

## AN INQUIRY INTO THE NATURE OF HALLUCINATIONS

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(See also: [An Inquiry into the Nature of Hallucination.](#))

The subject of hallucinations forms the stumbling block both of the psychologists and psychopathologists. The deeper one penetrates into the subject the greater confusion he encounters. Some regard hallucinations as being of peripheral origin, others regard them as central in character, while still others go to the extent of claiming that the most central hallucinations are of supernatural origin, being communications and messages from a transcendent world. In view of the great importance of the subject it may be well to make an attempt to throw some additional ray of light on this obscure matter from the standpoint of psychological and psychopathological analysis.

The usual definition of illusion and hallucination is with regard to the external object. Illusion is defined as fallacious perception of some actually existing object, while hallucination is perception of a non-existing object. This definition is good for practical purposes of the clinician, but it is not psychological. From a strictly psychological standpoint illusions and hallucinations cannot possibly be differentiated from other psychic states by the presence or absence of external objects. External objects can hardly be regarded as constituents or necessary ingredients of psychic states. Illusions and hallucinations should be defined in terms of psychic processes. As far as process is concerned it is quite possible that the same processes underlie both normal and fallacious or abnormal perception. In order to get a clearer insight into the nature of illusions and hallucinations it may be well to begin with a brief analysis of the process of perception.

## PART I

If we take a cross-section of a moment of consciousness and try to fixate it with our mental eye, we find a central psychic experience, or psychic element round which other psychic experiences or psychic elements are crystallized and organized. This psychic experience, or central element, is prominent, vivid and constitutes the vital point of all the other organized states, giving the tone to the rest, to a whole, to one organized experience. The psychic matter that surrounds the luminous central point does not stand in a free more or less disconnected relation to the latter, it is intimately related to the center and cannot be separated without destroying the moment as a whole and even the life existence of each particular constituent. The whole moment seems to form an organic network in which the other elements take their place according to a plan. The structure of the moment may in this respect be compared with that of the cell. In the cell we discriminate a nucleus round which cytoplasm is grouped. The protoplasm is connected with the nucleus by a network imbedded in the cytoplasm by a cytoskeleton. The destruction of the nucleus affects the cytoplasm and the destruction of the cytoplasm affects the nucleus. The two are intimately, organically interrelated by the common network, the general plan of their organization. If we closely examine the percept, we find in it a central sensory element surrounded by other elements. This central element stands out prominently in the given psychic state, while the other elements are subordinate. Not that those elements are unimportant for the percept, on the contrary they are of the highest consequence and moment, they only lie outside the focus of the mental state. Along with the focus those elements form one organized whole. All the elements of the percept form one texture having the central sensory element as its nucleus.

Integrated, however, as all these elements are they are not of equal value and importance to the life existence of the whole. The central sensory element is of the utmost consequence, it is the vital point of the total experience. While the change, or destruction of one or of some of the subordinate elements may still leave the total percept unchanged, or but slightly modified, a change of the central sensory element or of the nucleus will profoundly modify all the other

elements and their interrelation.

The elements of the percept may be regarded as bound up in a 'chemical' compound, so to say, together giving rise to the qualitative aspect of the total combination, the difference being that in the psychic compound there is a central element that gives the keynote to the combination; in the chemical compound the elements are all equal in value and importance. To form water for instance, an atom of hydrogen to two of oxygen is required; the oxygen and the hydrogen are both equally requisite to the formation of the compound; one is not more important than the other. Not so is it in the psychic compound; there the elements are of unequal value. The most important of them is the nucleus; it determines the interrelation of the psychic elements and also the outcome of the whole combination.

From a biological standpoint we can see why this should be so. A psychic compound is biological, not purely physical or chemical. In the physical components there is no higher and no lower, all are of equal value; in the psychic as in all life existence, there is a higher and a lower in structure. In other words, the biological compound is peculiar and different from the chemical, inasmuch as the former is really not a compound, but an organization. The characteristic of an organization is just this systemic combination of different grades and orders of importance for the total life existence of the whole.

