in the U.S. The motor is attached to sound-dampening mounts, and polyurethane helps absorb sound energy.

"There has started to be more demand from the U.S. for quieter, better sounding products," says Rachael Pink, an acoustic engineer at Dyson. "People now expect products to sound good—not just sound quiet, but have a nice quality."

Write to Ellen Byron at [ellen.byron@wsj.com](mailto:ellen.byron@wsj.com)

Control the music and you control the mood of the room

**Despite the time, effort and money invested in what people see, most companies have no strategy for what their customers hear.**

**An amazingly creative use of sound and smell-Dunkin Donuts:**

[http://www.youtube.com/watch?v=kmrc8ZJld8A&safety\\_mode=true&persist\\_safety\\_mode=1&safe=active](http://www.youtube.com/watch?v=kmrc8ZJld8A&safety_mode=true&persist_safety_mode=1&safe=active)

**CANNES, France—Ad agency Talent in São Paulo, Brazil, won the Grand Prix in the Radio Lions contest here tonight for something more deliciously devious than a straightforward radio ad campaign.**

**On behalf of Go Outside magazine, the agency dreamed up the unlikely idea of turning an ordinary FM radio broadcast into de facto mosquito repellent. It worked like this: From 6 p.m. to 8 p.m. every night for three weeks, the agency had a local radio station add a 15 kHz frequency sound to its normal music programming. That tone is all but inaudible to humans—but to mosquitoes it sounds uncomfortably like a dragonfly, one of its natural enemies. Thus, the pests stayed well away from the radios, allowing Go Outside's readers to, well, go outside**

**7/12 New research shows radio commercials are having an impact between the ears.** Theater of the mind has long been one of radio's most powerful weapons, but a new study conducted by Critical Mass Media for Katz Marketing Solutions takes that notion several steps further. It finds that "sonic branding" has an emotional and visual response on listeners, who often are able to link a radio spot to a brand by sound before the first word is even uttered. "It's just amazing what a second or two of audio can do to generate in terms of emotions and feelings," Katz Marketing Solutions president Bob McCurdy says. The 1.7-second gong of the Taco Bell ad brought images of chalupas and the restaurant's roadside sign to participant's minds at the same time it made them hungry. Similar results were seen for McDonald's and Little Caesar's commercials. McCurdy says that 40% of the people who heard a food ad actually reported being hungry. "Sound can impact you physiologically," he says.

"If you are an advertiser and there are key periods of consumption throughout the day, it is a perfect justification to go out and heavy up in those key periods of consumption and use radio." The study tested sonic brands from a wide range of marketers, from Mazda to Old Spice and from Pillsbury to Duracell. It's not all sound effects, however. The three-second "More Saving, More Doing" audio branding of Home Depot had people seeing orange aprons and thinking of weekend chores — exactly what the retailer wanted. In another case it was just the sound of Geico's spokes-gecko's voice that resonated. McCurdy sees the research as a tool to help radio sell itself to marketers. "Once an advertiser has an audio signature that is established, it is easy to shift money into radio," he explains. "It is more efficient and they still get the visual part of it — in a few seconds the message registers." Katz is looking at expanding the research, which is part of a larger effort at the rep firm to give advertisers ways to quantify the power of sound and connect it to the listening habits of consumers. McCurdy believes the results are applicable to advertisers on a local market level as well, noting the firm often suggests that clients have a consistent audio environment from TV to radio. The online study of 250 respondents tested 24 brands in all. See how people reacted to each of the commercials [HERE](#).

Check this out: very interesting. Discusses 4 ways sound impacts us:

<http://exp.lore.com/post/21208635527/soundcloud-explores-the-four-effects-sound-has-on>

## Social TV Keeps Viewers Engaged When Minds Might Wander, Study Says

Second Screen Helps Hold Viewers' Attention

By: [Mallory Russell](#) Published: [July 03, 2012](#)

**Even when viewers turn to social media during commercials, the study suggested that they still pay attention to the TV -- sometimes more than they think. Eye-tracking results revealed that viewers responded to audio cues, for example, both on the shows and during commercial breaks. (COMMENT- KIND OF AUDIO SOUND BITES. ILLUSTRATES THE POWER OF SOUND TO COMMAND AND FOCUS ATTENTION)**

## Cannes Lions, Sonic Branding and the Importance of Sound

*The whir of a fan at night ... The rev of a starting engine ... Your sister's laugh ... The sound of your father's steps on the stairs*

These make up the soundtrack to our lives, as much, if not more so, than our favorite songs. They orient us to the things we remember, the people we love and the experiences that have defined us. They are part of a language that we never forget.

Like it or not, brands are as much a part of our life's landscape as anything else. Our memories of our grandmothers are linked to the Oreos they fed

us on holidays. There are certain airlines that will always make us think of coming home. A particular Gap shirt reminds us of that guy/girl we fell in love with one hot summer in July.

When we think about these brands, we usually think of the product or the service -- the color of the Coke can, the taste of a Peep, the feel of the airplane seat against the back of your legs. What we don't think of as readily, but what is also always present, is the sound of the brand. The song from that iconic Pepsi commercial, the pinging sound your Mac makes as it fires up, the clicking of the blinker on your old Ford as you signal right. These are equally, if not more important, than the visual cues that usually come to mind first.

