

Perceptions of the Senses

Perceptions of the senses

About the research

If you'd like hard copy of this information, you can download it below.



PDF Version

PerceptionsOfTheSenses.pdf - 65KB

Who is conducting the research?

The research is being conducted by [Dr Christine Cuskley](#), a lecturer in language and cognition at [Newcastle University](#). If you have any questions or feedback about the research, you can contact her at christine.cuskley@ncl.ac.uk

What was the research about?

The goal of this research is to learn more about how much of a gap there is between the general public's understanding of sensation and perception, and what scientists know about sensation and perception. We're looking to create materials which can bridge this gap, but first we need to know exactly how large it is and what it looks like – this is why we hope you answered the questions without any Googling!

We genuinely want a picture of where people are now, so we can see what this gap is like. We think that the gap is considerable, and it has wide-ranging implications: sensory experience shapes how we view the world. We hope that spreading awareness in particular about how sensory experiences differ across individuals can help us to better understand and connect with one another, and be more inclusive.

Why did you collect some information about me?

The questions we asked you about your age, where you live, and your educational experience will help us to better understand how these factors might affect peoples' understanding of the senses. It may be that sensory variation is more widely accepted and better understood in certain parts of the world or certain communities, and for example, if

you have a PhD in Neuroscience, you probably have a pretty good grasp of these concepts already.

What will you do with my responses?

We really appreciate your participation, and all of your responses are completely anonymous. We didn't collect any information specific enough to be able to identify you even if we wanted to. We aim to put all the responses together (hopefully hundreds) and look at broad trends across people who are responding. **These broad trends may be released to the public as part of scientific publication, or used in teaching**, but individual data will never be identifiable.

If for any reason you want us to remove your responses from our dataset, you're well within your rights. Just contact the researcher responsible, christine.cuskley@ncl.ac.uk, with the approximate date and time you completed the survey.

Learn more

If you'd like to learn some more detail about the things we asked about within the survey, click on the 'Learn More' link below or to the right.

Learn more

Here, we'll go over the "correct" answers to the questions we asked about the senses. "Correct" is in scare quotes here because places where you got these "wrong" is the most interesting for our research, so don't feel bad if you weren't aware of these issues prior to reading this. We're interested in exactly where people don't already know much of the information presented here.

How many senses do we have?

In school, we're generally taught that we have 5 senses: sight, hearing, smell, taste, and touch. We do have these five senses, but there's actually more to it.

We all have a "sixth sense" called **proprioception** (sometimes also known as *kinesthesia*). This is our sense of ourselves in space. Close your eyes and describe where your right hand is – how do you know if you can't see it? You can *feel* where it is, even if you suspend it in the air and you aren't touching anything with it. This is proprioception, and it can be disrupted temporarily or more permanently in a variety of ways, sometimes severely. Temporary disruption can happen if you're very tired, or when a person is growing relatively rapidly (for example, during the teen years) – this causes what we'd normally experience as clumsiness, stumbling, or tripping, for example. More permanent and severe disruption to proprioception – usually caused by brain injury – can cause a person to rely heavily on e.g., vision to locate their own body in space.

Beyond this, there are other "senses" – sensitive nerves in your inner ear coordinate with your proprioceptive system to help you balance (known as the **vestibular system**), you actually perceive pain and temperature separately from touch and pressure (though both are processed through the skin), and we even sense more abstract things like the passage of time. In short, while we do have five senses, our sensory systems are arguably much richer than most people realise!

How do the senses relate to each other, if at all?

Many people think of the senses as being fairly separate from one another, but they actually work together very closely. Although there is some evidence of separate brain areas for separate senses (like a vision area of the brain), there is also very good evidence that these areas work together. Most of the time, we experience something in more than one sensory system simultaneously: I can hear the noise my keyboard makes, I can feel the keys, and I can sense my hands resting on the keyboard all at once.

This happens because I'm touching the keyboard and it makes a sound when I press, but in some individuals, known as *synaesthetes*, touching something like a smooth plastic key on a keyboard might make them see a particular color, even though it isn't really there.

Likewise, **infants as young as a few months old** - and **even monkeys** - have strong expectations about what something will look like even if they've only touched it. Overall, scientists now understand that the senses are, at a minimum, highly, if not fundamentally, connected.

Individual Variation in Sensory Experience

We gave a list of words you may or may not have known that relate to how sensory experience varies. Below we define each.

