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Cacogeusia

The term cacogeusia comes from the Greek adjective *kakos* (bad, unpleasant) and the Latin noun *gustum* (taste). It translates as 'bad taste'. It is used to denote a *gustatory hallucination or illusion presenting in the form of an unpleasant taste. Cacogeusia is often associated with – and confused with – *cacosmia. Etiologically, it is associated primarily with diseases of the tongue, oral cavity, oesophagus, and stomach, as well as with disorders of the upper respiratory tract. Cacogeusia may also occur as a side effect of recently ingested food, drinks, therapeutics, or illicit substances. In some cases it can be attributed to central disorders of the gustatory tract. Cacogeusia is classified as one of the *chemosensory disorders.

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Cacosmia

The term cacosmia comes from the Greek words *kakos* (bad, unpleasant) and *osmè* (smell, stink, fragrant, odour, scent, perfume). It translates as 'bad smell'. The term cacosmia is used to denote an *olfactory hallucination or illusion presenting in the form of an unpleasant odour. Some examples of cacosmia are the odours of burning flesh, faeces, garlic, rotting fish, rotting eggs, vomit, and garbage. Cacosmia is often associated with – and confused with – *cacogeusia. Cacosmia is classified as one of the *chemosensory disorders. The term is used in opposition to the term *agathosma (i.e. 'good smell'). When cacosmia takes the form of an *olfactory hallucination experienced as emanating from the oral cavity, the term *hallucinated halitosis applies.

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Café Wall Illusion

A term used to denote a marked wedge distortion that can be observed in horizontal rows of black and white tiles offset by half a tile width in alternating rows (a so-called Münsterberg checkerboard figure), with visible mortar lines in between the horizontal rows. The illusion consists of the horizontal mortar lines appearing as being tilted. The Café Wall illusion was first reported in 1979 by the British psychologists Richard Langton Gregory (b. 1923) and Priscilla Heard. It had been brought to their attention by a member of Gregory's lab, who had observed it at the front of a café (St. Michael's Hill, Bristol, UK) which was adorned with black and white ceramic tiles. The mediation of the Café Wall illusion is attributed to a combination of simple image processing occurring at the retina, and complex pro-

cessing carried out by the cortical cells of striate cortex. The Café Wall illusion is usually classified as a *physiological illusion.

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Cambiata Illusion

see Musical illusion.

Cannabis-induced Hallucination

Cannabis and its various products are known under many names, including bhang, canvas,

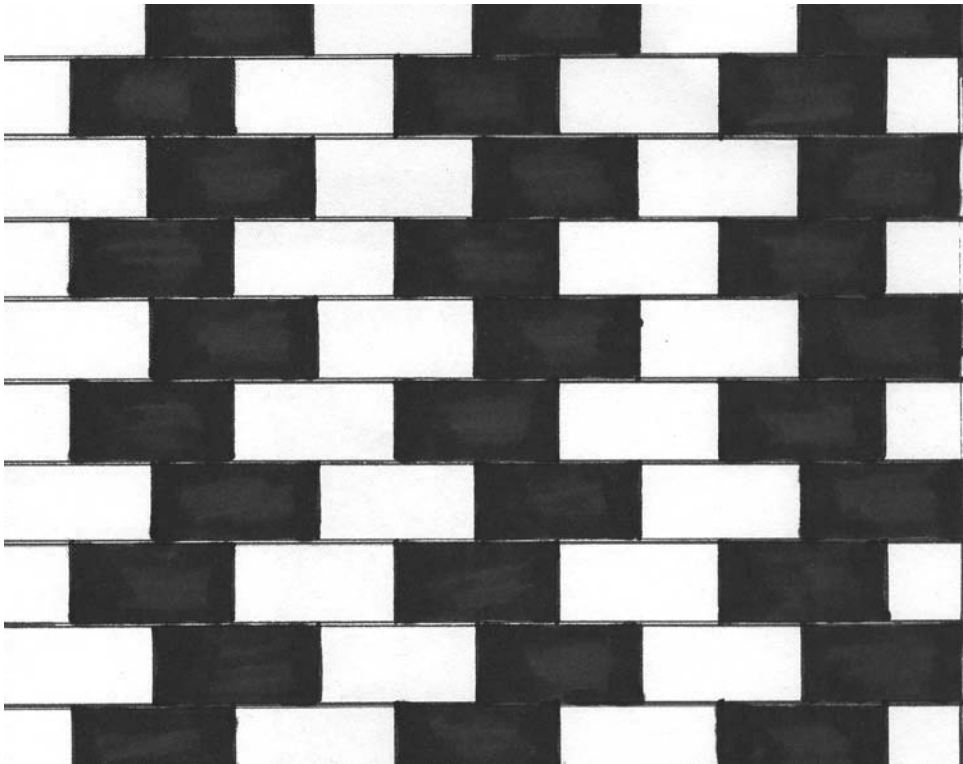


Fig. 1 Café Wall illusion. Illustration by JDB

ganja, grass, grifos, *hashish, Indian hemp, *kif, *marihuana, Mary Jane, pot, reefers, skunk cannabis, stick, and weed. The name *cannabis* is Latin for canvas or hemp. It comes from the Greek noun *kánnabis*, which originally may have been a Scythian or Thracian word. It has of old been used to denote three species of herbaceous plants from the *Cannabaceae* family, i.e. *Cannabis sativa*, *Cannabis indica*, and *Cannabis ruderalis*. However, a variety of polymorphous ecotypes and cultivated 'races' are also referred to as cannabis. The leaves and flowers of the pistillate (female) plants of these species contain tetrahydrocannabinol (THC), also known as delta-9-tetrahydrocannabinol and dronabinol. THC is one out of the more than 60 cannabinoids that can be found in cannabis. It is considered the plant's principal psychoactive constituent. Therefore, the concentration of THC is believed to be the main determinant of the strength of cannabis products. THC was isolated from cannabis in 1964 by the group made up of the Israeli scientists Raphael Mechoulam (b. 1930), Yechiel Gaoni, and Habib Edery. The term *hashish is used to denote a preparation composed of the compressed appendages (or trichomes) collected from the cannabis plant. The terms kif, kief, keef, and kef are used to denote a potent cannabis product obtained by removing the loose, dried trichomes of cannabis from containers or grinders. The term skunk cannabis refers to a potent cross-breed of *C. sativa* and *C. indica*. Cannabis has been used since ancient times as a therapeutic, an *entheogen, and an aphrodisiac, as well as for recreational purposes. The first scientific reports on cannabis appeared in the 1830s. Arguably the most important work from this early period is the book *Du Hachisch et de l'Aliénation Mentale* by the French alienist Jacques-Joseph Moreau de Tours (1804–1884). It is estimated that today about 4% of the world's adult population use cannabis at least once a year, and that 0.6% use cannabis on a daily basis. Cannabis products are usually administered through smoking. They can also be vaporized, however, or eaten, or drunk in the form of an infusion or tea. The intravenous use of cannabis products is ineffective, and is therefore uncommon. The minimum amount of THC needed to obtain a discernible psychoactive effect lies around 10 µg/kg of body weight. This effect is believed to be mediated via the cannabinoid receptor type 1 (CB₁), which is distributed throughout the CNS and other parts of the body. This cannabinoid recep-

tor was discovered in or shortly before 1988 by the group of the American molecular pharmacologists William Anthony Devane and Allyn Howlett. The acute effects of cannabis tend to commence several minutes after consumption, reaching their peak some 10–30 min later, and lingering on for several hours. Low doses of THC typically evoke mild euphoria, relaxation, and a disinhibition of social tension. This state is often accompanied by hunger, more specifically a craving for sweets. Other early side effects are thirst, uncontrollable laughter, nausea, vertigo, and dryness of the mouth. Subtle changes in sensory acuity may occur as well (i.e. an increase in the vividness of sight, smell, touch, taste, or hearing), as well as mild formal thought disorders, paranoia, anxiety, and panic feelings. Stronger doses tend to intensify these reactions. The user may experience impairments of concentration and short-term memory, a disorientation in time and place, formal thought disorders, rapid changes of affect, and an altered sense of self-identity. High doses may result in *metamorphopsias, *synaesthesias, *illusions, hallucinations, and *dissociation. The hallucinations occurring in the context of THC intoxication tend to be *visual and/or *auditory in nature. The visual hallucinations are mainly *simple or *geometric in nature, although *complex and even *compound hallucinations are reported as well. Because cannabis acts via its own unique cannabinoid receptor system, and makes use of a unique neurotransmitter (called anandamide), it is considered to constitute a pharmacological class of its own. In the past, cannabis has been classified variously as a narcotic, a sedative, and a *hallucinogen. Because of its purportedly weak hallucinogenic properties, cannabis has also been classified as a quasi-psychedelic. It can induce severe hallucinatory states, however, especially when relatively high doses of THC are consumed by an individual not accustomed to such doses, and/or when the individual has a heightened vulnerability for *psychosis. Cannabis-induced psychosis is believed to be a relatively infrequent complication of cannabis use. As indicated in the early 1990s by the group of the Dutch psychiatrist Don Linszen, cannabis use would seem to be associated with an earlier onset of psychotic symptoms in individuals diagnosed with schizophrenia. However, the exact relation between cannabis use and prolonged or recurrent psychosis (as in individuals with a clinical diagnosis of *schizophrenia) has not been

established with certainty. A person intentionally employing cannabis for the purpose of exploring the psyche may be called a *psychonaut.

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Capgras Delusion

see Capgras' syndrome.

Capgras for Arm

see Capgras' syndrome.

Capgras for Environment

see Capgras' syndrome.

Capgras Syndrome for Persons

see Capgras' syndrome.

Capgras Syndrome for the Mirror Image

see Mirror sign.

Capgras' Syndrome

Also known as Capgras syndrome, Capgras syndrome for persons, Capgras delusion, **illusion des sosies*, illusion of doubles, and illusion of false recognition. The eponym Capgras' syndrome refers to the French psychiatrist Jean Marie Joseph Capgras (1873–1950), who has been credited with being the first to describe the concomitant phenomenon in collaboration with his intern Jean Reboul-Lachaux in 1923. It was their French colleague Joseph Levy-Valensi who in 1929 proposed the eponym Capgras' syndrome. Capgras and Reboul themselves referred to this syndrome by the French term *illusion des sosies* (illusion of doubles). Today the term Capgras' syndrome is used to denote a condition characterized by the inability to identify a familiar person, even though one does recognize that person's facial and bodily characteristics. As a result, individuals with Capgras' syndrome tend to believe that the person in question has been replaced by a double (hence the name illusion of doubles). The syndrome is generally regarded as a type of hypo-identification, and classified as one of the *misidentification syndromes, or, more specifically, as one of the delusional reduplication syndromes. It has also been classified as an agnosia, and as a variant of reduplicative paramnesia (the latter condition being characterized by the affected person's conviction that a familiar place, or object, or person has been duplicated). Because of its association with various psychiatric and neurological disorders, doubts were long expressed about whether Capgras' syndrome deserves the nosological status of a syndrome. As to its pathophysiology, it has been suggested that Capgras' syndrome is associated with bifrontal cerebral cortical atrophy, and with the presence of one or more right parieto-occipital lesions. However, the right fusiform gyrus – which plays an important role in various stages of face recognition – has emerged as a possible candidate for the syndrome's primary neurophysiological correlate. A variant of the Capgras-type misidentification syndrome characterized by the conviction that one's house, or the building in which one currently resides (such as a hospital) has been replaced by a duplicate building, is known under the name Capgras for environment. The term Capgras for arm was introduced by

the American neurologist and psychiatrist Todd Feinberg and his colleague David M. Roane to denote a variant of *asomatognosia characterized by misidentification of a part of one's body (i.e. an arm).

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or from the age of 6 onwards, after the attacks had subsided.) It has been speculated that Cardan's visions may have been caused by a recurring *migraine aura without headache. Other possibilities include *hallucinatory epilepsy (although this condition tends to present in the form of a stereotyped hallucinatory scene, with little variation between subsequent attacks), *peduncular hallucinations (which can occur in the context of migraine, but also in association with a variety of other conditions), *closed-eye hallucinations, and *hypnopompic hallucinations (which would be in keeping with Cardan's observation that his visions would come to him while he was lying awake, waiting until it was appropriate for him to get out of bed).

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Cardan, Jerome (1501–1576)

Also known as Jeronimo Cardan(o/us), Geronimo Cardan(o/us), Hieronymus Cardano(o/us), Girolamo Cardan(o/us), and Gerolamo Cardan(o/us). Cardan was an Italian lawyer, mathematician, astrologer, and physician who between the ages of three and six experienced paroxysmal *visions depicting multiple tiny creatures, objects, and scenes perceived solely in the visual modality (i.e. *complex visual hallucinations, or, more specifically, *lilliputian and other *microptic hallucinations). Reportedly, the creatures were perceived as moving swiftly in a semicircle from the right side of the visual field to the left, while the scene as a whole was made up of colourless "images of airy nothingness of body", seemingly consisting of tiny ring-like structures. The figures perceived by Cardan included castles, houses, animals, horses with rider, plants, trees, musical instruments, theatres, men dressed in various costumes, swarming peoples, flowers, fields, groves, forests, and "shapes like unto bodies". Cardan did not experience any other symptoms, except for a perceived coldness of his lower legs, which followed the period of hallucinatory attacks. (It is unsure whether Cardan means that this coldness appeared after each attack,

Carroll, Lewis

see Dodgson, Charles Lutwidge.

Cataract Delirium

see Black patch delirium.

Causalgia

The term causalgia comes from the Greek words *kaiein* (to heat, to set on fire) and *algos* (pain). It was introduced in 1867 by the American neurologist Silas Weir Mitchell (1829–1914) to denote a specific painful condition following injury to one of the major peripheral nerves. Although various definitions of causalgia exist, today the term is used to denote an intolerable, burning pain, usually located in the palm of the hand, the palmar face of the fingers, or the dorsum of the foot, which is accompanied by severe *hyperaesthesia of the affected region. Causalgia is typically located along the efferent trajectory of a peripheral nerve containing sen-

sory fibres, at some distance removed from a skin lesion or wound that has healed. It can be accompanied by autonomic dysfunction in the form of sudomotor, vasomotor, and trophic skin changes. Although Mitchell recognizes that causalgic pain can also present in the form of a mild burning sensation, he emphasizes its predilection for causing "a state of torture which can hardly be credited". As he asserts, "Perhaps few persons who are not physicians can realize the influence which long-continued and unendurable pain may have on both body and mind. . . Under such torments the temper changes, the most amiable grow irritable, the bravest soldier becomes a coward, and the strongest man is scarcely less nervous than the most hysterical girl. Nothing can better illustrate the extent to which these statements may be true than the cases of burning pain, or, as I prefer to term it, *Causalgia*, the most terrible of all tortures which a nerve wound may inflict." Traditionally causalgia has been divided into two forms, referred to as causalgia major and causalgia minor. The term causalgia major has been used to denote a form of peripheral nerve injury, accompanied by electrophysiological cross-activation, and severe hyperactivity of the sympathetic ner-

vous system. This condition can be complicated by *hyperpathia, vasoconstriction, and movement disorders. Etiologically, causalgia major is associated with injuries caused by a high-velocity sharp object such as a razor knife, a vibratory-component major trauma (caused by a bullet, for instance), or a high-voltage nerve lesion (as in electrocution). The term causalgia minor has traditionally been used to denote a somewhat similar, but milder symptom complex. The difference between the two forms of causalgia is essentially a question of degree. The incidence rate of causalgia among victims of nerve injuries has been reported as lying between 2 and 20%. Causalgia can be classified as a severe form of reflex sympathetic dystrophy (RSD). In 1993 the International Association for the Study of Pain proposed the new term complex regional pain syndrome (CRPS) as an umbrella term for RSD and causalgia, in order to better reflect the possible nature of these painful conditions. Causalgia, RSD, and CRPS should not be confused with other pain syndromes such as *allodynia, *central pain, *hyperalgesia, hyperpathia, *phantom pain, *topalgia, and *hallucinated pain. The question of whether pain can also be experienced in a hallucinated form is a knotty philosophical issue.