Looked at from another standpoint, we can further see the necessity of such a central element. We have pointed out in another place that one aspect of the biological process is that of purpose, and if that be granted then psychic processes regarded as highly developed biological processes should present this general characteristic of purposiveness in its fully developed form. Now, where purpose is involved the end alone is the important thing, all the other elements are subordinate and determined by it. Not that the other elements are unimportant; they may be intimately related, but they, after all, are only means to accomplish the end. The elements that have for the time being the organizing power to aggregate round themselves the proper elements and lead towards the required end are predominant. For every psychic state is essentially for some reaction and that sensory element which gives the cue for the formation of the psychomotor elements leading to some given reaction is for the time being the center, the nucleus of the total state.

The flower before me attracts my attention. I see its color of a

light violet tint, its rounded bell shape and its velvet-like softness; I stretch out my hand carrying the flower to my nose, to enjoy its fragrance. What I really see is the light violet tint; the rest of the elements are not given directly, they are largely inferred. The shape is largely an inference from previous muscular eye-movements and its softness is derived from previous tactual experiences. They are all, however, perceived by the eye, the cue being given by the prominent sight sensation. Although the flower as percept appears as an organized whole, still the sensation of sight forms the nucleus round which the others cluster; the perceptual tone is given and determined by the particular sensations of sight. The softness, though perceived, is still altogether different from the sensation softness as directly experienced through the organ of touch; it is a sensory *sight* softness. The same is true of all the other sensory elements; they are all essentially determined in their quality by the central sensation. In seeing a lump of ice we perceive its whiteness, its transparency, its hardness, its smoothness, etc. The hardness and smoothness are essential elements of the percept ice. These elements seem to be given directly in sensory, experience. They seem to be directly perceived and still are qualitatively different from the hardness, smoothness and coldness as given directly by the experience, when the hand gets hold of a smooth lump of ice. The sensory element s are determined and colored by the central visual sensory elements. The sensory elements of coldness, hardness, smoothness are of a visual character.

It is usually claimed that such additional elements that are not given directly by the stimulated organ are elements representative in character, derived from memory. This statement is not quite correct. In seeing the piece of ice the hardness, the smoothness are not represented, they are *presented* to the eye; we really seem to see, to experience these sensations going to make up the percept ice. It is not true that on catching sight of whitish, transparent, glittering lump we remember that it is also hard, smooth and cold. The whole percept with all its sensory elements appears at once in the synthesis of the percept ice—we see, we perceive the hard, smooth, cold ice. The hardness simply remembered is altogether different from the hardness perceived in the seeing of the lump of ice. The hardness, smoothness as they appear in the ice are different to the eye and is different psychologically from the corresponding representations as the latter differ from the corresponding sensations directly

experienced by the appropriate sense organs.

Pathological cases seem to confirm the same point of view. There are certain mental diseases, when the patient can perceive the object correctly, though he cannot represent it to himself. The patient can perceive all the elements on being confronted with the object, but by no means can he remember them. On the other hand, there are cases when the patient can easily represent to himself objects, but cannot recognize the object when directly confronted with it.

The subordinate elements in their turn play an important *rôle* in the total unity of psychic experience, in the percept, inasmuch as they give the content of the total moment, fermented, so to say, by the predominant nuclear element. The visual elements, the perception of play of light and shade would have been nothing but mere play of light and shade, if not for the subordinate tactal and motor elements that give rise to the perception of distance, dimension, size, body. The leading element gives the character to the content by having it appear under its own special sensory aspect, while the other elements give the content to the whole moment. Thus where space is perceived through the organ of sight mainly, the space is visual in character, though, the content that gives rise to the perception of space itself is filled in by other psychic elements.

The central element with its content may be regarded as the nucleus of the cell surrounded by its cytoplasm and the total organic whole may be termed psychic compound. Now in the psychic compound the constituent elements of the content can no longer be directly discriminated. In the lower forms of mental life the elements are firmly bound as we find it to be in the psychic compound—the percept. In the forms where the elements are more complex the synthesis results in fusion in which the elements can be more or less easily discriminated. Thus if one listens to the beats of a metronome and to the rhythmical vibrations of a pendulum the sensations blend and fuse, the sounds seem to proceed from the vibrating pendulum. The same case is well illustrated in the well-known amusement of having one hidden behind a screen and making a speech, while another one is watched who is gesticulating in accordance with the modulations of the speaker's voice. The two series of sensations blend and the voice seems to proceed from the gesticulating person. The synthetized elements here are fused or more or less 'mechanically' joined instead of being firmly combined in a sort of 'mental

chemistry'.