There are a small number agencies in the marketing world that work or even dabble in the business of sound. One of few that does, and arguably one of the best, is [MassiveMusic](#). More than 10 years ago, this agency had its genesis at Cannes, after the repeated success of its opening night party. It is now one of the most coveted events of the week. The agency also usually take home a few awards. This year MassiveMusic is entered in Film Craft for Best Use of Music for Fiat "Get Ready," as well as Sound Design and Editing. It also worked on a [beautiful film](#) with Fitzgerald & Co for Bulwark titled *451<sup>o</sup>*, which is entered in several categories.

What's interesting about the agency is that it has found incredible success in something we often overlook. Yes, it matters what something looks like and feels like, but just as importantly, it matters what it sounds like. As Elijah Torn, their creative director describes it,

"Sound is such an important aspect of all of our lives. This becomes even more apparent as everything in our lives is becoming digital. Shutter sounds on digital cameras let us know that our memories are being captured even though there isn't a mechanical connection. Certain frequencies -- such as that of the human voice can resonate more deeply and convey their message more clearly. With music we can have an enhanced memory recall - music puts us in a specific place. Tying the proper music and sound design to a brand can then extend this is into our daily lives. Instead of only being thirty seconds of someone's daily life from a web or television commercial, you create a sense of familiarity, comfort and of course a direct memory."

This "sonic branding" reminds us of the importance of sound. A sense that we can sometimes forget about when we are so caught up in the acts of seeing and feeling. Hearing is hard-wired to our emotions and sound can allow us to experience things with a depth that wouldn't otherwise be present. Just imagine a day at the sea without the music of the waves hitting the shore. What would it be like to be more conscious and connected to the things we hear? Maybe we should all try it out. At some point today stop what we are doing, the same way we would pause to take in a view, and just...listen.

**Follow Sarah Hall on Twitter: [www.twitter.com/sarahh314](http://www.twitter.com/sarahh314)**

Check out these links to learn more about Sound:

This video is amazing. A blind young man sees with sound:

<http://www.youtube.com/watch?v=qLziFMF4DHA>

Click on below to see how sound can impact your perception of something innocent and funny:

[http://www.youtube.com/watch?v=2T5\\_0AGdFic&NR=1&safety\\_mode=true&persist\\_safety\\_mode=1](http://www.youtube.com/watch?v=2T5_0AGdFic&NR=1&safety_mode=true&persist_safety_mode=1) SCARY MARY

Julian Treasure: The 4 ways sound affects us:

[http://www.ted.com/talks/lang/en/julian\\_treasure\\_the\\_4\\_ways\\_sound\\_affects\\_us.html](http://www.ted.com/talks/lang/en/julian_treasure_the_4_ways_sound_affects_us.html)

Check this out- how a musical staircase alters behaviour:

<http://www.youtube.com/watch?v=2lXh2n0aPyw>

Check this out- How sound alters behaviour in a park:

<http://www.youtube.com/watch?v=cbEKAwCoCKw>

In This Clip Martin Lindstrom illustrates how effectively kids can identify an advertiser via and audio signature or the sound of the product:

<http://www.martinlindstrom.com/nbc-today-show-kids-inc-part-2/>

This clip from MassiveMusic nails the importance of an audio signature/sonic branding

<http://www.youtube.com/watch?v=VuMorarsTZw>

What images come to mind after hearing the following.....reading is really hearing...it is one part of your brain talking to another part of your brain:

TV/Movies - "Here's Johnny"; Houston, we have a problem; "I see dead people"; "I'll Be Back"; "You Can't Handle the Truth"; "Yeah, I can fly (Ironman)"; "Your Fired"; "Doah"; 60 minutes stopwatch; "The tribe has spoken"; "Book Em, Danno";

Music - Theme from ET; Jaws; the "chime sound" from Law and Order (when it switches each scene - this is a good one); Theme song from The Office; Theme from Friends; theme from American Idol; Jeopardy music; Glee - Ending credits/theme song.

**What you hear can be more unsettling than what you see.** Award winning director M. Night Shyamalan got the rating of his movie "The Village" changed from R to PG simply by eliminating **one sound**. Not one of his movies have been rated R

Open up a Coke or Beer with no sound....Would it taste right?"If you have the specific sound you "know" when you open this bottle you will already be happy before tasting the product itself," said Brigitte Schulte-Fortkamp, who teaches **psychoacoustics** at Berlin's Technical University. "It's not really a conscious process. You are influenced without knowing it." When a soft-drink aficionado opens his beverage of choice, **he is conditioned to expect the crisp sound of unleashed carbonation; he associates that sound with freshness and satisfaction-**

Vera Brandes- music pharmacologist-Like apothecaries of old, who distilled extracts from nature's store of herbs and plants, Ms. Brandes and her associates analyze music of all kinds to tease out its "active ingredients," which are then blended and balanced into medicinal compounds. Though they steer clear of gross pathologies or infectious diseases, they claim their methods have broad application in psychosomatic disorders, pain management and what Ms. Brandes calls "diseases of civilization": anxiety, depression, insomnia and certain types of arrhythmia. The pharmacopeia stands at about 55 tracks of medicinal music, with more in the pipeline.

Neuromarketing's raison d'être derives from the fact that the brain expends only 2 percent of its energy on conscious activity, with the rest devoted largely to unconscious processing. Thus, neuromarketers believe, traditional market research methods — like consumer surveys and focus groups — are inherently inaccurate because the participants can never articulate the unconscious impressions that whet their appetites for certain products

The Robert Wood Johnson Foundation released a study report in June 2004 showing that improving building design and reducing noise in hospitals can help boost healing. The study also showed that loud paging systems and beeping medical devices interfere with workers' satisfaction levels, reduce productivity and increase accidents.