Fig. 2 Silas Weir Mitchell

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Celestial Illusion

The term celestial illusion is indebted to the Latin noun *caelum*, which means heaven. It is used to denote a group of *size illusions characterized by an apparent increase in the size of celestial bodies when these are perceived above the horizon (as compared to the way they are perceived in the zenith). This illusion would seem to apply to all celestial bodies, but the most famous examples

of the celestial illusion are the *Moon illusion, the *Sun illusion, and a similar, apparently nameless phenomenon pertaining to the perceived distance between the stars in constellations such as the Great Bear and Orion. Celestial illusions have been known since ancient times. They are traditionally regarded as *physical illusions, i.e. illusions based on the physical properties of the celestial bodies themselves, and/or the surrounding atmosphere. Although today most experts would dispute this, it is still uncertain whether celestial illusions should be regarded as *physiological illusions, *cognitive illusions, or – most probably – a combination of the two. For a more detailed account of celestial illusions, see the entry Moon illusion. The notion of celestial illusion should not be confused with the notion of *autokinetic effect, which refers, among other things, to the illusory motion of stars.

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Cellini's Halo

see Heiligenschein.

Cenesthetic Hallucination

see Coenesthetic hallucination.

Census of Hallucinations

Also referred to as Census of Waking Hallucinations. Both titles are used to denote the first large-scale survey of hallucinations in the non-institutionalized population, carried out between 1889 and 1892 by the British Society for Psychical Research (SPR). In 1889 the SPR, represented by the Cambridge moral philosopher Henry Sidgwick (1838–1900), mobilized 410 interviewers in order to investigate 17,000 individuals in the United Kingdom. Reports of *dreams and other non-hallucinatory phenomena were excluded from the investigation, and Sidgwick's committee also weeded out all dubious cases. The results of

this cross-sectional survey suggested that 9.9% of the non-institutionalized population in the United Kingdom could remember having had one or more hallucinations. As the committee was particularly interested in signs of life from beyond, Sidgwick et al. focused on reports involving individuals who had died within a time frame of 12 hours before or after appearing in one of the participants' hallucinations. After rejecting all accounts in which foreknowledge of the illness or impending death of the person in question could have played a role, the committee was left with 350 first-hand reports of death-related visions. According to the committee, this number was 440 times higher than one would expect on the basis of chance alone. As a consequence, the general conclusion of the committee was that “between deaths and apparitions of the dying person a connexion exists which is not due to chance alone.” At the time, similar results had been obtained in Germany by a group headed by Baron Albert von Schrenck-Notzing (1862–1929), in France by the group of Léon Marillier (1862–1901), and in the United States by the American Society for Psychical Research, headed by the philosopher and psychologist William James (1842–1910). The activities of all four groups had been closely followed by the German hallucinations researcher Edmund Parish (1861–1916), who absorbed their preliminary reports as soon as they appeared, and published these in his book *Ueber die Trugwahrnehmung (Hallucination und Illusion)*. Parish's book appeared in 1894, a few months before the SPR's final *Report on the Census of Hallucinations* was published. It contains a meta-analysis of the material from all four groups, indicating that the combined research units had received a total of 27,329 answers from their respective target populations, of whom 11.96% on average were found to be familiar with hallucinations. Subsequent studies, carried out throughout the 20th century, roughly replicated the epidemiological findings of the SPR and their sister organizations, showing that this number had not been exaggerated. What does seem to have changed during the intervening century, however, is the prevalence of *visual hallucinations (which had been found to be higher in the earlier studies) and *auditory hallucinations (which had been found to be lower in the earlier studies). This may be a reflection of genuine change, as the American psychiatrist and epidemiologist Allen Y. Tien speculates, but it is also possible that it reflects selection bias

on the part of the SPR investigators. After all, they had been free to select participants from the population at large, and they were known to have a vested interest in tracking down so-called *veridical or *coincidental hallucinations involving dead or dying people, which were thought to be mainly visual in nature. The metaphysical implications of the SPR's findings were criticized by Parish, and by many others after him. In present-day scientific references to the Census of Hallucinations they tend to be ignored altogether. However, the SPR's epidemiological findings are still widely cited.

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Census of Waking Hallucinations

see Census of Hallucinations.

Central Achromatopsia

see Cerebral achromatopsia.

Central Macropsia

The term central macropsia comes from the Greek words *kentron* (centre of a circle), *makros* (large), and *opsis* (seeing). It refers to a visual distortion in which objects and stimuli are perceived as disproportionately large, but only in the central field of vision. Because objects and stimuli perceived in the periphery of the visual field retain their normal proportions, central macropsia yields an image similar to that perceived through a birds-eye lens. The introduction of

the French term *macropsie centrale* is attributed to the French psychologist Charles Binet-Sanglé (1868–1941). Central macropsia is classified as a variant of *macropsia, which is in turn classified as a *metamorphopsia.

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Central Pain

Also known as thalamic pain, pseudothalamic pain, and *anaesthesia dolorosa. The term central pain is indebted to the Greek noun *kentron* (centre of a circle). It refers to the central nervous system as the originator of this type of pain. The term central pain was introduced into the English language in 1914 by the American surgeon Richard Joseph Behan (b. 1879). The concomitant concept, however, was introduced in or shortly before 1891 by the German neuroanatomist Ludwig Edinger (1855–1918). Following various descriptions of pain arising in the context of bulbar lesions, spinal hemisection, spinal trauma, and pons tumours – as rendered in the literature since 1811 – Edinger envisaged *central entstehende Schmerzen* (i.e. 'centrally mediated pains') as "caused by direct contact of injured tissue with the sensory path coursing in the internal capsule". According to the Italian pain specialists Sergio Canavero (b. 1964) and Vincenzo Bonicalzi (b. 1956), the use of the terms thalamic pain, pseudothalamic pain, and anaesthesia dolorosa as synonyms for central pain is not entirely correct. Today thalamic pain is conceptualized as a specific form of central pain, whereas the term anaesthesia dolorosa only applies to central pain when there is an anaesthetic region caused by neurosurgical lesions. The term pseudothalamic pain has been discarded altogether. Today central pain is conceptualized as a somatosensory symptom due to a CNS lesion affecting a part of the spinothalamic-parietal path. It is defined by the International Association for the Study of Pain (IASP) as "pain initiated or caused by a primary lesion or dysfunction of the central nervous system". Central pain can be complicated by other non-sensory symptoms such as *visual and *auditory hallucinations, vertigo, and cognitive or motor function

abnormalities. Phenomenologically, it is characterized primarily by a segmentally distributed type of pain which is restricted to one or more body parts, such as the hemiface, one foot, one hand, a quadrant of the body, or the mouth and hand. In 40% of cases, the affected individual reports hemibody pain, with or without involvement of the face. The pain is described as having different qualities simultaneously. For example, there may be a burning pain in the leg and an aching pain in the face, or *dysaesthesia to the hemiface, and shooting pains to the limbs and trunk. Generally speaking, one type of pain tends to be present continuously, while the other tends to be episodic in nature. The intensity of the pain can vary significantly, but it can be so unbearable that the affected individual may consider, or actually commit suicide. When central pain takes the form of an itch, it is referred to as central neurogenic pruritis. Alternatively, central pain can also be characterized by an unpleasant sensation that is not pain or pruritis, and which the affected individual may find hard to describe. Pathophysiologically, central pain is associated primarily with structural lesions affecting the spinothalamoparietal path. Etiologically, it is associated primarily with stroke, neoplasms, and traumata. The notion of central pain should not be confused with pain syndromes such as *deafferentiation pain, *hyperalgesia, *hyperpathia, *causalgia, *topalgia, and *allodynia, or with the notions of *hallucinated pain and *hallucinated headache. The issue of whether pain can also be experienced in a hallucinated form is a knotty philosophical issue.

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Central Tinnitus

A term used to denote a type of *tinnitus (i.e. ‘ringing in the ears’) attributed to a lesion affect-

ing a part of the central auditory pathways. The term central tinnitus is used in opposition to the terms *otic (or *peripheral) tinnitus, and *somatic tinnitus. As part of a different tripartition, the term central tinnitus is also used in opposition to the terms *conductive tinnitus and *sensorineural tinnitus. Today tinnitus tends to be conceptualized as a condition that is mediated and sustained by central neural networks, even though in many cases it would seem to be triggered by peripheral pathology.

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Centrifugal Theory of Hallucinatory Activity

The centrifugal theory is an explanatory model of hallucinatory activity which is traditionally attributed to the German physiologist and zoologist Johannes Peter Müller (1801–1858). The centrifugal theory suggests that subcortical and/or cortical areas of the brain (or the mind, in a dualist reading) are responsible for mediating the initial impulse for some types of hallucinatory activity, which is then ‘projected outwards’ to produce the false impression of a sensory percept. Historical examples of the ensuing type of hallucination are known under the names *intuitive hallucination, *psychic hallucination, and *sensorial hallucination. In some versions of the centrifugal theory, the efferent impulse is considered to be conducted backwards, i.e. in an afferent direction, by the primary sensory pathways. The Italian psychiatrist Eugenio Tanzi (1856–1934), for example, hypothesizes that the primary sensory pathways possess such a capacity for ‘reversed conductivity’. The centrifugal theory constitutes the conceptual counterpart of the *centripetal theory of hallucinatory activity.

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Centripetal Theory of Hallucinatory Activity

The name centripetal theory refers to an explanatory model of hallucinatory activity which is traditionally attributed to the German physiologist and zoologist Johannes Peter Müller (1801–1858). Conceptually, the centripetal theory constitutes the logical counterpart of the *centrifugal theory of hallucinatory activity. The centripetal theory suggests that the sense organs or the peripheral nervous system must be held responsible for mediating the initial impulse for some types of hallucinatory activity, which is then ‘projected upwards’ towards the higher sensory or ideational centres of the brain (or to the mind, in a dualist reading), to produce the false impression of a sensory percept. A historical example of this type of hallucination is known as *psychosensorial hallucination. Today a compelling literature indicates that hallucinations can indeed be mediated by aberrant activity of the sensory pathways. These neural structures can be subdivided into the sense organs and the primary sensory pathways. The latter are charged with conducting perceptual information from the sense organs towards the cerebral sensory cortex. Theoretically, hallucinations can be mediated by any component of these trajectories, including the sense organs themselves. Thus instances of *tinnitus have traditionally been associated with a lesion affecting the vestibular organ (although a central origin is equally possible), *phosphenes with retinal disease, *floaters with protein clots inside the vitreous body, and some types of *metamorphopsia with ablatio retinae. Traditionally, however, biomedicine recognizes only a minority of these phenomena as *hallucinations proper. Instead, they tend to be relegated to the classes of *entoptic or otopathic phenomena, or

to the class of *automatisms as envisaged by the French alienist Jules Gabriel François Baillarger (1806–1891). Percepts most likely to be acknowledged as hallucinations proper are those which arise from the aberrant activity of groups of neurons in and around the primary sensory pathways. Studies of isolated hallucinations in single sensory modalities indicate that these percepts may arise from focal anatomical lesions and/or partial epileptic seizures. Because of their physiological characteristics, the American ophthalmologist David Glendenning Cogan (1908–1993) designates this class of phenomena as the *irritative form of hallucinatory activity (so as to distinguish it from the *release form of hallucinatory activity). As each of the sensory pathways serves a single sensory modality, focal pathology is thought to result in hallucinations limited to that specific modality. It has traditionally been assumed that the complexity of the resulting phenomena correlates with the function of the brain area involved. Thus lesions in the relative proximity of the sense organs have been associated primarily with the mediation of *simple or even *incomplete hallucinations, such as *ophthalmopathic hallucinations manifesting in one of the hemifields in ocular disease, or *unilateral auditory hallucinations in lesions affecting one of the acoustic nerves. Circumscribed lesions within the primary sensory cortex of the occipital lobe are typically associated with simple visual hallucinations such as phosphenes, *fortifications, and other geometric patterns. A well-known example is the *aura that may precede or accompany a migraine attack. In general, it is believed that lesions in and around the primary sensory pathways are capable of evoking little more than unvarying, stereotypical hallucinations. However, this situation can change when damaged tissue starts to recover, or when partial epileptic activity spreads to other anatomical loci.

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Cerebral Achromatopsia

see Achromatopsia.

Cerebral Akinetopsia

see Akinetopsia.

Cerebral Amblyopia

The term cerebral amblyopia is indebted to the Greek noun *amblyōpia*, which means weakness of vision. It refers to a variant of *amblyopia, or diminished visual acuity, attributed to a lesion affecting the retrochiasmal part of the visual system. In cerebral amblyopia, the ability to see stationary light stimuli is affected, whereas the ability to perceive moving light stimuli within the scotomatous field remains intact. This dissociative phenomenon is known as *Riddoch's phenomenon. When the loss of vision in cerebral amblyopia affects both visual hemifields, the term bilateral hemiambyopia is used. When only one of the visual hemifields is affected, the term unilateral hemiambyopia applies. Cerebral amblyopia constitutes the conceptual and phenomenological counterpart of *akinetopsia.

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Cerebral Dyschromatopsia

A term used to denote a variant of the group of *colour-processing deficits characterized by a diminished or residual type of colour perception.

Reference

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Cerebro-Sensorial Hallucination

The French neologism *hallucination cérébro-sensorielle* was proposed in or shortly before 1884 by the French psychologist Alfred Binet (1857–1911) as a substitute for the term *psychosensorial hallucination. The latter term had been previously introduced by the French alienist Jules Gabriel François Baillarger (1806–1891) to denote a type of hallucination mediated by an interplay between the sense organs and the imagination. As Binet points out, Baillarger's term would seem to suggest that in hallucinations a psychological or mental element is related to the sensorial, similar to the way the soul, in a dualist reading, is related to the body. In Binet's view, this rendition suggests that mental and physical conditions belong to mutually independent ontological categories, and that sensations do not fall into the class of mental events. As Binet argues, "This point of view is obviously untenable; the psychic element of hallucinations depends, equally intimately as the sensorial element, on physiological conditions from which they cannot be separated. To avoid a metaphysical discussion of this subject, it would be preferable to call hallucinations a cerebro-sensorial phenomenon."

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Cessation of Dreaming

see Charcot–Wilbrand syndrome.