Synaesthesia

Synaesthesia, from the Greek *syn-* (together) and *-aesthesia* (feeling) is a "joining of the senses" - it occurs when you experience stimuli to one sensory system in multiple ways. A synaesthete might experience a taste when they touch a particular shape, or see a particular colour when they hear a certain word. Synaesthesia is usually a life long condition and is thought to be inherited to some extent, although learning plays an important role. The most common type of synaesthesia is coloured letters, and it's estimated to **occur in about 5% of the population**. Synaesthesia might not be typical, but it doesn't put synaesthetes at any disadvantage. It may even be helpful: it has been shown to boost memory performance, and there are unusually high rates of synaesthesia among **creative people**, with some famous examples being musician Jimi Hendrix and Vincent Van Gogh.

ASMR

ASMR stands for Autonomous Sensory Meridian Response - it's a pleasant sensation people experience when hearing certain sounds, often described as tingling which is located in the head or scalp. ASMR is generally a pleasant experience. Some believe it might be a kind of auditory tactile synaesthesia. ASMR was only discovered in 2010, so it's not yet clear how prevalent it is. However, it has spawned a large genre of YouTube videos and vibrant online communities, suggesting it's quite common.

Misphonia

Misphonia is a severe negative emotional response (like anxiety, rage, or panic) to certain sounds. It's also known as 'selective sound sensitivity'. It's **caused by genuine differences in the way the brain responds to sounds**, and it may effect up to 20% of the population. It's often caused by sounds made by the mouth (for example, while eating), but can be caused by other kinds of sounds (for example, repetitive tapping or rustling). The disorder can have serious negative social effects, particularly since others often percieve a misphonic response as unreasonable over-reaction to a sound. Between the reaction of others and the trigger sounds themselves, misphonia can make it difficult for an individual to socialise with others (particularly where it may involve eating or drinking). Like ASMR, misphonia might be related to synaesthesia, with sounds eliciting an unusually strong emotional response. ASMR and misphonia also seem to be related, with **an unusually large proportion (about half) of misphonics also experiencing ASMR**.

Prosopagnosia

Prosopagnosia is a condition related to visual areas of the brain which specialise in facial recognition and perception, diagnosed in about 2.5% of the population from birth (but it can also be acquired through injury). A person with severe prosopagnosia can't process *faces specifically* even though their visual system is completely intact - they may not even recognise their own face. However, prosopagnosia can also be very mild – a person can just be bad with faces, but may not even notice this, unconsciously relying on other cues (e.g., voice, consistent accessories like glasses) to recognise people. These milder cases are generally not diagnosed. There's also another side to this coin – some people are super recognisers of faces. They never forget a face, and are more likely to see faces in objects (a form of **pareidolia** – the tendency to see patterns in random stimuli).

Aphantasia

Aphantasia is the inability to voluntarily generate mental imagery. If someone says “picture an apple”, many people can generate a generic kind of picture of an apple in your head. Maybe it’s not very good or very detailed, but it’s possible. However, if you’re aphantasic, you can’t do this – it’s sometimes described as “having a blind mind’s eye”. This is often related to prosopagnosia and doesn’t help especially with any visual memory task, but aphantasics are otherwise normal, and may not even realise that there’s something they can’t do others can. [This personal essay](#) describing the experience of aphantasia provides a good sense of the phenomenon. Although it’s been recognised since the late 1800s, it’s very much understudied, and there are no reliable estimates of how common it is.

Proprioception

Proprioception is our “sixth sense”, and is the technical term for your ability to sense your own body in space (also sometimes called *kinaesthesia*). Close your eyes and describe where your right hand is – how do you know if you can’t see it? You can *feel* where it is, even if you suspend it in the air and you aren’t touching anything with it. This is proprioception, and it can be disrupted temporarily or more permanently in a variety of ways, sometimes severely. Temporary disruption can happen if you’re very tired, or when a person is growing relatively rapidly (for example, during the teen years) – this causes what we’d normally experience as clumsiness, stumbling, or tripping, for example. More permanent and severe disruption to proprioception – usually caused by brain injury – can cause a person to rely heavily on e.g., vision to locate their own body in space.