In the higher and more complex mental states the constituents of the synthesis are neither 'chemically', nor 'mechanically' fused. The constituents stand out free and distinct. While I am writing this page I see on my table at one glance the light, the lamp, the paper, the pen writing words and lines and hear and feel the pen move on the surface of the paper; at the same time I see the table, the chair in the room and hear the ticking of the clock. The multiplicity of all these experiences is simultaneously synthetized and at the same time discriminated in the unity of the total experience.

In the processes of succession of complexes of psychic elements, in the trains of ideas, the constituent elements attain their greatest freedom and independence. In the states of perceptual synthesis, on the contrary, the directly experienced sensory elements constituting the nucleus of the percept calls out immediately its appropriate associated perceptual elements and the compound, the percept, appears, as a whole, that can be analyzed only under highly artificial conditions. Fixity is the essential characteristic of lower mental stages as well as of the percept.

The constituent psychic elements are so intimately united in the percept that they resist efforts at decomposition. If a percept *A* is composed of elements *a*, *b*, *c*, *d*, and if *a* be the nucleus, the stimulation of the nucleus brings out the rest—*b*, *c*, *d*. The central, or nuclear element is purely sensory, but the rest of the psychic elements *b*, *c*, *d*, are not sensory in the same sense as *a* is, since they are not derived from direct stimulations of the appropriated sense organs. Their character is not primarily, but only *secondarily* sensory. The retina gives only light sensations. The most differentiated and highly organized structure of the highest vertebrates such as that of the higher mammals can only give rise to local signs, to highly differentiated light sensations varying with each retinal point or element, or cellular termination. The stimulated retinal elements with the neuron terminations of the optic nerve can give nothing else but a series of light sensations and the image formed on the retina is in fact nothing else but a series of light sensations. If this be so, how then do we come to see that tangible, heavy, solid body yonder at a more or less definite distance? Solidity, bulk, are not given in light sensations as such, how then are those spatial and physical characters perceived so distinctly as to assume a direct sensory character? It

cannot be ascribed to the principle of association of ideas. For the object and its distance appear at once in one single glance before any idea comes to the mind. Furthermore, an idea from its very nature stands out distinct and definite; it is essentially free, but the psychic elements of object and distance are not discriminated. Again phylogenetically and ontogenetically sensation and perception precede ideation. The infant, the animal perceives objects and distance and certainly with little or no ideation present. In the visual perception of distance the subordinate psychic elements derived from other senses are not of an ideational character, they are of a sensory character. The eye sees the distance. The eye sees distance or volume directly, because of other elements involved in the process of perception, such as the kinæsthetic sensations coming from the movements of the eyes in their adjustment to the stimulations from the external environment, also tactful, muscular and kinæsthetic sensations derived from skin, muscles, joints and articular surfaces, all synthetized in the given percept. The subordinate psychic elements are neither of the character of pure sensations nor are they of the nature of pure ideas. What are they? They seem to be *intermediary* in character, intermediary between the nature of sensation and that of idea. Perception appears to be an intermediary process.

We may regard the same process from a hypothetical physiological standpoint which may possibly help us in picturing the mechanism. A specific physical stimulus produces in the peripheral sense organ a definite physiological process which is transmitted to groups of neuron systems stimulating them to activity and giving rise to specific physiological processes. Whenever these specific physiological processes are peripherally induced, the special sensory elements arise. If groups and systems of such psycho-physiological elements become associated and organized round a central nucleus, the result of the functioning activity of the total organic complex is a psychic compound, a percept. Whenever one of the groups is peripherally stimulated and is awakened to activity, the other elements become stimulated and the result is the organized activity of function of all the elements, thus giving rise to the synthesis of all the psychic elements, namely the percept.