Change Blindness

A term used since the 1970s to refer to the relatively poor ability of humans to detect large changes to a visually perceived object or scene. Experiments making use of manipulated photographs, motion pictures, live interactions, and other media indicate that unless a change to a visual scene produces a localizable change at a

specific position on the retina, humans tend to have difficulty detecting this change. The notion of change blindness can perhaps be illustrated best by reference to a classic experiment conducted by the American psychologists Daniel J. Simons and Daniel T. Levin, in which unsuspecting pedestrians were approached by a researcher asking for directions. During the ensuing verbal exchange, two other researchers carrying a door passed between them, blocking the pedestrian's view, and allowing the first researcher to swap places with one of the researchers carrying the door. Thus the pedestrian, having begun a conversation with one person, is interrupted, after which he continues his conversation with a different person. The extraordinary nature of this exchange notwithstanding, it was found that some 50% of the subjects failed to detect the switch. Based on findings like these, it has been suggested that the human perceptual system preserves relatively little visual information in between views of a single scene, especially when the interruption takes the form of saccadic eye movements, blinks, blank screens, movie cuts, or other artificial transitions. In addition, it has been suggested that detailed visual representations are not stored in the memory as observers go from one view to the next. It is not clear who coined the term change blindness, but the American psychologist George W. McConkie, who during the late 1970s studied changes made to words and texts during periods of saccadic eye movement, is generally acknowledged as one of the earliest pioneers of the research on change blindness. Conceptually and phenomenologically, change blindness is related to *inattentive blindness, *repetition blindness, *inattentive deafness, *auditory deafness, and *tactile insensitivity. On the basis of psychological and philosophical studies in areas such as these a new brand of scepticism has been developed (see the entry Grand illusion argument).

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Charcot–Wilbrand Syndrome (CWS)

Also known as defective revisualization and irremembrance. The eponym Charcot–Wilbrand syndrome refers to the French neurologist Jean-Martin Charcot (1825–1893) and the German neuro-ophthalmologist Hermann Wilbrand (1851–1935). It is used to denote a combination of visual agnosia (i.e. the inability to make sense of visual images and to revisualize images) and a reported global cessation of *dreaming. Etiologically and pathophysiologically, CWS is associated primarily with deep bilateral lesions of the occipital lobe. The syndrome's conceptualization is based on two individual case reports, one by Charcot in 1883 and one by Wilbrand in 1887. Charcot's case report involves a person's acquired inability to consciously conjure up the visual mental images of dreams, in association with a deficit in revisualization during wakefulness. Wilbrand's account involves a reported global cessation of dreaming, in association with prosopagnosia (i.e. 'face blindness') after infarction of the occipitotemporal region. Only a small number of reports on CWS can be found in the literature. In 2004 the Swiss neurologists Matthias Bischof and Claudio Bassetti reported a case of CWS in a 73-year-old woman who had suffered from acute, bilateral occipital artery infarction (including the right inferior lingual gyrus). Today the eponym CWS is generally used to denote any loss or reduction of dreaming or its imagery.

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Charles Bonnet Syndrome (CBS)

The eponym Charles Bonnet syndrome (CBS) refers to the Swiss naturalist and philosopher Charles Bonnet (1720–1792). It was introduced in 1936 by the Swiss neurologist Georges de Morsier (1894–1982) to denote a hallucinatory state or syndrome characterized by *visual hallucinations occurring in “senile syndromes with ocular lesions”, or, as de Morsier rephrased it in 1938, “in the elderly with intact cognition”. Historically, the eponym CBS has variously been used to denote (1) visual hallucinations occurring in the cognitive intact elderly, (2) visual hallucinations occurring in the context of eye disease, and (3) visual hallucinations occurring in the presence of preserved insight. The syndrome that was later to be named CBS was first described in 1760 by Bonnet, whose grandfather Charles Lullin suffered from this type of hallucinations. As rendered by Bonnet in his book *Essai Analytique sur les Facultés de l’Âme*, Lullin had suffered from loss of visual acuity due to a bilateral cataract. Eight years after a first cataract operation (and 1 year after a second operation, after which his visual

acuity had become even worse), Lullin reported seeing vivid images of scaffolding and brickwork patterns, a multitude of particles (“atoms”) whirling about, clover patterns covering the walls and furniture, as well as people, birds, carriages, buildings, and other objects. According to Bonnet these images were not accompanied by hallucinations in any of the other sensory modalities. Nor did Lullin, a retired magistrate, show any signs of cognitive impairment. Reportedly, Lullin was well aware that his visions were “fictions” of his brain, and showed himself intrigued and amused by them. Near the end of his life, Bonnet’s own visual acuity deteriorated as well, after which he, too, began to experience visual hallucinations. The hallucinations occurring in CBS have also been referred to as *ophthalmopathic hallucinations, and as *positive spontaneous visual phenomena (PSVP). Their complexity can range from *simple or *geometric to *complex, although the operational definition of CBS, as issued by the psychiatrists Jorge Manuel Ribeiro Damas-Mora et al. in 1982, requires the presence of complex visual hallucinations. Due to their *xenopathic character, hallucinations occurring in the context of CBS tend to have a highly realistic appearance. However, individuals in possession of proper reality monitoring strategies usually recognize the hallucinations at hand as non-sensory percepts. Their onset can be at any age, although CBS has been found to be most prevalent at old age. Estimates as to the prevalence of CBS among elderly individuals with impaired visual acuity range from 10 to 30%. Risk factors for the development of CBS include such conditions as poor visual acuity due to corneal degeneration, age-related macular degeneration, glaucoma, and cataract, as well as solitude, fatigue, poor general physical health, and the use of beta blockers. CBS can also occur in association with partial disturbances of vision such as *hemianopia, *quadrantanopsia, central scotoma, and *amblyopia, as well as in temporary disturbances of vision (i.e. *amaurosis fugax). Visual hallucinations occurring in the context of hemianopia or quadrantanopsia tend to manifest themselves in the impaired visual field, but they can also present in the intact field of vision. Pathophysiologically, the hallucinations concomitant to CBS tend to be regarded as falling into the class of *release hallucinations, i.e. hallucinations mediated by spontaneous electrophysiological activity originating from subcortical brain areas such as the thalamus, the pedunculus cerebri, and the limbic



Fig. 3 Charles Bonnet. Engraving by Ambroise Tardieu, 1827

system. A competing explanatory model, known as the *deafferentation hypothesis, attributes the mediation of hallucinations in CBS to the increased excitability of the visual pathways and/or the visual cortex, due to a lack of inhibitory afferent impulses. Brain regions considered capable of mediating spontaneous visual percepts include the retina, the lateral geniculate nucleus, the primary visual cortex, and the visual association cortex. Conceptually as well as phenomenologically (and perhaps pathophysiological as well), visual hallucinations occurring in the context of CBS appear to display some overlap with *bereavement hallucinations and *phantom vision. A variant of Charles Bonnet syndrome was reported in 1953 by the American neurologist and psychiatrist Walter Jackson Freeman (1895–1972) and his colleague Jonathan M. Williams, which involved visual *hallucinations in braille experienced by a virtually blind woman. In occultism and mysticism, individuals suffering from CBS are sometimes referred to as ‘Bonnet people’, and their capacity to hallucinate as ‘a portal to a parallel reality’.

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Charpentier's Illusion

Also known as size-weight illusion and *Demoor's sign. The eponym Charpentier's illusion refers to the French ophthalmologist and physiologist Augustin Charpentier (1852–1916), who has been credited with being the

first to describe the phenomenon, complete with appropriate experimental evidence, in 1891. The eponym Demoor's sign refers to the Belgian physician Jean Demoor (1867–1941), who employed the concomitant phenomenon as a diagnostic test in children with developmental disorders. The eponym Demoor's sign was coined in or shortly before 1903 by the Swiss neurologist and child psychologist Édouard Claparède (1873–1940). The three terms above are used interchangeably to denote the illusory difference in weight experienced when two containers of the same weight, but of different size, are lifted up simultaneously. In the ensuing illusion, the smaller container is experienced as heavier than the bigger one. Charpentier sought to explain the size-weight illusion by referring to a neurophysiological model of weight perception, and a psychological model pertaining to the “feeling of mental effort”. Even today, the debate continues as to which of these two factors should be granted primacy. Charpentier's illusion tends to be classified as a *physiological illusion. Sometimes the eponym Charpentier's illusion is also used as a synonym for *autokinetic effect.

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Chemosensory Deficits

see Chemosensory disorders.

Chemosensory Disorders

Also known as chemosensory deficits and disorders of taste and smell. Traditionally, the group of chemosensory disorders is divided into six

broad categories of taste disorders and five categories of smell disorders. The group of taste disorders comprises ageusia, hypogeusia, *dysgeusia, *hypergeusia, *parageusia, and taste agnosia. The group of smell disorders comprises anosmia, hyposmia, *dysosmia (also referred to as *parosmia), *hyperosmia, and smell agnosia. The history of taste and smell research, however, yields a rich legacy of additional terms, such as *gustatory hallucination, *olfactory hallucination, *phantosmia (which tends to be used as a synonym for olfactory hallucination), *cacosmia (bad smell), coprosma (the smell of faeces), *agathosma (good smell), crocosmia (the smell of saffron), and diosma (heavenly or divine smell). Etiologically, the chemosensory disorders are associated with a wide variety of conditions, including normal ageing, poor oral hygiene, Alzheimer's disease, local or general medical conditions such as rhinitis, oral candidiasis, nasal polyps, and influenza, as well as the use of certain therapeutics and illicit substances. Pathophysiologically, the chemosensory disorders are associated with one of three major types of losses, referred to as transport losses, sensory losses, and neural losses. The term transport loss refers to the obstruction of chemical stimuli before these can reach the peripheral taste or smell receptors. Sensory losses are those attributed to damage to the sensory organs themselves. This damage may be caused by a variety of conditions, mechanisms, and substances, including therapeutics, toxic chemicals, radiation therapy, neoplasms, and viral infections. Neural losses are those resulting from damage to the peripheral and/or central neural pathways, including the cortical taste area, and the part of the temporal (primitive) cortex involved in the mediation of smell. Known causes of neural loss include head trauma, neoplasms, and neurosurgical procedures. The term sensori-neural loss is used when a clear distinction between a sensory and neural involvement cannot be made with certainty.

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Chessboard Design

Also referred to as lattice, fretwork, filigree, honeycomb, and grating. All six terms were introduced in or shortly before 1928 by the German-American biological psychologist and philosopher Heinrich Klüver (1897–1979) as more or less synonymous terms denoting one of the four *form-constants of *geometric visual hallucinations occurring during the initial stages of mescaline intoxication. Klüver uses the term form-constant to denote certain visual forms and elements which in his view “appear in almost all mescal visions”. As he maintains, “many ‘atypical’ visions are upon close inspection nothing but variations of these form-constants.” The examples of the chessboard design given by Klüver, based on the observations of different test persons, are rendered by him as follows. “‘Soon there grew up an extremely beautiful architecture before my eyes. Hexagonal small honeycombs hung down from the ceiling...’; ‘stripes which formed a sort of fretwork...’; ‘somewhat later I saw shadow-like gratings...’; ‘incessant play of filigreed colors...’; ‘in the face of B., I saw a lattice of yellow-greenish horizontal stripes...’; ‘ornamental fretwork’.” Klüver designates the remaining three form-constants as *cobweb figure, *tunnel, and *spiral.

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Childhood and Hallucinations

Hallucinations occurring during childhood have been reported in both clinical and nonclinical populations. Arguably the most intriguing type of hallucination reported in 13–22% of healthy children around 4 years of age, and in about 45% of children between 5 and 12 years of age, is the *imaginary companion. Imaginary companions tend to take the form of *compound hallucinations. They are described by the children who experience them as other creatures: children, fairy tale characters, television characters, and toy animals, all with definite perceptual characteristics. In a population-based cross-sectional

study of hallucinations experienced by older children and adolescents (i.e. in the age group of 11 through 21 years) 9% reported having had one or more isolated *auditory hallucinations, 6% isolated *visual hallucinations, and 7% compound (i.e. auditory plus visual) hallucinations. Much higher prevalence rates of hallucinations are found in clinical populations of children and adolescents. Some examples of clinical disorders associated with a markedly raised prevalence rate of hallucinations are thyroid disease, parathyroid disease, porphyria, Wilson's disease, encephalitis, *meningitis, leprosy, migraine, epilepsy, Tourette's syndrome, and velo-cardio-facial syndrome. Moreover, a substantially higher prevalence rate of hallucinations is seen in children and adolescents with a clinical diagnosis of *schizophrenia, mood disorders, or anxiety disorders. The predictive value of hallucinations occurring in childhood or adolescence is a complex issue, but overall, empirical studies would seem to suggest that most of these hallucinations are transient in nature, and that only a minority of cases tend to develop into a major *psychotic disorder. However, an increased likelihood ratio was found for the development of depressive disorder, *post-traumatic stress disorder, substance use disorder, and social phobia later in life.

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Childhood Trauma and Hallucinations

An early hypothesis formulated by the Austrian founder of psychoanalysis Sigmund Freud (1856–1939) suggests that hallucinations can be best understood as re-experiences of childhood trauma. Freud later abandoned this hypothesis in favour of his wish-fulfillment theory of hallucinations, but the hypothesis of a possible relation between hallucinations and childhood physical or sexual trauma was revisited by various groups of researchers from the 1980s onwards. As summarized by the Dutch hallucination experts Marius Romme (b. 1934) and Sandra Escher (b. 1945), studies carried out among voice hearers with a clinical diagnosis of *schizophrenia or a related psychotic disorder indicate that 70–98% of the individuals with these diagnoses have a history of emotional neglect, physical abuse, and/or sexual abuse. An analysis of the relationships between types of abuse and specific psychotic symptoms carried out by the New Zealand psychologists John Reid and Nick Argyle suggests that hallucinations may be more prevalent than delusions or formal thought disorder among individuals with a history of incest or other types of sexual abuse, while delusions may be more prevalent in those with a history of physical abuse. A retrospective study carried out by the Dutch psychologist Bernardine J. Ensink (b. 1951) among 97 women with a history of sexual abuse by older family members or family friends yields a lifetime prevalence of 34% for hallucinatory *flashbacks, of 42% for *visual hallucinations, and of 43% for *auditory hallucinations. Although the operationalization of terms such as emotional neglect, physical abuse, and sexual abuse is not univocal across these various studies, and studies of this kind may be somewhat flawed by false memories or so-called *hallucinations of memory, the prevalence rates reported in these studies indicate that childhood trauma as a pathoplastic and possibly pathogenetic factor in the mediation of certain types of hallucinations may be a severely underexposed issue.

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Childhood Companion

see Imaginary companion.

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Chloropsia

The term chloropsia comes from the Greek words *chlōros* (green) and *opsis* (seeing), and translates to ‘green vision’. It is used to denote a *chromatopsia (i.e. a temporary aberration in colour vision) in which all objects and visual stimuli appear to be tinged with green. Chloropsia is usually classified as an *entoptic phenomenon. Etiologically, it is traditionally associated with digitalis intoxication. The term chloropsia is used in opposition to the terms *cyanopsia (blue vision), *xanthopsia (yellow vision), *erythroptopsia (red vision), and *ianothinopsia (violet or purple vision).