Amusia

Amusia is the technical term for what you might think of as being “tone deaf” – basically, having no ear for music whatsoever. Though lots of people may claim this, it’s actually fairly rare, only occurring in 4% of the population. People who are amusic aren’t just shy about their singing voice – they report music sounding no different than loud noise. The flip side to amusia – perfect or absolute pitch – is also rare, but the vast majority of people can in fact carry a tune and enjoy music. Alongside language, music is one of very few behaviours that are both uniquely and universally human – no other species appears to do music quite how we do, and it occurs across almost all human cultures. Even individuals who cannot hear (or cannot hear well) can feel and enjoy music (it is, after all, made up of vibrations).

CIPA

CIPA stands for *Congenital Insensitivity to Pain with Anhidrosis*, and it’s a rare genetic disorder that prevents someone from perceiving pain or temperature (but their touch and pressure pathways are preserved). This may seem like a great superpower to have, but it’s actually incredibly dangerous: individuals with CIPA may not know if they’ve broken a bone, and can’t feel if they have a life-threatening fever, for example (which is compounded by anhidrosis, which is difficulty sweating). Although CIPA is exceedingly rare – only about 20 cases have been reported in the literature – it has taught researchers a lot about the genetics of pain and temperature pathways. It also underscores the importance of pain: although we perceive pain as being a *bad* thing, it’s actually functional and adaptive.

Labrynthitis

Labrynthitis is difficulty with balance and a sense of vertigo (the room spinning - often visually and proprioceptively). It is caused by inflammation in the labrynth, a fluid-filled structure in the inner ear which helps regulate your feeling of balance and movement. The experience is usually brief, lasting days or maybe weeks, but some individuals can suffer from it for months. When severe, labrynthitis can severely affect someone's quality of life, making it difficult to walk around unassisted, even for short distances.

Anosmia

Anosmia is the temporary or permanent loss or damage to your sense of smell. Temporary cases of this are incredibly common – mild anosmia can be caused by upper respiratory illnesses such as the common cold, which inflames the nerves inside your nose. However, brain damage can cause more severe and/or permanent anosmia. Sometimes anosmia is specific – people can't smell particular things, but their sense of smell is fine otherwise. Anosmia might seem trivial, but it can actually significantly affect an individual's quality of life particularly when it persists long-term or is permanent. Anosmia sufferers report a loss of appetite, and can experience depression, though these effects are less common among people with anosmia that have had it all their life. The inability to smell can also keep someone from sensing danger, like the smell of a lethal gas leak.

Culture, language, and the senses

The survey asked a few questions about how many spoken and signed languages there are in the world. There are estimated to be between 6 and 7 thousand spoken languages, and

between 150 and 300 signed languages, but potentially more. For both spoken and signed languages we only have estimates - not every language spoken in the world is well-documented, and language changes very rapidly.

Spoken languages are dying out at an alarming rate, with almost 500 languages classified as endangered. Many signed languages are also marginalised, particularly since 90% of deaf individuals are born to hearing parents, and most people are unaware of the vitality and richness of sign languages. However, new signed languages in particular are also constantly emerging, particularly as deaf populations come together. For example, [Nicaraguan Sign Language](#) emerged only in the last fifty years after centralised schools for deaf children supported the emergence of a deaf community.

What do languages have to do with the senses? A whole lot, it turns out. Researchers are only beginning to recognise [the role that gesture has within spoken language](#). While signed and spoken languages are fully equivalent in terms of the basic ingredients that make language *language*, sign languages are understudied. We still understand little about how the two modalities accomplish the same goals in different ways. While we are still filling in many details, we do know that in terms of speaking and hearing, there is definitely a lot of interesting variation across hearing and deaf communities. Interesting things also happen when the two interact, as with another recently emerged sign language, [Al-Sayyid Bedouin Sign Language](#), which emerged in a small bedouin community with both hearing and deaf individuals.

This extends to the other senses as well. Blindness or visual impairment can have some interesting effects on language, for example, [language occupies the brain differently in blind individuals](#). Beyond this kind of marked sensory variation, cultures across the world seem to exhibit some systematic variation. The spoken language(s) you happen to learn growing up [can determine how easy it is for you to perceive certain sounds](#), which may be partly responsible for the well-known difficulty adults have in learning foreign languages. Humans with typical vision share the same physiological organisation of the eye, and so can see colors the same way (with the exception of color blindness, which occurs in 5-10% of the population). But while the [focal colours across the world's languages are roughly the same](#), languages may divide colours in different ways - [what English speakers would call blue might be two completely different colours depending on the shade for speakers of Russian](#).