

## ERUPTION OF THE SENSES

We have always been taught that there are five basic senses (sight, hearing, taste, smell and touch). There is continued and rapid advancement in the study of how complex and integrated those five senses can be, and scientists are building applications around that integration. Many other senses – including kinesthetic sense, balance, direction, time and acceleration – beyond those governed by the basic five have not traditionally been considered “sensory.” However, we are now beginning to realize that the framework of five senses might be entirely too limited, like playing a piano with only five keys, and that there may be an unlimited number of human ‘senses.’ This eruption of our understanding about human sensory systems will revolutionize technology, research, health, environments, consumer products and customer service.

### Enhancing Sight Through Augmented Reality (AR) Applications

Several companies are developing innovative versions of their own “smart” eyewear:

- An AR display similar to Google Glasses allows wearers to turn pages in a digital book using their eyes alone. This frees up the hands of wearers so that they can focus on other work – whether they are military mechanics or hospital surgeons (789-1112).
- Diet Goggles use augmented reality to fool the brain into thinking the stomach is full. An embedded camera sends images of the food the wearer is seeing to a computer, where scientists manipulate the size of the image (629-0912).
- Nike SPARQ Vapor Strobe Eyewear is a new training accessory that improves athletes’ reaction time by strengthening their vision skills. The technique trains the brain to anticipate what’s coming next when vision is obscured (629-0912).
- O2Amp glasses amplify oxygenation that is typically too subtle for the naked eye to detect. The glasses could serve as a tool for more refined patient diagnosis (629-0912).

### Enhancing Intimacy Through Touch & Sound

- Several new gadgets and apps offer long-distance couples novel ways to maintain intimacy:
- Kissenger can transmit the motions of a loved one’s lips from afar. The Lovotics product consists of two toy-like objects with huge lips that, when kissed by one user, can be felt when the other partner kisses theirs. The artificial lips measure the size, pressure and movement of real lips, providing a convincing sense of telepresence (630-0912).
- Pillow Talk is a prototype device which allows long distance partners to hear the real-time heartbeat of their companion while falling asleep (630-0912).
- The app Pair allows couples to “thumbkiss” by pressing the same spot on the screen, which then vibrates for makeshift, yet comforting, physical contact (630-0912).



### **Enhancing Data by Transforming it Into Sound**

We may soon be able to “hear” data. Artist Erin Gee is creating robots that translate human emotions into song. Microelectrode needles could be inserted into a peripheral nerve to record signals sent directly from the brain through the nervous system. This would provide an electronic picture of that person’s emotions. Software would then convert those electronic signals into instructions for music-creating robots (725-1012). Additionally, scientists from the U.S. Department of Energy’s Argonne National Laboratory recently took the data from microbial samples collected in the English Channel and turned them into musical notes. Researchers thought that turning the data into music – rather than creating a visual representation – was the best way to make sense of it all (724-1012).

### **Sensory Therapy**

While traditional therapy is on the decline across the U.S., the psychology field is experiencing a surge of creative new alternatives that better engage human senses to improve patients’ outlook:

- Immersionis is a videogame that uses virtual reality therapy to treat war veterans suffering trauma upon their return home. Similarly, SuperBetter is a customizable interactive tool designed to build personal resilience for those facing major life challenges (726-1012).
- Hip Hop Therapy is a self-proclaimed school of philosophical inquiry that utilizes the genre’s steady beats to supply both “emancipatory therapy and liberating education” (726-1012).
- Designed to guide students to a more fulfilling relationship with books, bibliotherapy pairs “literary patients” with consulting “bibliotherapists,” whereupon they work together to determine unique reading lists geared towards personal enlightenment (726-1012).

### **Other Innovations Involving the 5 ‘Traditional’ Senses**

- Inquire aims to be the world’s first intelligent textbook. At first, it looks like a dense textbook – until someone highlights text. Then, a question list appears in the margin. Touch one and the reader is taken to a page of information specific to the concept they are stuck on. Type in their own question and AI software will build a new page to answer their query (684-0912).
- In the near future, drivers may not have to stretch to look out their car windows while backing into parking spots. New optical camouflage technology could make the entire interior of a car look as transparent as glass (779-1112).
- On a rough street in London, shopkeepers are betting that babies can help change the ways of local criminals. Ogilvy and Mather advertising agency, which paid graffiti artists to paint the shop-front portraits from baby photos sent in by local families, claims the idea of using cuteness as a crime deterrent is backed up by science (671-0912).
- A glow-in-the-dark smart-road has been developed in the Netherlands. Designers created a photo luminescent powder to use for road markings, which gather energy throughout the day from the sun – enough for 10 hours of light once night falls. When the temperature falls to a certain point, glow-in-the-dark snowflakes will appear to alert the driver (778-1112).