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Choreomania

see Dancing mania and hallucinations.

Chromatic Illusion

see Musical illusion.

Chromatic-Graphemic Synaesthesia

see Coloured language.

Chromatic-Lexical Synaesthesia

see Coloured language.

Chromatic-Numeric Synaesthesia

see Coloured language.

Chromatic-Phonemic Synaesthesia

see Coloured language.

Chromatism

The term chromatism comes from the Greek noun *chrōma* (colour). It is used in *synaesthesia research to denote a hallucinated colour, or coloured light, evoked by a sensory percept experienced in one of the other sensory modalities. Thus a visually hallucinated patch of yellow light following the taste of spaghetti is referred to as a taste chromatism. Other examples of chromatisms are tactile chromatism, sound chromatism, *coloured language, and *coloured music.

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Chromatopsia

Also referred to as chromopsia. Both terms stem from the Greek words *chrōma* (colour) and *opsis* (seeing). They are used to denote a temporary aberration in colour vision, characterized by an excessive sensitivity to one particular colour. As a result, individuals with chromatopsia perceive white objects and stimuli as coloured, and some coloured objects and stimuli as tinged. Traditionally, the group of chromatopsias is divided into *cyanopsia (blue vision), *chloropsia (green vision), *xanthopsia (yellow vision), *erythroptopsia (red vision), and *ianothiopsia (violet or purple vision). Pathophysiologically, the group of chromatopsias is divided into central (i.e. cerebral),

retinal, and optical variants. Chromatopsias associated with cerebral cortical lesions or processes are also referred to as *coloropsia. Etiologically, central chromatopsia is associated primarily with head trauma, cerebrovascular disorders, psychiatric disorders, and intoxications. They tend to arise and disappear quite suddenly. They can be either monocular or binocular in nature, and they can occasionally present in the form of a coloured *flicker-scotoma. Chromatopsia of a retinal origin is associated primarily with changes in the macular area, due to macular oedema or central serous retinopathy, for example. Some types of retinal chromatopsia may be due to systemic digitalis or tridione intoxication. Chromatopsias of optical origin are associated primarily with corneal opacities, cataract, vitreous haemorrhage, fluorescein angiography, and icterus. Conceptually and phenomenologically, chromatopsia should not be confused with *colour vision deficiency or *colour-processing deficits.

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Chromopsia

see Chromatopsia.

Chronic Hallucinosi

The expression chronic hallucinosi refers to a subtype of *hallucinosi characterized by delusional and hallucinatory states of a protracted, and often permanent nature. It was employed at least as early as 1900 by the German neurologist Carl Wernicke (1848–1904). The term chronic hallucinosi is used in opposition to the expression *acute hallucinosi, which refers to a state which is similar but of a limited duration. As a nosological category, chronic hallucinosi is classified as a specific type of *hallucinosi syndrome.

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Chronic Tactile Hallucinosi

The expression *chronische taktile Halluzinose* was proposed in 1954 by the German neurologist and psychiatrist Klaus Conrad (1905–1961) and his colleague N. Bers to denote a syndrome characterized by *formicative hallucinations, parasitic or other dermatozoic delusions, and a chronic course. Conrad and Bers were under the impression that chronic tactile hallucinosi was most prevalent among women of 50 years of age and older. As a nosological category, chronic tactile hallucinosi is classified as a specific type of *hallucinosi syndrome.

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Cinematographic Vision

The term cinematographic vision is indebted to the Greek words *kinèma* (movement) and *graphein* (to draw, to write, to etch, to paint). It was introduced in or shortly before 1970 by the British neurologist Oliver Wolf Sacks (b. 1933) to denote a transient type of *akinetopsia, i.e. a transient and selective deficit in the ability to perceive motion. An individual experiencing cinematographic vision typically perceives scenes as a rapidly flickering series of 'stills', as in a slide show, a kaleidoscope, or a dvd in fast-forward mode. In 1928 the German-American biological psychologist and philosopher Heinrich Klüver (1897–1979) presented an apt example of cinematographic vision *avant la lettre* when he wrote, "A person walking downstairs is only seen at three different places of the staircase. Thus the continuous movement of an object is inferred from the successive appearance of this object at different places. A person moving his hand to his face may see it at the beginning and at the end of

the movement. Moving clouds may appear successively at different places. Under certain conditions, the moving object appears simultaneously at different places." Klüver's example is based on observations made during an experiment with the *hallucinogen mescaline. Etiologically, cinematographic vision is associated primarily with *aurae occurring in the context of paroxysmal neurological disorders such as migraine or epilepsy. Sometimes it can also be induced artificially with the aid of *hallucinogens such as LSD and mescaline, as in the example given by Klüver. The phenomenon has also been reported by individuals with a clinical diagnosis of *schizophrenia. When occurring in the context of a *migraine aura, the rate of flickering of the 'stills' is believed to be 6–12 per second, i.e. comparable to the rate of scintillation of *scotomata and *paraesthesiae in migraine. A return to normal vision is typically preceded by an increase in the rate of flickering. Although the pathophysiology of cinematographic vision is basically unknown, it is not unthinkable that there may be a parallel with the pathophysiological substrate of akinetopsia. Cinematographic vision is classified as a *sensory distortion. It should not be confused with *time distortions such as *tachypsychia, in which movements are perceived either as extremely slow or as extremely fast, due to an alteration in the perception of time.

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Circle of Ulloa

see Ulloa circle.

Clairaudience

The term clairaudience comes from the French words for hearing clearly. The term is used

in the parapsychological literature to denote a *verbal or *nonverbal auditory hallucination that is attributable to a metaphysical source, and is therefore interpreted as a *telepathic, *veridical, or at least *coincidental hallucination.

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Clairsentience

The term clairsentience comes from the French words for feeling clearly. The term is used in the parapsychological literature to denote a *tactile or *somatic hallucination attributable to a metaphysical source. It is therefore interpreted as a *telepathic, *veridical, or at least *coincidental hallucination.

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Clairvoyance

Also known as lucidity, telesthesia, and cryptesthesia. *Clairvoyance* is French for seeing clearly. The term is used in the parapsychological literature to denote a *visual or *compound hallucination attributable to a metaphysical source. It is therefore interpreted as a *telepathic, *veridical, or at least *coincidental hallucination.

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Classification of Hallucinations

Hallucinations are classified in a multitude of ways. As in all classifications, the resulting arrangements are subordinate to the purpose of the classification at hand, and to the guiding

principles involved. An implicit purpose of psychiatric classification tends to be the delineation of groups of signs and symptoms endowed with a similar pathophysiology, endowed with a similar etiology, and/or requiring a similar therapeutic approach. The 19th-century British physician and Professor of medical jurisprudence Henry Maudsley (1835–1918) advocates the view that all classifications in psychiatry should be based on etiology. However, the history of psychiatry demonstrates that that aim has seldom been realized. A less ambitious goal of classification is to organize the area of interest, for example, as a means of enhancing communication. Starting from the general class of *perceptual disturbances, which comprises the groups of *sensory deceptions and *sensory distortions, hallucinations are classified as a variant of the group of sensory deceptions. Arrangements of types of hallucinations are legion. Using the supposed location of the initial impulse of hallucinatory activity as a guiding principle, they are traditionally subdivided into those of a *centrifugal nature (i.e. hallucinations mediated primarily by the higher sensory areas of the brain, or, in a dualist reading, mediated by the mind), and those of a *centripetal nature (i.e. hallucinations mediated primarily by the sense organs or the peripheral nervous system). Using the involvement of sensory percepts as a guiding principle, a somewhat crude dichotomy has been constructed of *illusions and hallucinations (both belonging to the group of sensory deceptions). Arguably the most common way to classify hallucinations is an arrangement in accordance with the sensory modality involved. Traditionally the human *perceptual system is deemed to have five sensory modalities: olfactory, gustatory, visual, auditory, and tactile. However, this classification is not exhaustive. Hallucinations can also manifest in the form of somatic sensations (i.e. bodily sensations that would seem to come from within the body), vibrations, sensations of heat or cold, kinaesthetic sensations, proprioceptive sensations, feelings of sexual arousal (as in the *persistent sexual arousal syndrome), and the experience of time (as in *time distortions). It is debatable whether feelings of pain should be included as well (as in *hallucinated pain and *hallucinated headache, for example). Using context as a guiding principle, a historical tripartite division of hallucinations has been made, which consists of *dreams (i.e. ‘hallucinations’ occurring during sleep), *delirium, and hallucinations proper. The

idea of a continuum between these states is sometimes attributed to ancient schools of thought, but the question of whether the ancients understood this kinship in a literal or metaphorical sense has yet to be settled by historians of psychiatry. For all we know, the German philosopher Immanuel Kant (1724–1804) may have taken the relation quite literally, as witness his famous dictum that “the madman is a waking dreamer”. It would seem that 19th-century medicine took up this notion and expanded it in the direction of a worked-out theory of non-sensory perception. Thus the French classical scholar and dream researcher Louis-Ferdinand-Alfred Maury (1817–1892) suggests that the false perceptions of dreams, delirium, and hallucinations proper may well have a common origin. Using the *vigilance state* as a guiding principle yields a somewhat different tripartition, consisting of *hypnagogic hallucinations (occurring at the moment of falling asleep), *hypnopompic hallucinations (at the moment of waking up), and hallucinations proper (occurring during the waking state). Applying the guiding principle of *complexity* yields a subdivision into *elementary, *organized, *geometric, *complex, and *compound hallucinations. Elementary hallucinations are simple phenomena that confine themselves to a single sensory modality. They typically lack persistence and complexity. Some examples of elementary hallucinations are *photopsias, transient *paraesthesias, odours, and tastes, and sounds like humming, ticking, and coughing. It may be tempting to attribute the origin of these phenomena to peripheral neuronal discharges, but empirical studies indicate that they can also be mediated by central structures. Organized hallucinations are more complex in nature, ranging from simple geometrical patterns (or tunes, in the auditory modality) to full-colour, three-dimensional images (or symphonies). But they still confine themselves to a single sensory modality. The term complex hallucination is used to denote hallucinated symphonies, three-dimensional images, etc. Hallucinations occurring in more than one sensory modality at a time are referred to as compound or multimodal hallucinations. These latter phenomena can range from the combined sight and smell of a rose, to a full-blown imitation of everyday experience in all of the sensory modalities at once. On occasion, it is even possible for hallucinations to replace the entire sensory input, thus constituting a totally different reality for the individual affected. Such instances are referred to as *panoramic, *scenic,

or *dissociative hallucinations. Obviously, classifications of hallucinatory phenomena are not mutually exclusive. A hallucinated command, for example, can at once be identified as a *verbal auditory hallucination, a *command hallucination, a complex hallucination, a compound hallucination (when co-occurring with a visual hallucination of the person giving the command, for example), a *brainstem hallucination (when attributed to aberrant neurophysiological activity in the brainstem), a *hypnagogic hallucination (when occurring during the intermediate state between wakefulness and sleep), a *synaesthesia (when occurring in reaction to a sense perception experienced in any of the other sensory modalities), and an illusion (when an actual voice is heard but misunderstood). Some examples of hallucinations defined with regard to their etiology or pathophysiological substrate are *peduncular hallucinations, *brainstem auditory hallucinosis, *alcoholic hallucinosis, and cannabis-induced hallucinations.

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Clérambault Syndrome

see De Clérambault syndrome.

Clinical Lycanthropy

Also known as lycanthropy and lycomania. The term clinical lycanthropy comes from the Greek words *klinikos* (pertaining to a bed), *lukos* (wolf),

and *anthrōpos* (man). It is used to denote the delusional conviction that one has become a wolf or has the potential to become a wolf. The adjective 'clinical' serves to distinguish this delusion from lycanthropy as described in mythology, i.e. a metaphysical affliction in which people are believed to physically metamorphose into wolves (i.e. into lycanthropes or werewolves) and back again into their human form. In a broader sense, the term lycanthropy is used to denote the delusional conviction that one can be – or has been – transformed into an animal, and/or the display of animal-like behaviour suggesting such a conviction. However, the proper generic name for this latter type of delusion would then be therianthropy or zoanthropy. Clinical lycanthropy is an extremely rare condition, with only about 30 reported cases in the literature of the past 25 years. In clinical practice it tends to be diagnosed either as *schizophrenia, bipolar disorder, or depression, depending on the accompanying signs and symptoms. Although strictly speaking clinical lycanthropy is a delusional rather than a hallucinatory condition, it can in some instances co-occur with *hypercoenesthesiopathy, a condition characterized by an increased or hypertrophied feeling of bodily awareness, or with *paracoenesthesiopathy, a condition characterized by a qualitatively altered feeling of bodily awareness. The latter two conditions are neurological syndromes associated with lesions affecting one or more parts of the parietal cortex involved with embodiment and corporeal awareness (more specifically, the premotor cortex). Incidentally, as early as 1584 the British author Reginald Scot (c. 1538–1599) maintained that "lycanthropia is a disease and not a transformation".

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Closed-Eye Hallucination

Also known as closed-eye visual hallucination and closed-eye visualization. All three terms are used to denote a type of *visual hallucination experienced exclusively when the eyes are closed or when there is perfect darkness around. Some examples of phenomena classified as closed-eye hallucinations are **Eigenrau* (i.e. a type of *visual noise), the *fiery rings of Purkinje, *hypnagogic and *hypnopompic hallucinations of a visual type, (some types of) *hallucinogen-induced *geometric hallucinations, and visual hallucinations occurring in the context of *sensory deprivation. Although *Eigenrau* and the fiery rings of Purkinje are classified more appropriately as *physiological illusions or *entoptic phenomena, they are commonly included in the group of closed-eye hallucinations as well. As to the pathophysiology of closed-eye hallucinations, a certain analogy has been suggested with the *Charles Bonnet syndrome, which is characterized by the occurrence of visual hallucinations in individuals with visual impairment. However, this analogy is debatable, if only because visual hallucinations occurring in the context of Charles Bonnet syndrome tend to come and go, whereas closed-eye hallucinations are often described as arising immediately upon eye closure, and lasting continuously until the eyes are opened. And yet in both cases the hallucinations at hand would seem to constitute *release phenomena. The notion of closed-eye hallucination should not be confused with the notions of *dream and *nightmare, or with the notion of *crepuscular hallucosis, which is reserved for hallucinatory states typically arising in half-light. Neither should it be confused with the *monocular hallucination, which can be stopped rather than provoked by the closing of an eye.

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Closed-Eye Visual Hallucination

see Closed-eye hallucination.

Closed-Eye Visualization

see Closed-eye hallucination.

CNS Stimulants and Hallucinations

see Stimulant psychosis and hallucinations.