Royal Air Maroc's sound identity had to convey the five core values of the airlines, which are Moroccan, majestic, magical, maternal and modern, while respecting the oriental roots of the company and being strongly oriented to the future. The goal of this new identity was triple-fold: to better differentiate the airline, express its values, and reinforce the impact of its communication

In addition to influencing our mood by making us feel energized or sleepy, happy or sad, **sound has an amazing ability to inspire us and remind us of the past. Psychological studies have shown that humans strongly associate sounds with a particular memory. Thus, sound has this unique power to recall certain experiences, which is a crucial advantage when it comes to building a strong brand in the minds of consumers.**

EVP Chief Creative Officer R/GA Nick Law: I think sound as branding is incredibly important when it comes to these behaviors that I was talking about. Content now so often has an interface in front of it. So our relationship with content is through interface, and interfaces work better when they're visceral. That's why Apple has taken the time to brand all of these sounds, these functional sounds. I don't think many companies are using sound in as sophisticated of a way as they could be.

Both McDonalds and Coke have made extremely good use of their embedded brand mnemonics, and **Dunkin' Donuts recently combined smell (the aroma of coffee shot from an atomizer) with sound (the atomizer was actually triggered by a sonic signal sent from the brand's jingle) on public buses.** Sales shot up as a result. The Hamburg Philharmonic created an audio logo patterned after the image of a "waveform" that resulted in looking at the combination of the city skyline and its resulting reflection in Alster Lake, while Audi is working on a branded sound for their e-tron.

With its customized music set from The Playlist Generation, The Coffee Bean & Tea Leaf® is engaging with its loyal customers on a whole new level. "We are fully focused on enhancing every aspect of our customer experience," said Mel Elias, President and CEO, The Coffee Bean & Tea Leaf®. "The Playlist Generation has truly translated our brand into a distinct sound for our stores which has resulted in a phenomenal response from our customers and our Team Members."

Michael Smith, CEO, The Playlist Generation, stated, "With their unique Sonic Identity, The Coffee Bean & Tea Leaf® is differentiated from the generic coffeehouse sound and has created a platform



- It seems it's not only humans who can benefit from music therapy: a Tuscan wine grower has found his vines responding to the sounds of Mozart, Beethoven, Vivaldi and Mahler.
- When Carlo Cignozzi began restoring a Montalcino farmhouse and planting a new vineyard called Al Paradiso di Frassina, he intuitively felt that playing music to the vines would benefit their growth. His early efforts attracted the attention of Amir Bose, who personally supplied the large network of weather resistant loudspeakers required to cover the whole vineyard. Researchers from the university of Florence have since been applying academic rigour to test the theory with both on field and laboratory studies. These have focused on the positive effects sound waves have on the vine's root system, leaves and flowers and the negative effect they have on parasites and predators of wine grapes. Cignozzi is adamant that the grapes closest to the loudspeakers ripen fastest.
- Around 56 loudspeakers play classical music day and night and Carlo has named a Brunello wine Flauto Magico (The Magic Flute) in recognition of it being the first wine ever to be grown "completely in tune with Mozart's musical harmonies".
- Carlo believes his experiments have given a new "dynamic impulse" to organic farming methods. "Although experiments are still in their early stages the results so far are very encouraging," he says.

**Companies are starting to engineer foods that taste better by appealing to the eyes and ears**, for instance. The work may even have implications for medicine — helping to explain, say, how the brain can compensate for a missing sense — and for education.

Scott King, part of a UK company called Condiment Junkie that creates sounds to enhance products and events, says that recruiting multiple senses works best when "one sense is choreographed with another in a way that has an effect greater than the sum of its parts." The company has worked with Fat Duck restaurant in Bray, England, run by celebrity chef Heston Blumenthal, to develop soundtracks to bring out specific flavors in the food, based on their finding that hearing certain sounds (high tones, tinkling pianos) make people perceive a bittersweet toffee as more sweet,

while hearing low-pitched tones and trombones make the toffee taste more bitter.

ULABY: Director Michel Hazanavicius thinks every director secretly yearns to make a silent film. It's cinematic storytelling at its purest. And **"The Artist" is immersive in the same way great radio can be. There's a sense missing. Your brain fills it in.**

HAZANAVICIUS: **So you do it with your own imagination, with your own ghosts, your own life, your own sounds, your own reference. So it makes the movie much more yours in a way.**

ULABY: **I saw "The Artist" with someone who swore later he could remember what the actors sounded like.** The film is critically adored. It's a smash in France and the lead won the best actor award at the Cannes Film Festival. Still...

With the marketing world's emphasis on creating strong brand experiences, combined with a rapidly fragmenting media world, it is not surprising that smart marketers are looking at new ways to improve messaging, enhance recall and make better connections with consumers.

Music can do all that, and when used in more creative, insightful and strategic ways, it can be an incredible branding tool.

Let's try an exercise involving movie soundtracks. Close your eyes and recall the Harry Potter theme song. Now recall the James Bond theme. Do the same for Star Wars, 2001, Chariots of Fire, The Exorcist and Jaws. If you are at all sentient, you're probably getting an image with each bit of music, not to mention twinges of magic and mystery, intrigue and danger, awe, hopefulness, fear and maybe even mild panic with the Jaws theme that kept people out of the water for a decade.

See what is happening here? You are triggering visual memories and raw

emotions by merely thinking about a piece of music. If you were actually hearing the music as well, you'd be experiencing that even more intensely.

Elizabeth Loftus of the University of Washington:

In many ways the ear is superior to the eye. What I mean by that is that there is evidence from controlled laboratory studies that show when you present a list of words to people and you present either auditorily, say on a tape recorder, or you present it visually, say on slides, people remember more words if they hear the words than if they see them.

