

The Ultimate Experience: A Guide to the Principles of Sensory Design

Digital design routinely ignores neurological factors beyond sight. Sensory design principles emphasize the interconnection of human perception and prompt designers to explore non-visual solutions.

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Sight isn't the only way to experience the world: Senses work in tandem to guide cognition, movement, and communication. Experts posit that humans possess between 9 and 33 distinct senses, yet digital design routinely ignores neurological factors beyond sight. Sensory design principles emphasize the interconnection of human perception and prompt designers to explore non-visual solutions.

Life Is Multisensory

Smell-O-Vision.

AromaRama.

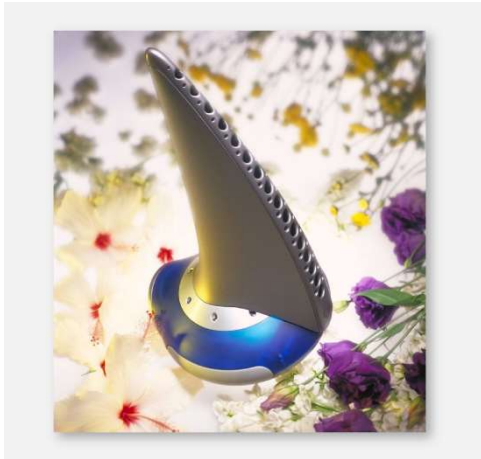
iSmell.

Real names of real products once thought to be the next big things in entertainment and technology. **All three failed miserably, along with countless other olfactory gadgets and multisensory gizmos.** [iSmell](#) bankrupted its founders, AromaRama faded into oblivion, and Smell-O-Vision made Time's "100 Worst Ideas of the Century" in 1999.

Contraptions such as [Smell-O-Vision](#) and iSmell represent the lower rungs of practicality. They also reveal a profound impulse that permeates invention: the desire to form symbiotic ties between products and the people who use them.

Unfortunately, most digital designers attempt to establish these ties through sight and sound alone, as if humans were all eyes and ears. To some degree, that makes sense. **The practical constraints of digital devices make vision and hearing the most obvious experiential targets.** It would be unwise to advocate the implementation of AromaRama-like hardware into smartphones, tablets, and laptops.

Still, myriad activities of humanity are multisensory. Everything from leisure to language requires a symphony of senses. Are vision and hearing the only modes of perception worth considering in the digital design process?



At the 2001 Consumer Electronics Show in Las Vegas, DigiScents launched iSmell, a USB device that paired with websites and email clients to bring fragrance to the internet.

The Five-Sense Myth

If there were a sense hierarchy in digital product design, it would consist of sight, hearing, and touch. The reason why is evident: mobile devices rely on visual, auditory, and tactile feedback. **But not only are there more than three senses, there are more than the five commonly cited.** Aristotle made that [pentamorous proposition](#), but today, experts suggest that humans have between 9 and 33 distinct senses.

At a high level, there are four types of human sensory receptors and four physical stimuli: photoreceptors (light), chemoreceptors (chemicals), thermoreceptors (temperature), and mechanoreceptors (mechanical forces). The information gathered from receptors and stimuli triggers processes such as vision, hearing, and smell (also called “sense modalities”). There are [nine](#) sense modalities — or sensations perceived *after* stimulus:

1. Vision
2. Hearing
3. Smell
4. Taste
5. Touch
6. Pain
7. Mechanoreception
8. Temperature
9. Interoception

Each of the nine modalities has sub-senses that are up for debate. Some are considered plausible, and others are deemed radical.

1. Vision

The power to see objects by use of the eyes

2. Hearing

The faculty by which sounds are perceived in the ears

3. Smell

The ability to detect odors through the nose

4. Taste

The sense through which the tongue discerns flavor

5. Touch

The sense by which materials are perceived through physical contact

6. Pain

The sensation of distress in a part of the body

7. Mechanoreception

The body's perception of vibration, pressure, or other mechanical stimuli

8. Temperature

The discernment of hot and cold through receptors in the skin

9. Interoception

The detection of stimuli and sensations originating within the body

How Are Sensory Design and Digital Design Related?

Whether there are 5, 9, or 33 [senses](#), designers prioritize sight, hearing, and touch because it's impossible to taste, smell, or feel an app's temperature. But what if it wasn't?

At the core of sensory design lies this reality: Every digital interaction is a sensory experience. The aim is to:

- Make sensory engagement more intentional and multifaceted
- Activate the senses in ways that bolster UX (enhanced navigation, improved discoverability, etc.)
- Create product (and brand) experiences that are more appealing and memorable

To leverage perception's full potential, designers need a principled framework for including senses in the [digital design](#) process.

3 Aims of Sensory Design

Make sensory engagement more intentional and multifaceted

Activate the senses in ways that bolster UX (enhanced navigation, improved discoverability, etc.)

Create product (and brand) experiences that are more appealing and memorable

9 Principles of Sensory Design

1. Learn About the Senses

To design for the senses, one needs a robust knowledge of receptors, stimuli, and modalities. It's wise to investigate sensory [disorders](#) and the various [theories](#) about how senses work. There's much to learn: **many scientists and specialists devote their entire careers to studying individual modalities and stimuli.**

2. Include the Senses in Research

Sensory design demands research. **As with other design disciplines, relying on hunches or personal experiences falls short of good practice.** Depending on the product and features planned, designers can use [UX research methods](#) to gather insights and iterate throughout the product development process. Even in the absence of formal user research, there's no shortage of peer-reviewed texts to help develop sensory design ideas.