Cobweb Figure

A term used to denote a type of *geometric visual hallucination or illusion associated primarily with the use of hallucinogens such as LSD and mescaline. The term cobweb figure was introduced in of shortly before 1928 by the German-American biological psychologist and philosopher Heinrich Klüver (1897–1979) to denote one of the four *form-constants of geometric visual hallucinations occurring during the initial stages of mescaline intoxication. Klüver uses the term form-constant to denote certain visual forms and elements that according to him “appear in almost all mesal visions”. As he maintains, “many ‘atypical’ visions are upon close inspection nothing but variations of these form-constants.” The examples of the cobweb figure given by Klüver, based on the observations of different test persons, are rendered by him as follows. “Colored threads running together in a revolving center, the whole similar to a cobweb”; immense areas over which gigantic cobwebs were

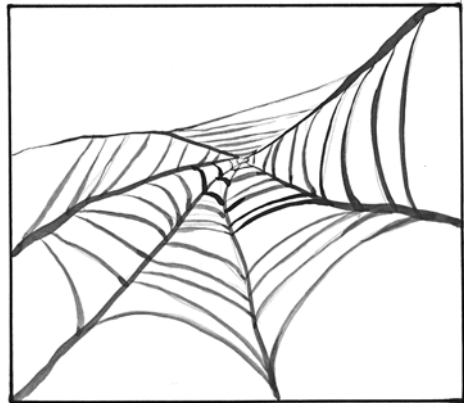


Fig. 4 Cobweb figure. Illustration by JDB

spread...; cobweb-like forms...". Klüver calls the remaining three form-constants *chessboard design, *tunnel, and *spiral.

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Cocaine Bugs

Also known as *Magnan's sign and Magnan–Saury's sign. All three terms refer to a *tactile hallucination consisting of a crawling foreign body beneath or upon the skin that is associated with the chronic use of cocaine. Except for their exclusive association with the use of cocaine, the notions of cocaine bugs, Magnan's sign and Magnan–Saury's sign are phenomenologically compatible with the notions of *formication, *formicative hallucination, and *insect hallucination. Cocaine bugs tend to be accompanied by pruritus and scratching, which may entail even more pruritis, and hence an aggravation of the tactile hallucinations. They may also be accompanied by delusional parasitosis, a condition historically referred to as Ekbohm's syndrome, after the Swedish neurologist Karl Axel Ekbohm (1907–1977), who published various accounts on dermatozoic delusions around 1938. Although the term cocaine bug refers to a type of hallucination confining itself to the tactile modality, the hallucinated bugs involved may also be seen (typically on the skin, within wounds, in the air, on clothing, and on objects in the direct environment). Such accompanying *visual hallucinations may occasionally develop further into hallucinations depicting individuals (i.e. *personifications), animals (i.e. *zoopsia), or objects. An early description of cocaine bugs comes from the Austrian physician Ernst von Fleischl–Marxow (1846–1891), a friend of Sigmund Freud's (1856–1939). Von Fleischl–Marxow experienced the characteristic tactile and visual hallucinations himself, after the prolonged use of morphine, cocaine, and other substances in the context of analgesia from painful neuromata. Ironically, it was Freud who advised him to try cocaine. Formicative hallucinations similar to cocaine bugs, but occurring in the context of amphetamine use, are known as *crank bugs. Incidentally, the slogan "Cocaine each day keeps

the bugs away" (sometimes cited with reference to the work of the American neurobiologists James A. Nathanson et al.) does not refer to a method to prevent cocaine bugs, but to the experimental use of cocaine in low concentrations as a natural insecticide in agriculture.

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Cocaine Hallucinosis

The term cocaine hallucinosis refers to the various hallucinatory phenomena associated with the chronic use of cocaine (as in a 'cocaine run' or 'cocaine binge', which are both characterized by the prolonged consumption of high doses of cocaine). The Italian physiologist and medical anthropologist Paolo Mantegazza (1831–1910) has been credited with publishing the earliest known account of cocaine hallucinosis in 1859. The typical *paraesthesias or *formicative hallucinations reported by long-term users of cocaine are referred to as *cocaine bugs, *Magnan's sign, and Magnan–Saury's sign. *Visual, *auditory, *olfactory, *gustatory, and *somatic hallucinations have also been reported in the context of chronic cocaine use, although these tend to arise at the later stages of chronic use. The hallucinations of chronic cocaine use range from simple (i.e. *snow lights, *halos around bright lights) to formed (geometrical patterns, often in black and white, and often composed of straight lines and dots) to complex (such as *lilliputian hallucinations or *zoopsia). *Metamorphopsias are reported as well, including *polyopia, *dysmegalopsia, and *dysmorphopsia. It has been suggested that there may be a typical order of appearance of the various types of hallucinations in cocaine abuse, starting with the tactile sensations of cocaine bugs, which may then develop into *visual hal-

lucinations of bugs or vermin moving about on the skin, within wounds, in the air, on clothing, and in the affected individual's direct environment. Reportedly, these visual hallucinations may develop further into hallucinations depicting individuals, animals, or objects. The mediation of hallucinatory phenomena in chronic cocaine use is associated primarily with central pathophysiological mechanisms. It has been suggested, however, that some of the *phosphenes and geometric visual hallucinations may be *entoptic phenomena, arising as a consequence of the increased ocular pressure that may accompany states of cocaine intoxication. As a nosological category, cocaine hallucinosis is classified as a specific type of *hallucinosis syndrome.

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Cocaine Spots

see Snow lights.

Cocaine-Induced Hallucination

Cocaine and its products are known under many names, including coke, freebase, base, rock, and crack. The term cocaine comes from the Quechua word *cuca* (which is the native name for the coca plant) and the Latin noun ending *ine*. It was coined in or shortly before 1860 by the German chemist Albert Niemann (1831–1917), who was also the first to isolate coca from coca leaves. Coca leaves stem from the coca plants *Erythroxylon coca* and *Erythroxylon novogranatense*, which are indigenous to the Amazon and the eastern slopes of the Andes. It is believed that the leaves of both *Erythroxylon* species were chewed by Peruvian Incas as early as 4000 BC. From the 1860s onwards, both coca and cocaine were commercialized in the Western world through the production of cocaine cigarettes, cocaine ointments, cocaine nasal sprays, and alcoholic as well as non-

alcoholic drinks prepared with the use of coca or cocaine. Incidentally, the beverage Coca Cola contained actual cocaine until the year 1906. Up to the present cocaine is used in biomedicine as an anaesthetic and analgesic. It was praised by Sigmund Freud (1856–1939) as a rather harmless stimulant (used by himself in modest quantities), as well as a useful therapeutic in the treatment of alcoholism and opioid addiction. Today the raw product, consisting of coca leaves, is either chewed or dried and processed to obtain the active compound benzoylmethylecgonine, an alkaloid of the tropane group. In the form of cocaine hydrochloride, a dry white powder, the drug is used intranasally with the aid of a thin tube or straw. It can also be used intravenously, smoked through a water pipe (called freebasing), or inhaled with the aid of special equipment (in the form of crack, the drug's most potent form). Cocaine is believed to act chiefly as a CNS stimulant. Using the criterion of psychoactive potential as a guiding principle, it is classified as a *deliriant or a drug of the stimulant-euphoriant class. Its use typically results in euphoria, an increase of physical energy, tachycardia, an increase in body temperature, and a decline in appetite. It may also lead to a paranoid and agitated state (in extreme cases referred to as cocaine dysphoria), hallucinations in any of the sensory modalities, trembling, vomiting, convulsions, and sudden cardiac arrest. *Cocaine hallucinosis and other perceptual disturbances are associated primarily with the chronic use of cocaine. Following the acute administration of cocaine, hallucinatory phenomena tend to be relatively rare. Tactile hallucinations of animals crawling beneath or upon the skin are referred to as *cocaine bugs.

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CODAM

see Defective corollary discharge model for hallucinations.

Codeine and Hallucinations

see Opioid-induced hallucination.

Coenesthesiopathy

Also known as coenestopathy. The term coenesthesiopathy comes from the medical Latin noun coenesthesia – which in turn comes from the Greek words *koinos* (communal) and *aisthanesthai* (to notice, to perceive) – and the Greek noun *pathos* (suffering). The term coenesthesia was used during the era of classic psychiatry to denote the ‘common sensation’ or ‘common general sensibility’ arising from the sum of all bodily sense impressions. (For a further explanation of the term coenesthesia, see the entry Coenesthetic hallucination.) The French term *cœnesthésiopathie* (i.e. coenesthesiopathy) was introduced in or shortly before 1905 by the French neurologists Paul Camus and Gaston Deny as a generic term for a group of conditions characterized by an alteration of internal bodily feelings (i.e. somatic or coenesthetic feelings). As Camus and Deny write, “We recently proposed to group together, under the very general term *cœnesthésiopathie*, suggested by M.E. Dupré, all psychosyndromes that seem to be connected with an alteration *a*, *hypo*, *hyper*, or *para* of the internal or organic sensations.” Thus Camus and Deny conceive hypocoenesthesiopathy as a diminished awareness of one’s coenesthetic feelings, *acoenesthesiopathy as a total lack of awareness of one’s coenesthetic feelings, *hypercoenesthesiopathy as a hypertrophic awareness of one’s coenesthetic feelings, and *paracoenesthesiopathy as a gross alteration in the quality of one’s coenesthetic feelings. Today the various forms of coenesthesiopathy would probably be classified as *somatic hallucinations or illusions, as disorders of embodiment, or as disorders of corporeal awareness.

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bles de la cœnesthésie. *Archives de Neurologie*, 20, 257–268.

Coenesthetic Autoscopy

Also written as cenesthetic autoscopia. Both terms are indebted to the medical Latin noun coenesthesia, which in turn comes from the Greek words *koinos* (communal) and *aisthanesthai* (to notice, to perceive). The term coenesthesia was used during the era of classic psychiatry to denote the ‘common sensation’ or ‘common general sensibility’ arising from the sum of all bodily sense impressions. (For a further explanation of the term coenesthesia, see the entry Coenesthetic hallucination.) The term *autoscopie cœnesthétique* or coenesthetic autoscopia was introduced in 1903 by the French physician and psychologist Paul Auguste Sollier (1861–1933) to denote a phenomenon characterized by the *sensed presence of one’s *double rather than its hallucinated presence. Thus individuals suffering from coenesthetic autoscopia have the intuitive feeling that a *doppelgänger* is present in their immediate surroundings. Sollier classified coenesthetic autoscopia as a variant of *positive autoscopia. The notion of coenesthetic autoscopia should not be confused with the notions of *coenesthetic hallucination, *coenesthesiopathy, and *acenesthesia.

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Coenesthetic Hallucination

Also written as cenesthetic hallucination. Both terms translate loosely to ‘hallucination of auto-somatic awareness’. They are used to denote a *somatic hallucination consisting of a peculiar visceral or other bodily sensation that cannot be explained by reference to any known physiological mechanism. Some examples of coenesthetic hallucinations are a scratching feeling against the inside of one’s skull, and the feeling of a propeller turning around inside one’s stomach. The term coenesthetic hallucination is also used in a broader sense to denote a hallucination involving the ‘common sensation’ or ‘common gen-

eral sensibility'. To clarify this connotation of the term coenesthetic hallucination, it is necessary to explain the notion of coenesthesia. The term coenesthesia is indebted to the Greek words *koinos* (communal) and *aisthanesthai* (to notice, to perceive). The introduction of the expression *koinē aisthesis* has been attributed to the Greek philosopher Aristotle (384–322 BC). The term was reintroduced during the late 18th century in the form of coenesthesia, or coenesthesia (in German *Gemeingefühl*) to denote the “common sensation” or “common general sensibility” arising from the sum of all bodily sense impressions. In everyday parlance, coenesthesia is the general feeling addressed by questions such as “How are you?” and “How do you feel?”. Any attempt to answer these questions with more than the usual cordial counter question requires a brief inspection of one’s status quo, involving issues such as “Am I hungry,” “Do I feel any pain,” “Do I feel rejected,” “Is that really a headache kicking in,” “Am I in love,” “Are my shoelaces too tight,” and so on. In accordance with the 19th-century viewpoint, issues such as these combine to form one’s coenesthetic feeling. As the Italian psychiatrist Eugenio Tanzi (1856–1934) explains, “The united and incessant exercise of the sensory functions is the perennial source, not only of all special information that is supplied to us regarding the external world and our body, but also of a general and indistinct, but often very active, consciousness that enables us from moment to moment to recognize the functional intactness of the body in all its parts, including those which, owing to being isolated and in a normal condition, never make themselves felt.” Feelings historically relegated to the class of coenesthesia include pain, ticklish feelings, hunger, thirst, sexual lust, fatigue, and boredom. They are considered closely akin to affective states, and even to personality traits. Many of the classic textbooks of psychiatry refer to coenesthetic hallucinations, or disturbances of coenesthesia, as explanations for bizarre types of behaviour occurring in the context of serious mental disorder, including fasting, binge eating, pica, chronic inactivity, manic hyperactivity, excessive masturbation, and so on. Conceptually, the notion of coenesthetic hallucination is closely related to the notion of *distortion of vital sensation. Whether the two phenomena fulfil all the formal criteria of hallucinations proper is debatable. A rather different way in which the term coenesthetic hallucination is used stems from the 1982 *Manual for the*

Assessment and Documentation of Psychopathology, which employs the term as a synonym for the general expression *bodily hallucination (which in turn is used as an umbrella term for the notions of *tactile hallucination and somatic hallucination). The notion of coenesthetic hallucination should not be confused with the notions of *coenesthetic autoscapy, *coenesthesiopathy, and *acenesesthesia.

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Coenestopathy

see Coenesthesiopathy.

Cognitive Behavioural Therapy

see Cognitive therapy and hallucinations.

Cognitive Illusion

Also known as strategy illusion and perceptual illusion. The term cognitive illusion is indebted to the Latin noun *cognoscere*, which means to learn or to scrutinize. It refers to an *illusion arising as a consequence of unconscious inferences about the nature of the physical world, rather than from physical or neurophysiological mechanisms. Some examples of cognitive illusions are *geometric-optical illusions such as the impossible figures in the artwork of the Dutch graphic artist Maurits Cornelis Escher (1898–1972), and the *Necker cube. The neuropsychological substrate of cognitive illusions is in the realm of higher-order cognitive processes such as *apophenia (i.e. an excess of perceptual

or heuristic sensitivity leading to the discernment of patterns or connections in random or meaningless data). The term cognitive illusion is used in opposition to the terms *physical illusion and *physiological illusion.

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Cognitive Model of Hallucinations

A generic term referring to a group of explanatory models that emphasize the role of cognitive rather than biological mechanisms in the mediation of hallucinations. As these cognitive mechanisms are generally understood in the wider context of a neuropsychological framework that incorporates relevant biological factors, the term cognitive model should not be interpreted here as referring to an explanatory model focusing exclusively on mental processes. Traditionally, cognitive models of hallucinations have focused predominantly on the group of *auditory hallucinations. The major psychological mechanisms addressed by these models are an unusual vividness of auditory images in hallucination-prone individuals, the quality of their *inner speech, and default source monitoring of inner speech. However, many cognitive models are multifactorial in nature, incorporating a wide range of mechanisms and coping strategies in their explanatory theses. The American psychoanalyst and founder of cognitive therapy Aaron T. Beck (b. 1921) and the Canadian psychologist Neil A. Rector summarize their cognitive model of auditory hallucinations (designed with reference to individuals with a clinical diagnosis of *schizophrenia) as follows. “The formation, fixation, and maintenance of hallucinations are dependent on multiple determinants: Hypervalent (‘hot’) cognitions of sufficient energy to exceed perceptual threshold and consequently to be transformed into hallucinations, a low threshold for auditory perceptualization exacerbated by stress, isolation, or fatigue, an externalizing bias that reinforces the purported external origin of the voices and resource-sparing strategies that help to fix belief in external origin and diminished reality-testing. . . The

maintenance of hallucinations is, in turn, determined by a range of beliefs: delusions regarding an external agent, underlying core beliefs, and the perceived ‘relationship’ with the voices. Specific coping responses and safety-seeking behaviours are also implicated.” In addition to these cognitive mechanisms, Beck and Rector acknowledge the contribution of biological factors such as neuronal hypoconnectivity, an excessive priming of neurons during adolescence, and “cerebral flooding” with dopamine. Crucial to cognitive models such as those of Beck and Rector is the assumption that cognitions can be transformed into percepts, whereas biomedical models of hallucinatory experience tend to grant cognitions no more than a pathoplastic or shaping role with reference to the content of hallucinations.