In order to understand why, you have to realize there are essentially two kinds of memory. **There is the iconic memory which stores visual images and the choic memory which stores auditory images.** When the eye see some picture or takes in some visual information, a fairly complete image registers itself in iconic memory., but it fades away fairly quickly, on the order of say a second or so. However when the ear takes in information, it too, registers a fairly complete image but it fades away more slowly, say on the orer of 4 or 5 seconds.

The power of the spoken word never really stops. **There is an important study that shows that even when people were anesthetized during surgery, if they are hypnotized later, can remember some of the things that were spoken, some of the sounds they heard during surgery.**

A study from Northwestern University shows that if you try to convince people about a product- it happened to be a shampoo- and you do it with just a verbal message, people are much more persuaded about your product. They like it better, they want to buy it more than if you accompany those verbal images with pictures. The verbal message alone seems to create in people's minds more of a positive feeling for this product.

Listening to a message is much more effective than reading it. Two things are different. First the mind holds spoken words in mental storage much longer enabling you to follow the train of thought with greater clarity. And second, the tone of the human voice gives the words emotional impact that no picture can achieve.

But there are other things that happen in your mind when you listen to the spoken word

Sticht: we conducted research for the U.S. Army in which we presented a speech without any tone to it and found that comprehension and learning were very poor. When we added natural inflection and intonation, then comprehension and learning were greatly improved.

The relationship between the two kinds of words may be of interest to you. We found that written language is recorded by the mind back into an internal form of oral language. Your mind apparently translates printed words into their spoken equivalents before the mind can understand them.

That format is verbally driven and rarely contains any visual distractions. People don't rave about their commercials. They just remember them.

"Never go to sleep without a request to your subconscious." – Thomas Edison

**Your subconscious loves to do work while your body performs other tasks that are easy. I can prove this very easily by asking you how many good ideas you have had while driving or in the shower. *When you are relaxed yet slightly distracted, your mind is often at its best.***

Charles Spence, from Oxford University, UK, walked away with the Nutrition Prize for showing how the way foods taste is affected by how they sound.

"When you play the sound of crisps when people bite into Pringles - if we change the sound as they eat, we can actually change how fresh, or how crisp, the Pringle tastes to people," he told BBC News.

"We've used [a bacon sizzling] sound to flip the flavour of bacon and egg ice cream. If we play that sound over the loudspeakers in the room, the ice cream will taste more 'bacony' than if you play the sound of, say, farmyard chickens."

Why Recall Studies are limited in their usefulness:

Neurologist Richard Cytowic says, “Not everything we are capable of knowing and doing is accessible to, or expressible in, language. This means that some of our personal knowledge is off limits even to our own inner thoughts! Perhaps this is why humans are so often at odds with themselves, because there is more going on in our minds than we can ever consciously know.”

**Psychologist Carl Jung compared this “unconscious” to swimming in the silent and weightless world underwater: above the waterline exists the sunlit world of the conscious mind filled with air, birds, trees and people. But below the waterline, in the unconscious mind, is a timeless world of twilight and shadows, symbols and beauty, metaphors and music.**

Visit this website for some terrific information re how sound impacts what we see, feel and purchase: [WWW.CSGAUDIO.COM/POWEROFSOUND](http://WWW.CSGAUDIO.COM/POWEROFSOUND)

Check out these two links: the first one confirms the power of an audio logo to penetrate society. The other one is just plain funny.

<http://youtu.be/P-rGG5jJyd4>

<http://www.guitarpee.com/>

## **Tweets On Steroids!?**

Short. Quick-hitting. Impactful. Not the 140-character kind but that of sound. Several seconds of an “audio tweet” can carry quite a punch as well.

“If you have consumers who are snacking on short amounts of time with different types of media channels, we have to think about how to communicate in short, ‘snack-like’ bits of messaging,” Unilever’s Patti Wakeling, Global Director of Media Insights recently stated in an industry trade magazine. The effective use of audio might just be the right recipe.

Audio, even just a few seconds of it, can powerfully and quickly bring to mind detailed brand messaging and emotions. Everyone's aware of the usual audio branding examples of the "Intel Inside" campaign, the NBC chime or McDonald's "I'm Lovin It."

We at Katz Marketing Solutions wanted to learn more and dig deeper, going beyond just 'awareness', to quantify the impact of sonic brands of the top U.S. advertisers. So we commissioned a study to determine the impact of various advertisers' "audio" snippets, whether it's an audio logo, music used in the commercial or the voice of a "spokesperson". The methodology was quite simple: play a short audio snippet, ask a few questions and have the participants jot down verbatim answers.

The goal was to quantify both the ability of these audio sound bites to communicate a brand message and generate emotion. Many of the previous studies on the subject focused on brand identification. We wanted to take it a step further and quantify the emotions that surfaced after exposure.

The following summarizes the findings from two of the 24 sounds tested. Both were from the fast food category but similar results were uncovered for all product categories tested. Two hundred-fifty respondents were asked to answer three key questions. The results confirmed the incredible power of audio.

**Question #1:** *Do you know the company or brand that uses this sound in its advertising?*

QSR #1: 75% correctly identified the advertiser unaided

QSR #2: 86% correctly identified the advertiser unaided

What was particularly surprising was the lack of misattribution.

**Question #2:** *What message comes to mind when you hear this sound?*

QSR #1: 65% provided some advertiser specific commercial messaging

QSR #2: 83% provided some advertiser specific commercial messaging

**Question #2 Verbatims:**

“That there are other fast food choices besides hamburger places.”