3. Investigate the Relationships Between Senses

Senses work in [tandem](#). Sensory integration is a process whereby the brain prioritizes information from senses and surroundings to inform bodily responses. For example, the brain combines:

- Sight and hearing to decipher communication cues
- Temperature and pain to prevent injury
- Smell and taste to trigger digestion

In digital design, sensory pairings should be tested, as presumed relationships may produce unintended responses or usability obstacles.

“...there is not in the normal subject a tactile experience and also a visual one, but an integrated experience to which it is impossible to gauge the contribution of each sense.”

— Maurice Merleau-Ponty, Phenomenology of Perception

4. Target Specific Senses

Design concepts filter through a process of ideation, testing, and review. Even when ideas don't work as planned, the process yields valuable insights for subsequent efforts. **The same intentionality must apply to sensory choices.** Otherwise, it's difficult to discern how sensory features help or hinder the user experience.

5. Trigger Synesthetic Experiences

The objective of sensory design isn't to outfit mobile devices with expensive accessories that spray pheromones or simulate pressure. **Given the technological landscape, the real opportunity of sensory design exists within digital products themselves.** How so? By employing digital design elements to activate modalities other than sight, hearing, and touch — even when prototypical stimuli aren't present.

If that seems far-fetched, consider that 1 in 23 people experience a persistent commingling of perceptual pathways known as [synesthesia](#). Colors are tasted. Music is seen. Smells are touched. And while synesthesia is relatively uncommon, synesthetic experiences are not — a truth long leveraged in marketing [strategies](#) used to uncover cross-sensory connections and metaphors.



Sensory connections are complicated. In one experiment that leveraged participants' sight and proprioception, researchers poked a prosthetic limb and stimulated real pain and touch sensations. ([Live Science](#))

6. Discover the Sensory Implications of Design Elements

In addition to searching for synesthetic connections, designers should be aware that design choices may have unforeseen sensory implications:

- Patterns cause dizziness
- Words elicit taste
- Images evoke odors
- Sounds stimulate [touch](#)

It's not necessary to agonize over all aesthetic elements but it's smart to consider their hidden sensory potential, especially in the case of high-impact words and graphics.

7. Impose Hypothetical Sensory Constraints

Sight is the principal sense and primary means of analyzing the world. Whether designers are aware or not, it's an ever-present design factor, shaping most every decision. **A helpful way to escape sight's sway is to impose a hypothetical constraint: What if vision wasn't an option?** This scenario has real-world accessibility ramifications that warrant discussion but the [constraint](#) is meant to:

- Spur creative thinking
- Expose the degree to which digital products ignore other senses

- Force designers to explore alternative sensory solutions

8. Avoid Sensory Overload

Sensory overload is real. Combining sounds, images, and animated UI components may be delightful but it could also backfire. **If a user is looking for information or engaging with content, introducing sensory features might be distracting.** Depending on the context, sensory elements can be obvious or subtle. Either way, they should elevate UX, not overwhelm it.

9. Include Senses in Product Strategy

Novelty has its place in product design. Many companies launch one-off features to generate buzz but gimmicks lose their charm. Sensory design isn't a garnish. It's a design pursuit based on the scientific realities of human cognition. As such, it should be integral to a product's strategic vision from the outset.

With careful planning and regular refinement, sensory features can transcend functionality and permeate the subconscious associations that make brands and products desirable.

9 Principles of Sensory Design

1. Learn about the senses
2. Include the senses in research
3. Investigate the relationships between senses
4. Target specific senses
5. Trigger synesthetic experiences
6. Discover the sensory implications of design elements
7. Impose hypothetical sensory constraints
8. Avoid sensory overload
9. Include senses in product strategy

Embrace Sensory Experience Design

Perhaps the future of sensory design will usher in a physical-product paradigm that regards the totality of human perception. From wearables to neural links and [haptic interfaces](#), there's no shortage of emerging [multisensory devices](#). None has achieved market control but that does not negate the impulse to untether communication and commerce from smartphones and laptops.

For all the talk of unchecked technological advancement, industrial change isn't instantaneous. The expectations and behaviors associated with digital products are deeply ingrained, and the bulk of design

knowledge centers on [visual elements](#) and experiential patterns. Even if sensory-savvy physical products are nearing prominence, it will take time before they achieve the smartphone's [ubiquity](#).

Until then, the future will resemble something of the present. In a world in which mobile devices remain dominant, it's up to [designers](#) to incorporate sensory principles into their design processes. Whatever happens, there's an opportunity to create innovative sensory experiences and make digital products more useful, efficient, and memorable.

Further Reading on the Toptal Blog:

- [UX and the Importance of Web Accessibility](#)
- [Design Constraints Are Not Restraints, They Stoke Creativity](#)
- [The Mind's Eye: A Look at Data Visualization Psychology](#)
- [Designing for Interactive Environments and Smart Spaces](#)
- [Aesthetics and Perception: How to Approach User Experience Imagery](#)

Understanding the basics

- What is sensory design?

Sensory design is concerned with creating products and experiences that engage the gamut of human senses, either simultaneously or across multiple customer touchpoints. Sensory design doesn't have large numbers of practitioners, but it impacts designers in fields such as UI, UX, and Branding.

- How do you create a sensory experience?
- What is multisensory design?
- How many sensory systems are there?
- What are the sensory skills?

Tags

- [UX](#)
- [DesignPsychology](#)
- [DesignProcess](#)



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About the author

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