References

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Cognitive Therapy and Hallucinations

Cognitive therapy (CT) is also known as cognitive behavioural therapy. Both terms are indebted to the Latin noun *cognoscere*, which means to learn or to scrutinize. They refer to a psychotherapeutic intervention that aims to reduce the individual’s degree of suffering by influencing the interpretation of his or her negative feelings and problematic behaviour. The development of this method is traditionally attributed to the American psychoanalyst and neuropsychiatrist Aaron T. Beck (b. 1921). In 1952 Beck published the first case report of CT in an individual with a chronic psychotic disorder. In individuals with *auditory hallucinations, the primary aim of CT is to re-label the meaning of the voices’ content, thus reducing the degree of power and malevolence attributed to them. More specifically, CT seeks to counter the notion that voices are externally generated, that they represent the individual’s own feelings or wishes, that they have power over the hallucinator, and that there are meaningful intentions behind them. Today CT is recognized

as an evidence-based intervention for delusions and *auditory hallucinations in countries such as Great Britain, Scotland, Australia, New Zealand, and the Netherlands. Although reports of a substantial reduction in the frequency and/or intensity of hallucinations due to CT are rare, the simple re-labelling of the meaning and significance of these phenomena alone has been shown to have the potential to reduce overall anxiety and distress, and increase the affected individual's feelings of empowerment and control.

References

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- Dickerson, F.B. (2000). Cognitive behavioral psychotherapy for schizophrenia: A review of recent empirical studies. *Schizophrenia Research*, 43, 71–90.
- Van der Gaag, M. (1992). *The results of cognitive training in schizophrenic patients*. Thesis University of Groningen.

Coherent Tinnitus

A term used to denote a subtype of *tinnitus (i.e. 'ringing in the ears') presenting as a single, centred, auditory percept. Regarding its pathophysiology, coherent tinnitus is associated primarily with a single central lesion, or, alternatively, with bilateral peripheral lesions producing similar *nonverbal auditory hallucinations. The term coherent tinnitus is used in opposition to the term *incoherent tinnitus.

Reference

- Henry, J.A., Dennis, K.C., Schechter, M.A. (2005). General review of tinnitus: Prevalence, mechanisms, effects, and management. *Journal of Speech, Language, and Hearing Research*, 48, 1204–1235.

Coincidental Hallucination

The term coincidental hallucination is indebted to the Latin noun *coincidentia*, which means simultaneous occurrence. It used to denote a type of hallucination that is believed to coincide in a meaningful way with an actual event taking place in the external world. In reports of hallucinations designated as coincidental the images tend to be visual or compound in nature, although auditory and tactile phenomena are reported as well. These images can depict any given situation or event, but in the literature they often pertain to an individual who is ill or dying at the moment the hallucination takes place. When a temporal as well as an intrinsic relation can be demonstrated between the actual individual and the hallucination at hand, the term *veridical hallucination is used. Both coincidental and veridical hallucinations are sometimes conceptualized as *telepathic hallucinations, although other putative mechanisms have also been suggested by parapsychologists. Claims of having experienced a coincidental hallucination have been made from the earliest times to the present day. The multitude of claimed contacts with the dead circulating during the latter half of the 19th century culminated in the publication of the book *Phantasms of the Living* by the British paranormal investigators Edmund Gurney (1847–1888), Frederic Myers (1843–1901), and Frank Podmore (1856–1910). This book contains 5,700 first-hand descriptions of *apparitions. It proved a major source of inspiration for the *Census of Hallucinations, carried out between 1889 and 1892 by the Society for Psychical Research (SPR) among 17,000 individuals in the non-institutionalized population of the United Kingdom. Within this population the SPR found a sky-rocketing odds ratio of 440 for the occurrence of coincidental hallucinations. As a corollary, the SPR concluded that "between deaths and apparitions of the dying person a connexion exists which is not due to chance alone." However, critics such as the German hallucinations researcher Edmund Parish (1861–1916) suggest that a substantial number of the reported *visions are really *memory hallucinations (i.e. false memories conjured up afterwards to fit a meaningful mould) or other types of *non-coincidental hallucinations. In the final analysis, it would seem that the issue of whether or not to believe in the possibility of coinciden-

Cohn, Helen

see Schucman, Helen.

tal and veridical hallucinations is not decided by empirical studies, even when they are carried out as thoroughly as the SPR's.

References

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- Parish, E. (1897). *Hallucinations and illusions. A study of the fallacies of perception.* London: Walter Scott.
- Sidgwick, H., Johnson, A., Myers, F.W.H., Podmore, F., Sidgwick, E. (1894). *Report on the census of hallucinations.* In: *Proceedings of the Society for Psychical Research. Volume XXVI. Part X.* London: Kegan Paul, Trench, Trübner & Co.

Cold Allodynia

see Allodynia.

Collective Apparition

see Collective hallucination.

Collective Hallucination

Also known as collective percipience and collective apparition. All three terms are indebted to the Latin adjective *collectivus*, which means gathered or united. They are used to denote a rare type of hallucination that is shared by a limited number of individuals (typically two or three), and which those individuals believe to be *veridical or at least *coincidental in nature. The German hallucinations researcher Edmund Parish (1861–1916) distinguishes collective hallucinations from *epidemic hallucinations, using the latter term exclusively for cases where great crowds of people are overcome by the – hysterical – notion of sharing a common hallucinatory percept. Explanations for the working mechanism of collective hallucinations range from sheer chance to an ‘infectious’ type of telepathy to the so-called ‘psychical invasion’ of certain places by spiritual powers. Perhaps the most plausible explanation, at least from the vantage point of the biomedical paradigm, stems from the British mathemati-

cian and parapsychologist George Nugent Merle Tyrrell (1897–1952). As suggested by Tyrrell, collective hallucinations may well be promoted by the physical presence of percipients in a shared environment, which in turn suggests to them a shared idea-pattern or percept. However, Tyrrell's solution would seem to stand and fall with the assumption that each of the percipients must be considered prone to hallucinatory activity (or, in a parapsychological reading, must be considered ‘connected telepathically’ to an agent actually present). In the context of the late 19th-century *Census of Hallucinations, in which 27,329 individuals were polled in Great Britain, Germany, France, and the United States, collective hallucinations formed 8% of the total. Parish collected and critically examined a number of historical reports of collective hallucinations, concluding that they were most likely indebted to suggestion and/or a shared preoccupation of the individuals involved (for example, with a feared or beloved person, or with the impending arrival of enemy troops). In addition, he points out the possible influence of peculiar environmental and/or atmospheric circumstances, such as dusk, foggy weather, or the moment immediately following a thunderstorm, which might be of aid in creating suitable **points de repère* for hallucinations or *illusions. Finally, Parish presents various reports of collective hallucinations that he attributes to *physical illusions such as *mirages. One such case was described by him as follows. “So early as 1785 the appearance of spectral soldiers on several days in January and February, at Ujest (Silesia), was explained by mirage, which rendered visible a detachment of troops marching to the funeral of a certain General von Cosel.”

References

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Tyrrell, G.N.M. (1953). *Apparitions. Revised edition*. London: The Society for Psychological Research.

Collective Perception

see Collective hallucination.

Coloropsia

The term coloropsia comes from the Latin noun *color* (colour) and the Greek verb *opsis* (seeing). It is used to denote a type of *chromatopsia (i.e. a temporary aberration of colour vision) mediated by a cerebral cortical lesion or process.

Reference

Pinckers, A., Cruysberg, J.R.M., Liem, T.A. (1989). Chromatopsia. *Documenta Ophthalmologica*, 72, 385–390.

Colour Audition

see Colour hearing.

Colour Blindness

The term colour blindness was introduced in or shortly before 1844 by the Scottish physicist and *homo universalis* David Brewster (1781–1868) as an alternative for the expression *Daltonism. Brewster's proposal for this new name was inspired by his observation that there are actually more colour defects than those described by John Dalton (1706–1844) in his 1794 article on the subject. The term colour blindness refers to the inability or diminished ability to distinguish between two or more colours. Although this group of visual deficiencies is traditionally referred to as colour blindness, true colour blindness (i.e. *achromatopsia) is extremely rare. What is generally meant by the term colour blindness is a *colour vision deficiency. As a consequence, the term colour vision deficiency is the preferred term to denote any of these conditions.

References

- Brewster, D. (1826). On the invisibility of certain colours to certain eyes. *Edinburgh Journal of Science*, 4, 85–87.
- McIntyre, D. (2002). *Colour blindness. Causes and effects*. Chester: Dalton Publishing.

Colour Hearing

Also known as coloured hearing, coloured hearing synaesthesia, sound-colour synaesthesia, opsiphonia, colour audition, and *audition colorée*. All these terms are used interchangeably to denote the most common variant of *synaesthesia, consisting of a *chromatism (i.e. a hallucinated colour, or coloured light) arising simultaneously with, or in succession to, a regularly perceived sound. The Hungarian-Dutch experimental psychologist Géza Révész (1878–1955) defines colour hearing as follows. “By *colour hearing* we understand the *fixed permanent association of acoustic sensations with optical images*. In persons with pronounced colour hearing, certain tonal stimuli always create *involuntarily, regularly, and constantly* the same colour sensation (so-called chromatisms or photisms). These chromatisms or photisms can be divided into three classes, according to type: *perceptual*, as though the colours were actually seen; *conceptual*, when the colour is envisaged as an ideated sensation; and *mental*, when the colour comes to mind, when only its name is suggested to the conscious mind.” In 1786, the physicist and mathematician Johann Leonhard Hoffman published a matching list of musical instruments and colours. Whether this list was based on actual colour hearing is unknown, but it has been referred to as the earliest known historical example of this type of synaesthesia. The oldest known written report on synaesthesia, by the Austrian philologist F.A. Nussbaumer, published in 1873, involved a case of colour hearing, or, more specifically *coloured music. It has been known since the late 19th century that the relation between colours and sounds tends to be systematic in individual cases of synaesthesia, but no interindividual – let alone universal – relation was ever established. In general, deeper tones tend to be associated with darker colours, and higher tones with brighter ones, but this relation itself tends to vary from person to person. Moreover, some people seem to respond to timbre, others to vowels or

specific musical tones. The *Revue de l'Hypnotisme* of December 1892 includes a case report on the transformation of *audition colorée* into *gustation colorée* (i.e. *coloured taste) in a person whose somatic condition was deteriorating at the time.

References

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- Parish, E. (1897). *Hallucinations and illusions. A study of the fallacies of perception.* London: Walter Scott.
- Révész, G. (2001). *Introduction to the psychology of music.* Translated by de Courcy, G.I.C. Mineola, NY: Dover Publications.

Colour Scotoma

A term used to denote a variant of *achromatopsia, characterized by the inability or diminished ability to perceive a specific colour within an island-shaped part of the visual field.

Reference

- Zeki, S. (1990). A century of cerebral achromatopsia. *Brain*, 113, 1721–1777.

Colour Vision Deficiency

Also known as *colour blindness and anomalous colour vision. All three terms refer to the inability or diminished ability to distinguish between at least two colours. Although this group of visual deficiencies is traditionally known as colour blindness, true colour blindness (i.e. *achromatopsia) is extremely rare. What is generally signified by the term colour blindness is one of a group of colour vision deficiencies. As a consequence, the term colour vision deficiency is the preferred term to denote any of these conditions. Because the human optical system is trichromatic (as opposed to some animal systems which are quadrichromatic), persons with normal colour vision are called normal trichromats. Colour vision deficiencies in humans present in the form of *monochromatism, *dichromatism, or *anomalous trichromatism. Usually both eyes are affected, but rare cases of unilateral colour

vision deficiency have also been described. Individuals with monochromatism are unable to discriminate differences in hue. In dichromatism, the affected individual is able to detect differences in hue, except for those between two primary colours. There are three basic varieties of dichromatism, called *protanopia, or red-green colour vision deficiency; *deuteranopia, or green-red colour vision deficiency; and *tritanopia, or blue-yellow colour vision deficiency. Etiologically, all three conditions are associated primarily with specific chromosomal deficits. Pathophysiologically, colour vision deficiencies are attributed to the absence or diminished function of the long-, medium-, or short-wavelength cones within the retina. As a consequence, colour vision deficiencies have traditionally been labelled as *entoptic phenomena. They have an estimated lifetime prevalence of 8% in men and 0.5% in women. Colour vision deficiencies may be either congenital (i.e. hereditary), or acquired through trauma or disease. Etiological factors in acquired colour vision deficiencies include multiple sclerosis, optic neuritis, anaemia, leukaemia, vitamin B1 deficiency, carbon disulphide intoxication, lead poisoning, thallium poisoning, nicotine poisoning, and chronic alcohol abuse. The correlations between the transmission of colour vision deficiencies, genes, and sex linkage were first established by the American zoologist and geneticist Edmund Beecher Wilson (1856–1939). Colour vision deficiencies should not be confused with *chromatopsia and the group of *colour-processing deficits.

References

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- McIntyre, D. (2002). *Colour blindness. Causes and effects.* Chester: Dalton Publishing.

Coloured Hearing

see Colour hearing.

Coloured Hearing Synaesthesia

see Colour hearing.

Coloured Language

Also known as coloured words. Both terms are used to denote a *chromatism (i.e. a hallucinated colour or coloured light) arising simultaneously with or in succession to linguistic elements. Coloured language is classified as one of the many forms of *synaesthesia. Although colour-word correspondences are idiosyncratic, intrindividually they tend to be quite consequential. Phenomenologically, coloured language can be either word-based (connected with the Gestalt of words), graphemic (connected with the way it is written), phonemic (connected with the way it sounds), or numeric (pertaining to numbers). Following this arrangement, coloured language can be divided into chromatic-lexical synaesthesias, chromatic-graphemic synaesthesias, chromatic-phonemic synaesthesias (i.e. *phonopsia), and chromatic-numeric synaesthesias.

Reference

Cytowic, R.E. (2002). *Synesthesia. A union of the senses. Second edition.* Cambridge, MA: MIT Press.