“To get tacos instead of hamburgers.”

“I think of hot and ready pizza. The company is trying to tell me i can always get my pizza hot and ready from them.”

“Pizza is yummy, their pizza is the best.”

“Reliable fast food restaurant where you get the foods you love to eat.”

**Question #3 *What pops in your head when you hear this sound? How does it make you feel?***

“Hunger” was the most evident response when consumers were exposed to these fast food audio clips. It incited a craving desire to eat:

“I can go for a taco and it made me hungry.”

“Burritos and tacos. Makes me wanna eat.”

“Makes me feel like trying something new.”

“Makes me hungry for pizza.”

“Hungry! I love their delicious food and cheap prices!”

“It makes me want to eat their pizza... I used to eat it all the time in college and now i want one now.”

“Makes me want their breadsticks which are amazing.”

“Happy and hungry.”

“Want pizza.”

“Crave pizza.”

“Hungry.”

“Fast food, hungry.”

“Tacos. I get hungry.”

“I can go for a taco and it made me hungry.”

"Hungry, yummy food."

It is important to note that there was absolutely no prompting of any kind.

Also impressive was the fact that many of the respondents referenced in detailed fashion either the advertiser’s spokesperson’s attire/appearance, their feelings toward them or jotted down the advertiser’s exact slogan, which was not present in the tested audio snippet.

It’s all too often forgotten or overlooked that audio can very effectively trigger brand messaging, elicit an emotional response to the point of impacting us physiologically while positively impacting several key branding metrics: awareness, intent and affinity. This study is a powerful reminder of how even one or two seconds of audio can trigger brand messaging and explicit visual images, providing an advertiser with the benefit of the visual at audio prices. Radio anyone?

Check out the results of the entire study at [www.sonicbrandstudy.com](http://www.sonicbrandstudy.com)

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## NASA heads to a lab in Minnesota to put astronauts through acoustic torture tests

By Mike Wehner, [Tecca](#)

If you've been to a crowded airport, sporting event, or even a kid's birthday party lately, a little peace and quiet might sound like the perfect thing to help you kick back and relax. Just don't let things get too quiet, or you might drive yourself a wee bit insane: the [anechoic chamber](#) at [Orfield Laboratories](#) in Minnesota can mute 99.99% of all sound, but visiting the silent oasis isn't as calming as you might expect.

The room holds the current Guinness World Record as the quietest place on the planet, and companies from all over the world seek out its unique acoustic properties. The walls of the chamber are lined with sound-absorbing baffles that can capture noise and mute it in an instant. This allows companies — both Whirlpool and Harley-Davidson have visited — to test just how noisy their products are without the risk of outside interference.

But while the super-silent oasis is a great testbed for various products, it holds a darker side: silence, it turns out, can put a great strain on the human brain. Researchers at [NASA](#) test the room's unique acoustic capabilities on humans rather than hardware. The noiselessness is used to simulate the silence of space — an environment astronauts would be well served to grow accustomed to.

What they've found is that when all outside noise is removed from an enclosure, human hearing will do its best to find *something* to listen to. In a room where almost 100% of sound is muted, people begin to hear things like their own heartbeat at a greatly amplified volume. As the minutes tick by in absolute quiet, the human mind begins to lose its grip, causing test subjects to hallucinate.

NASA then monitors how the would-be [space](#) explorers react, and whether they can get past the very obvious awkwardness of seeing or hearing things that aren't actually there. According to lab officials, the longest anyone has lasted is 45 minutes before being allowed to hear the sweet sounds of planet Earth once again.

In the end, the chamber has proven a valuable scientific tool, just don't plan on renting it for some peace and quiet — it may do more harm than good.

Sound is a terrific memory anchor and memories are comprised of not only words, but pictures. When someone asks us to “remember when...” we don't remember in words, we recall entire scenes first, then fill in with dialogue. Sound triggers visual images very effectively.

The study of how radio messaging influences listeners is important for marketers. While only a certain percentage of listeners are fully engaged at any given time, messaging does register with those who even listen passively.

Dr. Robert Heath from the UK, has spent years studying how the human mind absorbs commercial messaging. Several of his articles have been published in the Journal of Advertising Research. His research describes and explains how advertising is processed at different levels within the human brain even by people who are only partially engaged or even completely disengaged from the commercial message.

He's identified several ways in which people learn, retain and absorb commercial content while paying little or even no attention to the messaging:

1. **Passive learning**- Low attention cognitive process that requires partial attention and deployment of cognitive resources.
2. **Implicit learning** – An automatic non-cognitive process that requires no attention or any deployment of cognitive resources

Heath defines the third type of learning as “explicit,” which occurs when all cognitive resources are focused on the printed page, the radio or television. But unlike print, which requires total attentiveness, radio messages can also be absorbed passively as well as implicitly. Explicit learning has been linked to the rational processing of commercial messages, while passive and implicit learning tend to appeal to the more enduring and influential emotional processing of commercial messages. This is another benefit of radio's audio messaging as in the fast pace of everyday life, “considered” or

rational decisions tend to be subservient to “intuitive” or emotional decisions. This combination gives Radio the most complete attentiveness package of any medium.

Radio is a “soak in” medium rather than “seek out” medium. We typically consume radio in a more relaxed state that enables relevant messages to register more effectively than when we are in a “seek out”, task oriented mode as is often the case with internet messaging.