Now we should postulate some difference in the psychic state as to whether psychophysiological elements are stimulated directly

through their own appropriate sense organ or whether they are awakened to activity indirectly through other sense organs. The *direct* peripheral stimulation gives rise to psychic elements characteristic of the particular sense organ and its nervous tracts and central systems of neurons, whilst the *indirect* peripheral stimulation gives rise to psychic elements whose pure and real sensory character is not clearly revealed in the total psychic state or moment. These indirectly induced sensory elements are so much colored and infused with the sensory qualities of the nuclear sensory elements that their character and origin are transformed and they appear not to differ in their nature from the nuclear elements. A closer inspection however fully reveals their real nature as sensory elements extraneous to the nuclear elements and derived from different sensory sources. The nuclear elements are primarily derived, in so far as they are directly initiated by the incoming peripheral stimulation, while the extra-nuclear sensory elements may be regarded as secondarily initiated by the peripheral stimuli.

Let  $V$  be the sensory visual system,  $T$  and  $M$  tactal and sensory motor systems,  $A$  sensory auditory systems. Let  $V_1$  be the visual sensations peripherally stimulated,  $T_1$ ,  $M_1$ ,  $A_1$ , tactal motor sensations of the corresponding sensory systems. Let, further,  $V_2$ ,  $T_2$ ,  $M_2$ ,  $A_2$ , be the psychic elements indirectly or secondarily initiated; then the percept when  $V_1$  is the nucleus may be represented by  $V_1$ ,  $T_2$ ,  $M_2$ ,  $A_2$ .

Psychic elements primarily or secondarily peripherally initiated are not identical with ideational states. An idea differs qualitatively from a percept and its elements—an idea lacks sensory character. An idea is more generic, while a percept is more specific. I see that lamp-post yonder. It is a particular object limited in a particular space; not so is the idea; the idea of the lamp-post refers to lamp-posts in general. When I perceive an object and then try to represent it to myself, the object is not presented to consciousness in its sensory perceptual form—it is present to consciousness rather as a symbol ideally representing perceptual experience peripherally initiated.

From an anatomical and physiological standpoint, it is quite probable that ideo-motor systems are different neuron organizations from those of sensory-motor systems. Psychopathology with its rich store of facts seems to favor this view. As we have already pointed out that there are pathological cases where the patient does not know the

object on perceiving it, though he can represent it to himself, and there are cases where the patient cannot represent to himself the object but he knows the object on perceiving it. Flechsig's embryological studies go further to show that the sensory centers are different from the associative centers which do not stand in direct relation with the external environment and appear rather late in the course of ontogenetic development. The view that the same sensory structures underlie both sensory and ideational processes does not seem to be probable in the light of recent research. The activity of the sensory-motor neuron systems does not give rise to ideas, but to psychic states essentially sensory in character. In the case of the percept the subordinate psychic elements entering into the synthesis of perceptual psychic compounds are of a sensory nature; they only differ from pure sensations in so far as they are not directly peripherally initiated, but centrally, or truer to say, *indirectly peripherally* initiated and as such occupy an intermediary state between sensation and ideation. In other words, the subordinate perceptual elements may be regarded as *reflex* in character, as being of the nature of *secondary sensations*.

The nature of illusions and hallucinations is more or less cleared up from this standpoint and the latter in its turn may be still further illustrated and confirmed by the facts coming from the domain of abnormal mental life. Let us take a series of cases of abnormal or fallacious perception. In looking through the stereoscope the two plane dissimilar views are combined and give the illusion of a solid object. Here the illusion is due to imitation of external conditions; the external stimulations that give rise to the perception of a solid object are here closely reproduced. The visual sensory elements are stimulated and the rest of the groups are reproduced, the rest of the sensory elements or secondary sensations emerge and the perceptual synthesis arises. The illusions to which in my student days I attracted Professor Münsterberg's attention are of similar character. If each eye looks through a separate tube and if the other ends of the tubes are brought together, the openings of the tubes coincide, appearing as one, and the eye appears to look through one tube only. If now only one tube is looked through and the other eye glides along the surface of the tube the opening of the tube appears outside, removed and raised higher than the real opening; the opening appearing to be directly seen not by the eye which looks

through the tube, but by the other eye that does not look through. The illusion can be emphasized by putting the hand where the illusory opening appears and the hand appears to be pierced by a round hole. Here the conditions are such that the convergence of the eyes displaces the lighted-up opening towards the field of vision of the open eye not enclosed in the dark tube. Similarly when closing one eye and having the other wide open we press the closed eye sideways towards the nasal side the round phosphene seems to be projected into the field of vision of the other eye and the phosphene really appearing in the field of the closed eye as one can convince himself by closing the open eye, appears to be directly seen by the open eye. In all these experiments the arrangement is such as to imitate conditions under which other percepts normally arise and the result is the reproduction of those specific states of perception. To take another example, in a fog or in the darkness we may take a tree for a man or mistake a rope for a snake. Similarly, in the shape of clouds and blots we can often see different figures. The illusion here is rather due to the vagueness of the cue or of the sensory nucleus, the character of which may vary with distance or with the intensity of light.