Coloured Music

Also referred to as music-colour synaesthesia. Both terms are used to denote a *chromatism (i.e. a hallucinated colour or coloured light) arising simultaneously with or in succession to a musical element such as a key, a bar, or a composition. Coloured music is classified as one of the many forms of *synaesthesia. The German psychiatrist Johannes Stein (1871–1951) describes a test subject in a mescaline experiment who saw colours corresponding to the tones of a flute: carmine red when an A was played, greenish yellow for E flat, a yellowish tint for F, violet for D, and blue and red for E. Although colour-key correspondences such as these tend to be consistent for a given individual over many years, interindividual correspondences have never been found. The first known description of coloured

music comes from the Austrian philologist F.A. Nussbaumer, who in 1873 published an account of his brother's and his own experiences with this phenomenon since childhood. Two other historical figures who claimed to be familiar with coloured music are the Russian composers Nikolai Rimsky-Korsakov (1844–1906), and Alexander Scriabin (1872–1915).

References

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- Stein, J. (1928). *Die Synästhesien.* In: *Handbuch der Geisteskrankheiten. Band I. Allgemeiner Teil I.* Edited by Bumke, O. Berlin: Verlag von Julius Springer.
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Coloured Taste

Also known as *gustation colorée*. Both terms are used to denote a *chromatism (i.e. a hallucinated colour, or coloured light) arising simultaneously with, or in succession to, a taste sensation. Coloured taste is classified as one of the many forms of *synaesthesia.

Reference

Cytowic, R.E. (2002). *Synesthesia. A union of the senses. Second edition.* Cambridge, MA: MIT Press.

Coloured Words

see Coloured language.

Colour-Processing Deficit

A generic term for a group of visual phenomena characterized by a marked loss or alteration of colours attributed to a lesion affecting the sensory cortex and/or white matter. Due to a colour-processing deficit, colours may either seem dif-

ferent in some way (i.e. darker or brighter), or they may be substituted by shades of grey. The group of colour-processing deficits comprises the classes *achromatopsia and *dyschromatopsia. Colour-processing deficits are traditionally distinguished from other types of anomalous colour vision, such as *colour vision deficiency and *chromatopsia.

Reference

Zeki, S. (1990). A century of cerebral achromatopsia. *Brain*, 113, 1721–1777.

Command Hallucination

see Imperative hallucination.

Complementary Afterimage

The term complementary afterimage refers to a type of *afterimage in which the hues are approximately the complements of those in the original stimulating field. The complementary afterimage of a yellow circle, for example, is executed in blue. The term complementary afterimage is used in opposition to the term *homochromatic afterimage (which refers to an afterimage in which the distribution of hues is the same as that of the original stimulation field). Complementary afterimages are commonly classified as *physiological illusions.

Reference

Brown, J.L. (1965). *Afterimages*. In: *Vision and visual perception*. Edited by Graham, C.H. New York, NY: John Wiley & Sons.

Complete Hallucination

A term used to denote a hallucination fulfilling all the formal characteristics of *hallucinations proper, in the sense that it perfectly mimics a regular sense perception. The French psychiatrist Pierre Lelong conceptualizes complete hallucinations as dissociated or depersonalized mental elements that are somehow transformed into ego-alien or ego-dystonic percepts. According to Lelong, this transformation involves three sub-

sequent stages, namely obsession (characterized by self-consciousness and anxiety), *psychic hallucination (characterized by depersonalization and *automatisms), and *sensorial hallucination (characterized by its subconscious nature, and its seeming objectivity). Complete hallucinations are traditionally considered prognostically unfavourable. Whereas the 'desensorialisation' of hallucinations tends to be interpreted as a sign of recovery, the 'concretisation' or 'reconcretisation' of hallucinations tends to be interpreted as a sign of deterioration or relapse. The term complete hallucination is used in opposition to the terms *incomplete hallucination and *rudimentary hallucination.

References

Lelong, P. (1928). *Le problème des hallucinations*. Paris: Librairie J.-B. Baillière et Fils.
 Parish, E. (1897). *Hallucinations and illusions. A study of the fallacies of perception*. London: Walter Scott.

Complex Hallucination

A term used to denote a phenomenologically rich and often well-organized type of hallucination that is confined to a single sensory modality. Theoretically, complex hallucinations may present in any of the sensory modalities. It is customary, however, to reserve the term for hallucinations experienced in the *visual or *auditory modalities. In the auditory modality, complex hallucinations typically take the form of well-articulated speech, elaborate and realistic environmental sounds, or music. In the visual modality, they typically take the shape of a person, a face, an animal, a landscape, a scene, or a composite image of fantasy elements. When a complex hallucination replaces the entire sensory input picture, it is referred to as a *scenic or *panoramic hallucination. Pathophysiologically, complex hallucinations are traditionally associated with aberrant neurophysiological activity in higher-level cortical regions, such as those in the temporal lobe. It has been suggested, however, that the initial impulse for the mediation of complex hallucinations may stem from other cerebral structures, such as the limbic system (rendering a *reperceptive hallucination), the pedunculus cerebri (rendering a *peduncular hallucination), or the speech areas (rendering a *verbal auditory

hallucination). Moreover, complex hallucinations have been described in individuals suffering from lesions affecting the primary sensory cortex, and from lesions affecting the peripheral sense organs. It is unlikely that lesions in such early sensory structures can be held responsible for mediating complex hallucinations. Instead, it has been suggested that such lesions act via the *deafferentation of higher-level cortical areas, which are in turn responsible for mediating the hallucinations at hand. The term complex hallucination derives from a classification of hallucinations governed by the guiding principle of complexity. It is used in opposition to the terms *simple (or *elementary) hallucination and *geometric hallucination. When hallucinations are experienced in more than one sensory modality at a time, they are referred to as *compound hallucinations.

References

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- Parish, E. (1897). *Hallucinations and illusions. A study of the fallacies of perception*. London: Walter Scott.

Complex Regional Pain Syndrome (CRPS)

see Causalgia.

Complicated Metamorphopsia

The term complicated metamorphopsia comes from the Latin verb *complicare* (to fold together), and the Greek words *metamorphoun* (to change the form) and *opsis* (seeing). It is used to denote a type of *metamorphopsia (i.e. a visual distortion) that is accompanied by an alteration in the affective tone of one's experience of the extracorporeal environment, analogous to cases of *kalopsia

or *kakopsia (i.e. seeing things as beautiful or ugly, respectively). The term complicated metamorphopsia is used in opposition to the term *simple metamorphopsia.

References

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- Willanger, R., Klee, A. (1966). Metamorphopsia and other visual disturbances with latency occurring in patients with diffuse cerebral lesions. *Acta Neurologica Scandinavica*, 42, 1–18.

Compound Hallucination

Also known as multimodal hallucination, polymodal hallucination, polysensual hallucination, polysensory hallucination, polysensorial hallucination, intersensorial hallucination, and fantastic hallucination. All these terms are used to denote a hallucination experienced in more than one sensory modality at a time. Some examples of compound hallucinations are the audiovisual hallucination, the *audioalgesic hallucination, and the *audiovisuoalgesic hallucination. When a compound hallucination replaces the total *sensory input, it is referred to as a *scenic or *panoramic hallucination. When it depicts one or more human beings, it is referred to as a *personification. In a study by the American psychiatrists Donald W. Goodwin (1932c–1999) et al. among 117 individuals with varying clinical diagnoses (i.e. affective disorder, acute and chronic *schizophrenia, alcoholism, organic brain syndrome or hysteria) compound hallucinations were found to be relatively rare, whereas the subsequent occurrence of hallucinations in two or more different sensory modalities was reported by three-quarters of the population under study. The simultaneous occurrence of these hallucinations was reported by 50% of the individuals with a clinical diagnosis of affective disorder or schizophrenia, but only as an infrequent experience. The term compound hallucination derives from a classification of hallucinations governed by the number of sensory modalities involved. It is used in opposition to the term *unimodal hallucination.

References

- Critchley, M. (1939). Visual and auditory hallucinations. *British Medical Journal*, 2, 634–639.
- Goodwin, D.W., Alderson, P., Rosenthal, R. (1971). Clinical significance of hallucinations in psychiatric disorders. *Archives of General Psychiatry*, 24, 76–80.

Compulsive Hallucination

A term used to denote a hallucination in which a perceptual memory trace or fantasy is compulsively retrieved and re-experienced, often in a repetitive manner. Two examples of compulsive hallucinations are drug-related *flashbacks, and flashbacks occurring in the context of *post-traumatic stress disorder. The notion of compulsive hallucination should not be confused with the notions of *hallucinatory obsession and *obsessional hallucination, which have a related, but slightly different connotation. All three types of hallucination have been described in individuals with a clinical diagnosis of obsessive-compulsive disorder and/or *schizophrenia, but they may also occur in other conditions, as well as in individuals without a psychiatric diagnosis.

Reference

- Poyurovsky, M., Weizman, A., Weizman, R. (2004). Obsessive-compulsive disorder in schizophrenia: Clinical characteristics and treatment. *CNS Drugs*, 18, 989–1010.

Conception Hallucination

see Psychic hallucination.

Conceptual Synaesthesia

The term conceptual synaesthesia comes from the Latin adjective *conceptualis* (pertaining to the mental concept), and the Greek words *sun* (together, unified), and *aisthanesthai* (to notice, to perceive). The concept was introduced in or shortly before 1954 by the Hungarian-Dutch experimental psychologist Géza Révész (1878–1955) to denote a *synaesthesia in which

the secondary sensation is an ideated sensation rather than a hallucinated percept. For example, in *colour hearing of the conceptual synaesthesia type the actual sound of a trumpet may trigger an imagined colour rather than a hallucinated colour. The term conceptual synaesthesia is used in opposition to the terms *mental synaesthesia and *perceptual synaesthesia.

Reference

- Révész, G. (2001). *Introduction to the psychology of music*. Translated by de Courcy, G.I.C. Mineola, NY: Dover Publications.

Conductive Tinnitus

A term used to denote a type of *tinnitus (i.e. ‘ringing in the ears’) attributed to otosclerosis. The term conductive tinnitus is used in opposition to the terms *sensorineural tinnitus and *central tinnitus.

Reference

- Henry, J.A., Dennis, K.C., Schechter, M.A. (2005). General review of tinnitus. Prevalence, mechanisms, effects, and management. *Journal of Speech, Language, and Hearing Research*, 48, 1204–1235.

Cone

see Tunnel.

Cone-Monochromatism

see Achromatopsia.

Confuso-oneiric State

see Delirium.

Contingent Aftereffect

Also known as contingent perceptual aftereffect. Both terms are used to denote a type of

*aftereffect that is dependent on (i.e. contingent with) the orientation of the perceived object with respect to the retina. An example is the *McCullough effect, in which the prolonged and alternate viewing of two differently coloured grid patterns with opposite orientations, and the subsequent viewing of a similar pattern in black and white, yields an illusory perception of complementary colours. The contingent aftereffect is classified as a *physiological illusion.

Reference

Ninio, J. (2001). *The science of illusions*. Translated by Philip, F. Ithaca, NY: Cornell University Press.

Contingent Perceptual Aftereffect

see Contingent aftereffect.

Continuity Hypothesis

In hallucinations research, the term continuity hypothesis is used as a generic term for a group of hypothetical models that conceptualize hallucinations as lying on a continuum with other percepts such as sense perceptions, *illusions, *dreams, *imagery, and fantasies. In some versions of the continuity hypothesis even cognitive phenomena such as thoughts and memories are taken into the equation. In different models, the alleged continuity between these phenomena is either understood in a phenomenological or a neurophysiological sense. As summarized by the American philosopher C. Wade Savage, "Any of the following formulations are candidates: (1) The experiences listed are composed of the same stuff, so to speak; they differ not in kind, but in degree – degree of vivacity, coherence, voluntariness, creativeness, concreteness, and veridicality. For example, perceptions are often more vivid than dreams; fantasies are usually more voluntary than perceptions. (2) The experiences listed are not sharply distinguishable from one another, as the existence of intermediate cases shows. For example, between a vivid hallucination and a not-so-vivid dream, we can find an experience intermediate in vivacity, and we may be unsure whether to call it a dream or an hallucination. (3) The experiences listed can evolve into, become

transformed into, one another. For example, a dream, on waking, may evolve into a fantasy; a perception, on falling asleep, may evolve into a dream. (4) The internal mechanisms of the experiences listed, the processes by means of which they are produced, are similar." Two historical examples of continuity hypotheses are those of the French psychiatrist Jacques-Joseph Moreau de Tours (1804–1884), who stresses the phenomenological similarities between dreams, hallucinations of *delirium, and hallucinations induced by *hashish, and of the French classical scholar and dream researcher Louis-Ferdinand-Alfred Maury (1817–1892), who suggests the existence of a common physiological mechanism called *oneirism underlying both dreams and hallucinations.

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Convergence Micropsia

Also referred to as accommodative micropsia, accommodation-convergence micropsia, and oculomotor micropsia. All three terms are used to denote a type of *micropsia (i.e. the visual perception of an object or stimulus that is apparently decreased in size) due to convergence and accommodation of the eyes, as may occur in squinting, for example. The process of reducing the apparent size of objects and stimuli is called *minification. The British scientist and inventor Charles Wheatstone (1802–1875) has been credited with being the first to report on convergence micropsia *avant la lettre* in 1852. The term accommodative micropsia appears in the 1939 *Text-book of Ophthalmology* by the Scottish ophthalmologist Sir Stewart Duke-Elder (1899–1978). Experimental research suggests that this physiological type of micropsia is due mainly to convergence, and only to a lesser extent to accommodation

of the eyes. Additional mechanisms that may play a part in the mediation of convergence micropsia, albeit to an even lesser extent, are the pinhole effect (i.e. in cases where an object is observed through a pinhole), the shift in the position of the nodal point of the eye while it accommodates, and perhaps a central mechanism connected with the *corollary discharge signal coinciding with accommodation. Convergence micropsia is classified as a *physiological illusion.

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Convergence Phosphene

A term used to denote a *phosphene (i.e. ‘seeing stars’) arising physiologically in association with convergence of the eyes. In 1978 the American neuroscientist Christopher W. Tyler proposed a distinction between two types of convergence phosphene: one mediated by rapid convergence movements, and one mediated by prolonged convergence movements. Phenomenologically, the type of phosphene which follows rapid convergence movements is characterized by two large rings that can be seen best in a dark environment. This type is also referred to as the *fiery rings of Purkinje, after the Bohemian physiologist Johannes Evangelista Purkyně (1787–1869), who described the phenomenon in his textbook of 1823. The mediation of the fiery rings of Purkinje is attributed to stretching of the optic nerves and the region of the papillae, followed by peripheral neuronal discharges. The second type of convergence phosphene, occurring after sustained convergence of the eyes, can be best perceived with eyes closed against an illuminated background. This type is characterized by a red dumbbell-shaped form that extends horizontally from the region of the fovea to the periphery. Because of

its shape, this type of phosphene is also referred to as a *dumbbell phosphene or dumbbell-shaped phosphene. Convergence phosphenes are classified either as *entoptic phenomena or as *physiological illusions. The term convergence phosphene is used in opposition to the terms *flick phosphene, *movement phosphene, and *sound phosphene.

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Conversion

see Sensory conversion.

Conversion Anaesthesia

Also known as psychogenic anaesthesia. Both terms are used to denote the inability or strongly diminished ability to perceive tactile sensations, due to *sensory conversion. An extreme variant of this symptom, described in hypnosis and classical cases of hysteria, is known as *total or *systematized anaesthesia.