Due to most sound being processed subconsciously, we’re often oblivious to the impact sound has on our product perception and choices. But whether we realize it or not, sound has the ability to inspire, create desire and persuade. Neurologist Richard Cytowic says, “Not everything we are capable of knowing and doing is accessible to, or expressible in, language. This means that some of our personal knowledge is off limits even to our own inner thoughts! Perhaps this is why humans are so often at odds with themselves, because there is more going on in our minds than we can ever consciously know.”

The automotive industry has long recognized the power of sound to generate sales. Studies show that almost a third of consumers can distinguish one car from another by the sound of their doors closing. Chrysler, Mercedes and Acura all have acoustic engineers working on refining the sound of their car doors. Bentley’s acoustic engineers have actually influenced the design of the car to achieve a unique and instantly identifiable sound in a market where almost half (44%) of consumers say the sound of a car is an important factor in their purchasing decision.

It’s been proven time and again that sound can alter people’s behavior. Numerous experiments have illustrated that the pace of music can influence the size of the check at restaurants—the slower the music the greater the check.

A grocery store study confirmed that the type of music played greatly influences the choice of wine. And when classical music is piped over loudspeakers in the London Underground, crime dropped 33%. In the 1920s, the use of sound actually assisted in making people more

comfortable with the elevator. When first introduced, people had a high level of anxiety about riding in elevators. Recognizing the calming effect music had on people, soothing music was pumped in to make passengers more at ease—and the term “elevator music” was born.

While sound contributes heavily to the perception of quality in the automotive industry, it is making major inroads in other categories. Kellogg’s employed a company to design a particular crunching sound for its cereal. Nokia succeeded in trade-marking its ringtone, with 41% of global consumers able to recognize the Nokia tone. Bahlsen, a German food company, created a division of researchers to engineer an optimal crunch for its biscuits and potato chips, going as far as developing special microphones placed inside testers’ ears to record crunching. Other companies clearly understand the power of sound to convey freshness by focusing on the sound of opening a jar of freeze-dried coffee, a can of soda or a can of Pringles, which are largely engineered.

Sound also plays a critical role in gaming. How engaging would Space Invaders be if the music intensity didn’t pick up as the aliens got closer? Ogilvy used sound on behalf of Fanta to more effectively position the product with teens by creating a mobile application that used high-pitched frequencies audible only to people under 25. These sounds included wolf-whistles, warnings and “pssts,” along with tags representing traditional words and phrases.

Author Julian Treasure said, “Sound affects human beings in four ways: physiologically, psychologically, cognitively and behaviorally. These effects are profound, changing how we feel and what we do - including our commercial decision-making and actions.”

Without the effective use of sound, the ability to evoke emotion is severely limited. Sound has an immediate, direct link to both the rational and emotional parts of our brain. Sound shapes our thoughts, our feelings, our behaviors, our lives. With all of the scientific and physiological evidence available, there is a real opportunity to begin using sound and our sense of hearing more effectively in the marketing of products particularly in radio. After all, there are only two senses that can be “broadcast” to reach

customers en masse- sight and our sense of hearing. Sound enables the messenger to reach a place within the human mind that visual branding cannot — and does not — approach. We can hear around corners, we can see in the dark and our sense of hearing enables us to envision a product in a personalized fashion based upon our own individual experiences.

Jack Trout has said, “After analyzing hundreds of effective positioning programs, we ran into a surprising conclusion: the programs were all verbal. There wasn’t a single positioning concept that was exclusively visual. We have come to the conclusion that the mind works by ear, not by eye.”

Helen Keller wrote, “The problems of deafness are deeper and more complex, if not more important than those of blindness. Deafness is a much worse misfortune than blindness for it means the loss of the most vital stimulus...the sound of the voice that brings language, sets thoughts astir and keeps us in the intellectual company of man.”

The following excerpt is taken from the book, “What Sticks”.

Dr. Daniel Schacter professor of psychology at Harvard: you may think that because you pay little attention to commercials.....your judgment about products are unaffected...but a recent experiment showed that people tend to prefer products featured in ads they barely glanced at several minutes earlier...even when they have no explicit memory of having seen the ad.

Dr. Elizabeth Loftus, ranked 58th on a list of the 100 most influential researchers in psychology in the 20th century wrote when she was at the University of Washington:

In many ways the ear is superior to the eye. What I mean by that is that there is evidence from controlled laboratory studies that show when you present a list of words to people and you present either auditorily, say on a tape recorder, or you present it visually, say on slides, people remember more words if they hear the words than if they see them.

In order to understand why, you have to realize there are essentially two kinds of memory. There is the iconic memory which stores visual images and the echoic memory which stores auditory images. When the eye sees some picture or takes in some visual information, a fairly complete image registers itself in iconic memory., but it fades away fairly quickly, on the order of say a second or so. However when the ear takes in information, it too, registers a fairly complete image but it fades away more slowly, say on the order of 4 or 5 seconds.

The power of the spoken word never really stops. There is an important study that shows that even when people were anesthetized during surgery, if they are hypnotized later, can remember some of the things that were spoken, some of the sounds they heard during surgery.

In a 2011 issue of [Media](#) magazine, and the subsequent editorial, were devoted to "The Brain." I began reading with the hope that the issue's guest editor, Dr. Carl Marci, would cover the ability of sound to impact the brain. But aside from one article, which touched on the impact of music in advertising, there was very little discussion on the topic.

If, indeed, the brain is the ultimate screen "where everything ultimately plays out," as A.K. Pradeep from Neurofocus states in the magazine, then what are the various ways for marketers to impact it?