## **Beyond the ‘Five Senses’ – Emerging Insights into Other ‘Senses’**

### **Sleep Senses**

- Forty-two of the Las Vegas MGM Grand’s rooms are now “Stay Well” rooms, designed to reinvigorate travelers and make them feel better. Guests will experience melatonin-producing lighting for better sleep and quicker jetlag recovery, electromagnetic field protection for sounder sleep and dawn-simulator alarm clocks (727-1012).
- Even while in a deep sleep, people can still learn new information. Sleepers soak in new associations between smells and sounds – knowledge that lingers into the next waking day. Scientists also recently found that musical skills could be strengthened if a person listened to song recordings during sleep (737-1012). The realization that sleeping and dreaming actively engage our basic five senses and could both constitute their own senses is highly intriguing.

### **Presentiment**

Presentiment without any external clues may, in fact, exist, according to new research. A person playing a video game at work while wearing headphones, for example, cannot hear when their boss is coming around the corner. However, if someone were tuned into their body, they would be able to detect these anticipatory changes between two and 10 seconds beforehand and close their video game. This phenomenon is sometimes called “presentiment,” as in “sensing the future,” but researchers are not sure whether people are actually sensing the future (791-1112).

### **Sense of Language**

An actual sense of language may impact human behavior more than ever previously understood. Languages differ in the degree to which they distinguish future events from the present. For example, in what linguists call strong future-time reference (FTR) languages, a speaker says, “It will rain tomorrow.” In a weak-FTR language like German, one simply says, “Tomorrow it rains.” Strong-FTR speakers have to do a little more verbal work to make it clear they are talking about the future. This subtle difference actually changes the way speakers of different languages conceive time – which affects how people act in the present. Psychological research shows that linguistic differences actually do affect the perception of external phenomena. Weak-FTR languages include German, Mandarin, Japanese and the Scandinavian languages. English, Greek, Russian and Spanish are strong-FTR. Researchers found that speakers of weak-FTR languages on average save more for retirement, smoke less and are less likely to be obese (701-1012).

### **Sense of ‘The Earth’**

Electroreception is the ability to detect electric fields. Several animal species have this capacity to sense changes in electric fields in their immediate vicinity. However, up to this point, this sense has not been verified in humans. That being said, a tenet of some spiritual and meditative beliefs is that people can harness their ability to ‘sense’ the Earth, nature and everything around them – perhaps through electromagnetic signals. Capitalizing on this, Chef Timo Linnamaki is opening a restaurant in Finland located 80 meters underground, in a limestone mine. He said the idea of preparing food down a mine was all part of being close to the earth (641-0912).



## **Vibration**

According to a recent study of medical workers, 76 percent say they have experienced “phantom vibration” – an insistent buzz from imagined texts or phone calls. Scientists speculate this to be the result of random nerves firing – biochemical noise that our brains easily tuned out until they were reconditioned by modern smartphones (689-1012). Many people may already be tuned into vibrations and frequencies in the external environment. But perhaps modern technology itself has actually rewired humans to have a more easily-identifiable and pervasive sense of vibration.

## **Implications:**

Enhanced multi-sensory engagement is becoming a critical tool in the reinvention of long-standing businesses, systems and products. Consider public libraries, for example. These days, libraries are beginning to look very different. In addition to lending traditional media materials, libraries are becoming community centers for creativity and innovation. Recently, the Online Education Database published a list of the *10 Most Amazing Library Laboratories*. Through book publication, digital media workshops, “makerspaces,” and even organic gardens, these laboratories are demonstrating that libraries are not just places to borrow things, they are also places to make things – and ultimately, engage the senses (758-1012). And this extends to...

## **Changing the Sensory Interface in Customer Service**

Enhancing the sensory experience could revolutionize customer service. Boston’s Logan Airport, for example, has a new hologram-like virtual assistant named Carla. She stands by one of the checkpoints, explaining the rules for passing through security. As projection technology improves, airports have become the latest industry to experiment with virtual helpers and an imagined sense of presence. In other examples, human tellers may disappear entirely from branches of certain banks. They will be replaced by video-conferencing kiosks connected to staff housed at a central location (621-0912). In this scenario, customers could have increased visual and auditory engagement with customer service, but the sense of intimacy inherent in physical proximity will essentially disappear.