Reference

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Conversion Blindness

see Hysterical blindness.

Conversion Hallucination

see Conversive hallucination.

Conversive Hallucination

Also known as conversion hallucination. Both terms are used to denote a hallucination attributed to *sensory conversion. Sensory conversion is conceptualized as an unconscious process by means of which anxiety, generated by an intrapsychical conflict, is transformed into a perceptual symptom. Conversive symptoms are by definition suggestive of a neurological disorder, although upon state-of-the-art clinical examination they remain inexplicable. The term conversive hallucination is traditionally used in opposition to the term *psychotic hallucination, so as to emphasize its purportedly non-psychotic origin. Although the conceptual distinction between conversive and psychotic hallucinations is not self-evident, it has been claimed that conversive hallucinations are relatively rare, and that they tend to occur in the form of recurring *complex visual, *scenic, and/or *auditory hallucinations depicting prior experiences from the affected individual's life, especially when these are emotionally charged. In older, clinical studies, conversive hallucinations are reported in up to 88% of the individuals with a clinical diagnosis of hysteria. Classical examples of conversive hallucinations include those depicting a previously witnessed traumatic scene, those re-enacting prior physical or sexual abuse, and those depicting a fervently wished-for, but practically impossible situation (such as the wish for a relationship with a married person, or with a person of the same sex). Explanatory models for the mediation of conversive hallucinations tend to revolve around the notion of *dissociation with restricted awareness, meaning that percepts that would normally be appreciated as endogenous or imaginary in nature, are considered real because of a certain misinterpretation and/or misperception, which is in turn attributed to a restricted awareness. A competing model to these 'dissociative' models is the cognitive model, which attributes the mediation of conversive hallucinations to the so-called extension of thoughts to images, known in the older literature as *perceptualization of the concept. Conversive hallucinations are generally classified as *psychogenic hallucinations. Conceptually as well as phenomenologically, they would seem to display a certain similarity to Freud's *hallucinatory confusion.

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Cornsweet Edge

see Cornsweet effect.

Cornsweet-Edge Effect

see Cornsweet effect.

Cornsweet Effect

Also known as Cornsweet edge, Cornsweet-edge effect, Cornsweet stimulus, Cornsweet illusion, Craik–Cornsweet illusion, Craik–O'Brien–Cornsweet illusion, and Craik–O'Brien effect. The eponym Cornsweet effect refers to the American cognitive psychologist Tom Norman Cornsweet (b. 1929), who described the concomitant phenomenon in or shortly before 1970. The eponym Craik–O'Brien effect refers to two authors responsible for an earlier description of the same phenomenon. In 1940 the Scottish philosopher and psychologist Kenneth John William Craik (1914–1945) was the first to describe it in his doctoral thesis. However, Craik died in a car accident before his discovery was published. It was the American physicist Vivian O'Brien (b. 1924) who rediscovered the phenomenon and published it in 1958. All the above eponyms refer to a contrast illusion in which a difference in hue is observed between two adjacent fields of equal hue that are interconnected by a contrast edge with a colour gradient on one side. Only when the colour gradient is covered or removed, the perceptual system is able to recognize the two fields as being of the same hue. The mediation of the Cornsweet effect is commonly attributed to a cortical filling-in process, although it is generally acknowledged that its neurobiological correlates are not fully understood. Because it arises from the inherent properties of the perceptual system, the Cornsweet effect can be

classified as a *physiological illusion. It should not be confused with a related contrast illusion called *Mach bands.

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Cornsweet Illusion

see Cornsweet effect.

Cornsweet Stimulus

see Cornsweet effect.

Corollary Discharge Model

see Defective corollary discharge model for hallucinations.

Corona

see Halo.

Corona Phenomenon

The term corona phenomenon is indebted to the Latin noun *corona*, which means crown. It was introduced in or shortly before 1966 by the Danish neuroscientists Axel Klee (1933–1982?) and Rolf Willanger to denote a *visual illusion consisting of an extra edge perceived around objects. The phenomenon itself has been described before, however, and referred to by such terms as *halo, border, and shiny ring. The German ophthalmologist Christian Georg Theodor Ruete (1810–1867) has been credited with providing the first written account of a corona phenomenon *avant la lettre* in 1845. Corona phenomena typically



Fig. 5 Corona phenomenon. Illustration by JDB

present in the form of a single or a double contour. They can surround objects in whole or in part, can be executed in any type of colour, including black and white, and may take on a shining, silvery, or shimmering quality. They may occur in isolation, or in association with an incomplete loss of vision (i.e. a *scotoma), a *scintillating scotoma, or a complete *hemianopia. In addition, they may be accompanied by *geometric hallucinations. Atypical corona phenomena have been described as well, presenting in the form of multiple coloured edges, multiple waves and zigzag lines, coronas surrounding illusory images, or combinations of corona phenomena and other illusory or hallucinatory phenomena such as *mosaic vision, *autoscopy, *polyopia, *teleopsia, and *micropsia. Etiologically, corona phenomena are associated primarily with *migraine aura and with *sensory deprivation. Their pathophysiol-

ogy is basically unknown, but it has been suggested that they may be mediated by CNS structures involved in visual contrast perception. The corona phenomenon should not be confused with the corona of light associated with *Buddha's halo, with *heilighenschein, with the *visual halo (also known as corona), and with the *aura featuring in the paranormal literature.

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Cortical Blindness

see Blindsight.

Cortical Metamorphopsia

see Cerebral metamorphopsia.

Cortical Probing and Hallucinations

The term cortical probing refers to an experimental method in which cerebral cortical areas are electrically stimulated with the aid of unipolar silver electrodes in order to determine their physiological function. The American physician Roberts Bartholow (1831–1904) has been credited with initiating this type of research shortly before 1874. Arguably the most celebrated work in this domain is that of the Canadian neurosurgeon Wilder Graves Penfield (1891–1976). From the 1930s through the 1950s, Penfield and his group performed open temporal lobe explorations on 520 individuals with uncontrollable epileptic seizures. These individuals were given a local anaesthetic injected into the scalp, so that they remained conscious during the probing experiment, and thus were capable of verbalizing their experiences. Upon the probing of

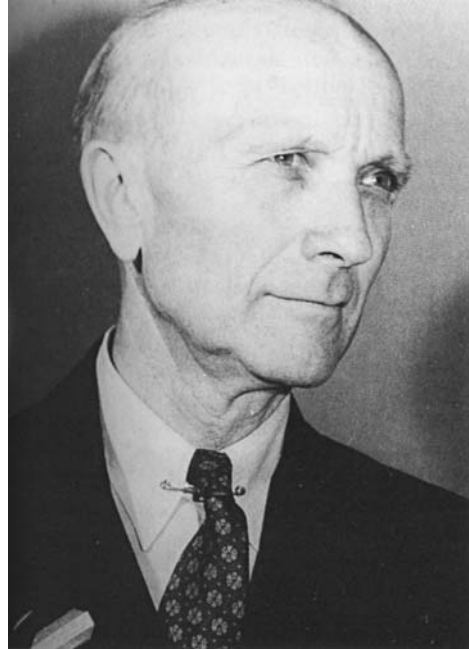


Fig. 6 Wilder Penfield

distinct sensory cortical areas (mostly temporal), 40 of these individuals reported vivid hallucinations. According to Penfield, many of these hallucinations seemed to be re-enactments of previously memorized events. He gives the example of a young South African patient, who “lying on the operating table exclaimed, when he realized what was happening, that it was astonishing to realize that he was laughing with his cousins on a farm in South Africa, while he was also fully conscious of being in the operating room in Montreal.” Throughout his work Penfield refers to hallucinations evoked by cortical probing either as *experiential phenomena, experiential responses, experiential hallucinations, memory flashbacks, psychical illusions, *psychical hallucinations, or *flashbacks. As he considered the sensory cerebral cortex responsible for receiving *and* storing sensory input signals, he conjectured that these hallucinations might well be re-perceived memory traces of prior perceptual experiences (i.e. *reperceptive hallucinations). He was impressed by their varied, acute, and detailed nature, and

hypothesized that the human memory data base may well contain a literal record of its total conscious experience. He used the terms ganglionic record, neuronal record, and memory cortex to refer to this data base, which he located tentatively within or just beneath the cerebral sensory cortex. In later years, Penfield felt compelled to adjust this view. For example, he moderated his ideas on the alleged completeness of the ganglionic record, on the grounds that certain modes of experience were conspicuously absent from the test persons' reports (such as eating and tasting food, sexual arousal and performance, the execution of skilled procedures, speaking, resolving to do this or that, and memories of pain, suffering, and weeping). Moreover, he realized that memories might well be altered by dream activity *after* their initial recording, and, ironically, by prior instances of re-perception. Therefore, he concluded that re-perceptions could hardly be exact copies of prior sensory experiences. However, he remained convinced that they derived from memorized sense impressions. Long before Penfield's time, the concept behind this physiological model had been conceived by the British physician John Ferriar (1761–1815), who suggested that apparitions might spring from recollections of familiar images. The German psychiatrist Karl Ludwig Kahlbaum (1828–1899) gave this process the name *re-perception. He dubbed the resulting percepts *re-perceptive hallucinations, so as to distinguish them from what he called *perceptive hallucinations. Criticisms of Penfield's cortical hypothesis derive mainly from studies with stereotactically implanted depth electrodes conducted from the 1970s onwards. On the basis of these studies it has been suggested that re-perception can only occur when subcortical as well as cortical centres are activated. As the Swiss-Canadian neurologists Pierre Gloor (1923–2003) et al. state categorically, "Unless limbic structures are activated, either in the course of a spontaneous seizure or through artificial electrical stimulation, experiential phenomena do not occur." Gloor's view concerning the involvement of limbic structures is in keeping with the now dominant long-term potentiation (LTP) model of synaptic transmission, which links memories primarily to alterations in the synaptic transmission of hippocampal neuronal circuits. As a result, Penfield's concept of a 'ganglionic record' within or beneath the cerebral sensory cortex is generally regarded as superseded today. In his final, retrospective work *The Mystery Of The Mind* Penfield indicates that around

1958 he himself had also come to the conclusion that "the record is *not* in the cortex". From that time onwards, he discarded the terms ganglionic record, neuronal record, and memory cortex, and introduced the term interpretive cortex to denote the temporal cortical areas that upon stimulation would mediate experiential phenomena. As he mused accordingly, "Stimulation of the interpretive cortex activates a record located at a distance from that cortex, in a secondary center of gray matter. Putting this together with other evidence makes it altogether likely that the activated gray matter is in the diencephalon (higher brain stem)."

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Corticosteroids and Hallucinations

see Steroid psychosis and hallucinations.

Craik-Cornsweet Illusion

see Cornsweet effect.

Craik-O'Brien-Cornsweet Illusion

see Cornsweet effect.

Craik-O'Brien Effect

see Cornsweet effect.

Crank Bugs

A term used to denote *formicative hallucinations (i.e. *tactile hallucinations mimicking bugs crawling beneath or upon the skin) occurring in the context of amphetamine use or withdrawal. In this specific context, the pruritic lesions resulting from scratching are referred to as speed bumps or meth sores.

Reference

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Creative Hallucination

The term creative hallucination stems from the literature on hypnotism. It is used to denote a *complex or *compound hallucination prompted by a relatively simple perceptual stimulus in one of the sensory modalities. The Swiss psychologist Carl Gustav Jung (1875–1961) gives an example of “the appearance of hallucinatory processes through simple stimulations of touch.” As Jung maintains, “The patient’s subconscious uses these simple perceptions for the automatic construction of complicated scenes which then take possession of his restricted consciousness.” Creative hallucinations can be classified as a variant of *reflex hallucinations.

Reference

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Crepuscular Hallucinosis

The term crepuscular hallucinosis is indebted to the Latin noun *crepusculum*, which means dusk or half-light. It is used to denote a hallucinatory state typically arising at dusk, or during any other episode of half-light. The notion of crepuscular hallucinosis should not be confused with the – related – notions of

*closed-eye hallucination, *hypnagogic hallucination, and *hypnopompic hallucination.

Reference

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Cross-Activation Hypothesis

In hallucinations research the term cross-activation hypothesis is a generic term for a group of hypothetical models that attribute the mediation of certain types of hallucinations to ‘cross-talk’ between two or more adjacent cerebral areas. The cross-activation hypothesis constitutes one of the major explanatory models for the mediation of *synaesthesias, i.e. phenomena in which the perceptual stimulation of one sensory modality leads to a hallucinatory experience in a second sensory modality. *Number-colour synaesthesias, for example, have been tentatively explained by the American neuroscientists Vilayanur S. Ramachandran (b. 1951) et al. as resulting from a genetically determined hyperconnectivity between cerebral colour and number areas. These areas are located within the fusiform gyrus (in so-called ‘lower’ number-colour synaesthetes), or within the angular gyrus (in so-called ‘higher’ number-colour synaesthetes). Theoretically, the cross-activation hypothesis might also be applicable to phenomena such as the *reflex hallucination, the *creative hallucination, the *functional hallucination, and the *Tullio phenomenon, which are all characterized by a hallucinatory experience occurring in reaction to a regular sense perception.

Reference

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Cryptesthesia

see Clairvoyance.

Crystal-Vision

A term used to denote a type of *visual hallucination or *illusion that may arise during a period of fixed gazing into an opaque or reflecting object, such as a Braid's crystal, a glass of water, or a metal mirror. The ancient technique employed to call forth this type of hallucination is known as crystal gazing, crystallo-mancy, or scrying. When water or other liquids are employed, the term hydromancy is used. When oil is used, the term lecanomancy applies. It is believed that reflections of light within the medium of choice act as **points de repère* for the formation of visual hallucinations. In biomedicine, the *visions thus evoked are variously classified as *reperceptions or as *release phenomena. They can also be classified as *cognitive illusions. The German hallucinations researcher Edmund Parish (1861–1916) holds that crystal-visions are typically experienced while one is fully awake and conscious. It has also been suggested, however, that a trance-like or self-hypnotic state is required to allow these phenomena to be conjured up. In parapsychology, crystallo-mancy is considered a mode of divination. As a corollary, the ensuing hallucinations are considered *veridical, *telepathic, or *coincidental in nature.

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Cutaneous Perception

see Eyeless vision.

Cyanopia

see Cyanopsia.



Fig. 7 John Dalton. Source: Sterling, W. (1902). *Some apostles of physiology.* London: Waterlow and Sons

Cyanopsia

Also known as cyanopia and blue vision. The term cyanopsia comes from the Greek words *kuaneos* (blue) and *opsis* (seeing). It is used to denote a *chromatopsia (i.e. a temporary aberration of colour vision) in which whites are seen as blue or bluish, and yellows as less intense. As the opposite condition (known as *xanthopsia or yellow vision) is sometimes caused by cataract of the lens, it is understandable that cyanopsia can occur as a temporary side effect after cataract extraction. Cyanopsia tends to be classified as an *entoptic phenomenon. The term is used in opposition to the terms *chloropsia (green vision), *xanthopsia (yellow vision), *erythropsia (red vision), and *ianthiopsia (violet or purple vision).

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