"Screens" are synonymous with viewing and sight. But are visual stimuli required to generate images? The answer is obviously no. Humans are quite capable of creating pictures in our minds by visualizing. This is defined as "recalling mental images or pictures," which requires no direct visual stimulation. And what happens while we sleep? Every night, our eyes are completely closed, yet we are creating vivid imagery while dreaming. So the human brain is quite capable of "seeing" without direct visual stimulation.

A fact overlooked by many is that the sound waves that enter our ears do greatly impact what we ultimately see. We hear a voice, a commercial, a song, a movie trailer, a tire screech, a church bell and immediately we begin to visualize, activating our own internal \_ video screen that's fueled by sound.

A powerful argument could be made that this type of intensely personal visualization can actually be more impactful than the actual picture. Renowned author and marketing expert Jack Trout came to understand the impact of sound after analyzing hundreds of positioning programs. He said: "We have come to the conclusion that the mind works by ear, not by eye."

Need further proof of our ability to see without direct visual stimuli? Imagery Transfer anyone? In a recent study we conducted for a major national advertiser, without prompting, consumers continually referenced the company's television campaign after exposure to its radio commercials.

The Hindus have a saying, "Nada Brahma," which translates to "The world is sound." While this might be overstating things a bit, the ability of sound to trigger visual images, motivate consumers and impact our brains is immense. Certainly, this warrants the ultimate sound vehicle -- radio -- to be elevated from its current "lost continent" status in some marketing departments.

A word has the power to change your life. Think about that for a moment because it is literally an Earth-moving statement – to change your life.

Words, my friends, change everything! Words have a dramatic effect on what we know, how we interact with people and the decisions we ultimately make. Words can influence us, inspire us or just as easily bring us to tears.

Words change our relationships, our demeanor, our entire system of beliefs, and even our businesses. Being a planet or not being a planet makes a major difference, just as the words "I love you" or "I hate you" have majorly different meanings behind them. Words have a powerful and undeniably overwhelming influence on us – for good and, at times, for bad. Think for a moment how words have changed your life:

*Marry me! It's a girl! You're hired! You're fired. We won! We lost. Guilty. Not guilty.* Google is a company with a focus on classifying and organizing words. It is a very simple focus, really: to be better than any other entity at organizing words. Words have become the key to everyday life. In our vehicles, many of us use words to get assistance, either via a service such as OnStar (I need help, my car won't start) or via GPS (and don't turn left when told to turn right, or the next word to leave your mouth may well be S%\*T).

## **The new science of our cross-wired senses**

*Yes, your ears can change what you taste. What discoveries about cross-sensory perception are revealing about the brain.*

*By Courtney Humphries*

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December 11, 2011

Martin Gee/Globe Staff

The senses have always been our portals into the outer world. We have the classic five that Aristotle talked about — sight, hearing, smell, taste, and touch — plus more recently recognized senses of balance, temperature, pain, and body position and movement. Each evolved to collect some distinct type of information about our environment, and to tell us our status within it.

That's largely how we tend to think about the senses, anyway: separately, each one its own distinct way to understand the world around us.

But in recent years, various findings have emerged to challenge that assumption — strange illusions in which one sense seemed to change the perceptions of another. One study published in 2000 particularly grabbed people's attention: When researchers at Caltech showed test subjects a brief flash of light accompanied by two quick tones, many people saw two flashes instead of one. The same effect occurred when the researchers



tapped their subjects' skin twice as the light flashed. **Vision — considered our most reliable and dominant sense — could be altered by sound or touch.**

And that wasn't all. Other studies showed that what people saw affected what they heard; **that certain types of music or background noise affected how food tasted;** and that smells could influence how a texture felt to the touch.

What the researchers were uncovering, in other words, is that our senses are not so separate after all. Scientists have realized that interaction between the senses “is the rule rather than the exception,” says Ladan Shams, one of the researchers who conducted the light-flashing study and now a sensory scientist at the University of California at Los Angeles. From the earliest stages of perception, it appears, the senses are enhancing, competing with, and even altering one another in surprising ways.

Since then, a new field has emerged to study cross-sensory perception, with laboratories throughout the world devoted to understanding how the senses merge. Scientists are developing a new way of thinking about how our brains are organized and how we perceive the world. And what began as basic scientific research to understand the brain's organization is spreading into other fields, such as marketing: **Companies are starting to engineer foods that taste better by appealing to the eyes and ears,** for instance. The work may even have implications for medicine — helping to explain, say, how the brain can compensate for a missing sense — and for education.

It might seem unsettling that the perceptual tools we rely on to navigate the world are so fluid — not just capable of being fooled, but capable of fooling one another. But the constant interaction and interference between our senses, in fact, is central to one of the brain's most astonishing feats: its ability to take a sea of complex, conflicting sensory input and assemble it into a fairly reliable picture of the world.

Philosophers have long debated the primacy of the senses in knowing truth, but they have rarely questioned their separateness. The Epicurean poet and philosopher Lucretius, for example, argued that the senses couldn't

influence one another, “for each has powers discrete and apart, its separate force.” Because of these separate powers, he reasoned, “it must be, then, that one sense cannot prove another wrong.”

Yet we’ve always understood intuitively that senses do affect one another in certain ways. As anyone who’s ever eaten dinner while nursing a bad cold knows, nearly all of food’s flavor comes from our sense of smell, not taste. Since the dawn of the talkies, moviegoers have experienced this kind of sensory interaction, too. Their ears might hear sounds from a speaker behind them, but their eyes persuade them that the voices are coming from actors projected on the screen.