## **Robotics, Digital Replications & Avatars**

Hugh Herr, a roboticist at MIT, made the claim that during the 21<sup>st</sup> century disability would be largely eliminated. In the future, he suggested, people might choose to replace arthritic, painful limbs with fully functional robotic ones (739-1012). We may now be able to 3D print these from our own body cells. If such devices can restore sight or mobility, it may be necessary to ask the question: Will artificial extensions of the human body be able to “sense” in the traditional way? If sensory inputs can effectively be replicated, will they be considered truly authentic? And what will the ramifications be for anyone – designers, marketers or policy makers – who interface with those previously considered “disabled?” Similarly, it is fast becoming possible to create digital proxies of ourselves to represent us remotely. They can be programmed with our characteristics and preferences, are able to perform chores like updating social networks, and can even hold conversations (625-0912). And as advanced and “human” as avatars and digital copies of people may become, they might ultimately be limited by the fact that they cannot truly engage with the external environment through human sensory systems.



### Capitalizing on the “New” Senses

Ancient traditions frequently revolved around sensory engagements that have been ignored in the modern world. Sleep senses, presentiment and a sense of the Earth – among others – may seem like “softer” senses to accurately quantify, but they are fast becoming legitimized by science. And increasingly, organizations of every kind will begin taking them into account. There are already visible undercurrents in the marketplace of consumer-facing businesses that are promoting more spiritually-based, Earth-connected and nature-connected products. In an era when many people are struggling to define their spiritual center – especially outside the structure of organized religion – these newer, alternative senses will become *big* business.

### Crowdsourcing the Senses

After performing a Yahoo! image search for photos of Comet Holmes, which passed Earth in 2007, a team of astronomers used the returned images to reconstruct the comet’s orbit in three dimensions – proving that astronomers can take advantage of data provided by an unwitting group of participants. Now, astronomers are assembling an image-based map of the entire sky, an effort that will focus on every astronomical object in the scientific literature over the last 100 years. Other fields, like medicine and meteorology, could also benefit from this crowdsourced data mining (640-0912). Similar to the example of researchers converting human emotions into musical data, taking what people collectively see, hear, touch, taste and smell and weaving it into a useful tapestry is perhaps the next major evolution of “big data,” which is already moving toward visualization as an interpretive tool.

### Consumers Processing Sensory Information Differently

People are now responding to basic sensory inputs in new ways. For example, it used to be that when someone went into a museum, they stopped to actually process and look at all of the art as visual inputs. However, modern research indicates that because of smartphone technology, many museum-goers skip the step of actually looking at the artwork and move straight to photographing (689-1012). Marketers will have to adjust how they package their products in an era when people may respond to sensory stimuli differently, reprioritize (either consciously or subconsciously) incoming sensory stimuli or ignore the stimuli altogether.

### Innovative Companies Taking the Lead – Case Study: Disney

Innovative companies can develop, and already are developing, concrete applications to engage consumers in novel, multi-sensory ways. Disney, as a practical case study, is a great example of a large company innovating in three separate areas here:

- The Disney Human-Computer Interaction Research Team is engineering plants to become touch interfaces for controlling computers – a project it calls ‘Botanicus Interacticus.’ They have been working out unique ways to interact with objects, whether developing circuits to provide tactile feedback or broadening the kinds of experiences that touch interactions can make possible. This noninvasive fusion of plants and computers could lead to much richer interactivity with physical environments that could also incorporate music and art (635-0912).
- Disney recently outlined patent plans for augmented-reality and interactive cakes and other food products. Entire digital worlds could be mapped over an AR cake’s surface where waterfalls, snow-



capped mountains and flowing volcanoes could be brought to life. Anyone could manipulate the landscape by using certain props to trigger stimuli (719-1012).

- Girls aged 3-12 can now have a princess figurine made with their face on it. Using a hi-res 3D facial scanner to create a digital model, girls can select which of three expressions they want to be printed onto one of the seven classic Disney princesses (803-1112).

### **Collecting Data on Individual Consumers' Senses**

With all the emphasis on collecting massive amounts of data about consumers – preferences, habits, relationships, etc. – collecting data on how various stimuli affect their senses may well be more critical to marketing, product development and relationship-building in the future.