In mental derangements such as in the different forms of insanity or of psychopathic functional diseases, in hypnotic, posthypnotic and hypnoidic states the object is perceived as different, independent of external conditions, such, for instance, as convergence, divergence, light, distance. A chair may be perceived as a tiger no matter how the visual axis is placed or what the distance be, or how intense the light is, certain definite visual sensations may be correctly perceived, but on account of central dissociation in psychopathic states quite different than the customary associated secondary sensations are aroused which in turn arouse different secondary sensations in other sensory motor systems of neurons and the result is a different psychic compound, an illusion or a hallucination.

In the preceding cases the nuclear elements obscured in different ways by the subordinate elements are nevertheless present in consciousness and still form the nucleus of the percept into which other subordinate elements enter as organic constituents, and give rise to fallacious perception. Should now the nuclear elements themselves on account of inattention or of their minimal sensory

intensity, or what is still more often the case, on account of states of dissociation, should such nuclear elements be left out of consciousness or remain in the subconsciousness as in dissociative states, then the fallacious percept stands out clear and distinct in the light of consciousness and a fully developed hallucination results. Sensory elements which themselves may remain unperceived stimulate other sensory elements that give rise to a perceptual compound which is entirely of a secondary sensory character. The hallucinatory percept does not contain the primary sensations aroused by the stimulus; it consists of secondary sensory elements and as such a hallucination may be regarded as a *secondary percept*. *Hallucinations are of the nature of secondary sensations.*

The simplest state of hallucination is possibly found in the phenomena of synæsthesia or in the phenomena of secondary sensations, such as light-phonisms, sound-photisms, etc., when one sensation, instead of giving rise to a subsequent idea, awakens instead a qualitatively different sensation derived from another sense organ—a color or letter arousing a certain sound, definite sounds arousing certain colors and so on. When a certain stimulus makes an impression on a peripheral sense organ and gives rise to secondary sensations, we really have a hallucination, but in its simplest form. He who on seeing the letter A, for instance, also hears a sound or feels a prick, or a touch may be regarded as having a hallucination. In this simple form we can possibly more clearly discriminate the character of hallucination. When on seeing letter A we hear a sound, the indirectly aroused auditory sensory elements do not contain the primary sensory visual elements. In the secondary sensation or in the more complex state of perception of secondary character the primary elements are left out. A stimulus may arouse sensory elements in one sensory center, which in its turn may stimulate systems of sensory elements in other sensory centers, thus giving rise to a group of secondary sensations synthetized into a percept, while the original sensation with its nuclear sensory elements may remain in the background. Such a physiological stimulus may often be not an external physical stimulus, but a pathological process going on either in the peripheral sense organ from which the nuclear sensory elements arise or in the sense organs from which the secondary sensory elements originate.

Let S be the stimulus and  $V_1$  the visual sensory elements in  $A_2$

$T_2 M_2$  the secondary sensory elements, then  $V_1$  may be dissociated while the secondary elements  $A_2 T_2 M_2$  stand out alone in consciousness as a secondary percept or hallucination.

It may again be that not only the primary but also the appropriate system of secondary elements may be left out of consciousness, while *associated* systems of secondary elements may be awakened and stand out fully in the light of consciousness and give rise to a hallucination removed in its character from the original primary elements with their organized secondary elements.

The preparedness of remotely aroused secondary groups may often be determined by the type of mental structure. Hallucinations of visions, or of voices, or of movements will predominate, according as the type of mental structure is visual, audile, or motile. The mental type plays, no doubt, a very important part in the formation of illusions and hallucinations. In the insane auditory illusions and hallucinations predominate in the audiles, and while on the one hand, paranoiacs are often audiles, on the other hand, audiles are inclined to paranoia. In hypnosis hallucinations become more easily realized, if they are adapted to the mental type of the subject.