Now, science is showing that such connections among the senses are more widespread and deeply rooted than we ever imagined. What happens in the movie theater isn’t just an isolated illusion — the blending of sensory information is critical for the brain to create a seamless interpretation of its outside world.

Research into perception is following suit. Over the past decade, previously disparate studies of the senses have begun to merge. There is now a yearly conference devoted to multisensory research, and the topic is finding its way into neuroscience meetings. Some scientists focus specifically on the integration of senses, while others have expanded their previously single-sense research to include others. Shams, at UCLA, says that while some people initially doubted whether isolated illusions had bearing on the everyday function of the senses, most now accept there are countless ways they are intertwined.

One researcher who has spearheaded this change is psychologist Charles Spence, head of the Crossmodal Research Laboratory at Oxford University. While neuroscientists have been piecing together how senses connect in the brain, his work has revealed how the crossing of sensory information affects perception and behavior. His recent work on the psychology of flavor perception, for instance, has shown that the flavor of your food is influenced by touch, vision, and even sound. A study from his lab a few years ago showed that people rate potato chips as crisper and better-

tasting when a louder crunch is played back over headphones as they eat. **A study published this year showed that people thought a strawberry mousse tasted sweeter, more intense, and better when they ate it off a white plate rather than a black plate.** Other researchers have conducted similar studies showing that our impressions of experiences, and our emotional responses to them, derive from a blending of different kinds of sensory input — a process that is usually completely unconscious.

These findings are leading to a fuller picture of how we really perceive the world around us. **Barry Stein, a multisensory scientist at Wake Forest University,** says that what's been surprising is how early in the process of perception the senses begin to overlap. Even before the brain makes higher-level judgments about the sensory information it is receiving, Stein says, special “multisensory neurons” that respond to more than one sense begin to synthesize it.

This process allows the brain to quickly blend different channels of information into one impression. In some cases, senses enhance one another: A distant image paired with a weak sound can appear more noticeable than each alone. In some cases they compete with each other and one wins out (as your eyes win over your ears in the movies). In others, the information merges into something new; when people watch a video of a person saying “ga” while the audio is dubbed with a voice saying “ba,” they hear an intermediate “da.” Though the senses can fool us in certain cases, being able to integrate them helps us make a quick judgment and move on, rather than puzzling over conflicting information.

The ability to coordinate among the different senses seems to be something the brain learns; we're not born being able to do it. “You'd think that the brain comes with all this hardware built into it,” says Stein. “But that's not the case.” Instead, research shows that after we're born, the brain quickly learns to put information from the senses together. This early wiring of the brain to coordinate sensory input helps explain why people born without a sense who then regain it — such as deaf people who receive cochlear implants later in life — have a difficult time learning to integrate the new sensory information.

This research sheds light on other fascinating phenomena that neuroscientists have observed in those with impaired sensory functions, too — and it may ultimately suggest possible therapies. **In blind people, for example, research has shown that the sense of touch activates the visual cortex; in other words, areas of the brain normally designated for processing one sense can adjust to make use of information from another.** Then there are people, like those with autism or other conditions, who have impaired abilities of sensory integration. Therapists influenced by the science of multisensory integration have worked with people with autism to create “sensory diets,” interventions that focus on using senses together.

And the new work may ultimately affect how the rest of us learn, as well. **Shams’s group at UCLA has found that people learn a visual task better when it’s accompanied by sound, for instance — even when they are later tested using only vision.**

In broader commercial applications, meanwhile, the science is already providing a new basis for what marketers have long surmised: They are selling customers more than just the core sensory experience. Restaurant owners, for instance, know that choosing decor, lighting, music, and table settings that complement their food can boost their bottom line, and companies have long market-tested food products for texture and packaging as well as taste. But we are now beginning to understand that these elements don’t just create atmosphere and associations — they can actually make food taste different. **For example, several studies have found that adding red coloring can make drinks taste sweeter, allowing a company to reduce sugar content while turning color up a notch.**

**After all, no sight or sound exists in a vacuum; at the deepest neurological level, when we sit down to that meal, all our senses will be working together.**

## **Sound Science**

Many scholars have conceptualized radio as a low involvement medium (Speck & Elliott, 1997), with much of the overall time spent listening being actually spent doing other things while the radio plays in the background.

The implication here is that information from radio commercials mostly fails to penetrate the cognitive system. However, a recent series of studies using persuasive radio messages as stimuli (Potter, in press, 2000; Potter, Chen, Cho, & Zhou, 2000; Potter, Lang, & Bolls, 1998) suggests that while listener involvement may vary greatly from person to person, there are other structural attributes of an audio message that cause the human cognitive system to automatically pay attention to the message. The biological mechanism for this automatic allocation of cognitive resources is known as the **orienting response** (“the OR,” Pavlov, 1927; Sakolov, 1963; Watson & Gatchel, 1979). This is hard-wired into the cognitive system such that a person will predictably have an OR in response to **novelty** in the environment or to learned signals, such as hearing one’s name called out. An occurrence of an OR in a human subject can be identified by physiological changes such as a momentary deceleration in heart rate and increase in skin conductance over 6 to 10 seconds following the onset of the novelty into the environment (Graham, 1979; Watson & Gatchel, 1979;

The implications of this series of studies is that, regardless of the fact that radio tends to be a medium of lesser involvement, there are certain identifiable structural features that the human brain cannot help but cognitively process—at least initially. This is even the case if the listener has the radio on in the background while involved primarily in completing other tasks. One of these features that listeners automatically process is the beginning of a commercial message (Potter, Lang, & Bolls, 1998).