Preparedness and subexcitement of ideo-motor groups with which the secondary sensory groups are also associated also form an important factor in the final determination of the character of the illusion or a hallucination. This is rather of an indirect character. It is not that the ideo-motor groups themselves directly enter into the structure of fallacious perception; but they often may determine which of remote secondary sensory groups should be stimulated to activity. Groups of elements are more easily brought into active functioning the greater the activity of the elements with which they are associated, the course of group excitation being, so to say, in the direction of least resistance.

Pathological processes going on in one sense organ may sometimes give rise to secondary sensory elements belonging to other sense organs especially when favored by general states of dissociation; in fact we may say that from our point of view a state of dissociation is an indispensable condition to the formation of hallucination. The following cases may be taken as clear typical instances. Thus in one of the cases reported to me by one of my associates, Dr. Wm. A. White, the patient saw spirits and regarded them as ghosts of her deceased daughter. On examination her eyes

were found to be normal in all respects. The patient saw the spirits even when her eyes were shut, and furthermore the hallucinations were not in the least affected even when her eyes were injected with atropine.

When, however, the ears were examined a pathological process of old standing was discovered. Now when auditory stimuli were applied to the ear, the hallucinations were at once strongly affected, the spirits multiplied in number. This increase of spirits ceased as soon as the auditory stimuli were removed. A closer examination revealed the fact that the patient was greatly affected by the loss of a daughter. The pathological process served as the stimulus, while the excitability of the ideo-motor systems along with the general state of dissociation determined the nervous processes initiated in the ear in the direction of the sensory visual systems and gave rise to secondary sensory elements formed in the hallucinatory percept of ghosts and spirits resembling the patient's daughter. The aural pathological process itself remained in the background of consciousness and was unknown to the patient.

A similar case came under my notice in a paranoiac who had visual hallucinations of spirits, hobgoblins and saints. Thy organs of sight and hearing were found normal, but a pathological state was found in the skin of his scalp and especially in the muscular sensibility of the muscles of the neck. An inclination of his head in any direction caused him to see the spirits and hear their voices. In another case of mine definite auditory stimuli such as the singing of birds brought about hypnoidic states which are really complex states of hallucinations. In another case, in a female paranoiac with clearly defined auditory hallucinations, a similar state was revealed. The patient heard voices not through the ear but through a spot located just over the region of the Fallopian tubes. Examination of the spot revealed tenderness and painfulness to pressure. The hallucinations, which were of a sexual character, became exacerbated during the menstrual period. Similarly in another case under investigation the auditory hallucinations were shown to he intimately connected with phenomena of unconscious phonation and with frequent earaches, with a limitation of field of vision due to an error of refraction which, when corrected by eyeglasses modified the auditory hallucinations, the latter finally becoming dissolved. More cases of similar nature could be adduced, but the ones referred to are sufficient, and extreme

as they are, they bring out clearly the secondary character of hallucinations. *Hallucinations are essentially secondary percepts.*

Hallucinations are frequently due to peripheral process, pathological or otherwise, occurring under conditions of dissociation, within the same sense organ, but the reflex hallucinations originating in other sense organs bring more clearly to light the secondary nature of hallucinations. The contention generally maintained that there are hallucinations independent of peripheral sources, or of 'purely central origin' which even regarded as supernormal experiences is highly dubious. Insofar as directly observed facts go, whether they be normal or abnormal, there is little to justify the central point of the contention. Like percepts hallucinations are peripheral in character, and are only insofar central as *peripherally* initiated secondary sensations are concerned. Hallucinations are of peripheral origin and may be regarded as complex cases of secondary sensations with the original primary sensation dissociated or left in the background of consciousness. If, however, hallucination is abnormal perception, perception, on the other hand, is normal hallucination. If a hallucination is a secondary compound with the primary sensations ABSENT, a percept, insofar as it consists of secondary sensory elements, is a hallucination with the primary sensations PRESENT. Normal perception, illusion and hallucination have the same underlying processes, and as such may be arranged in a continuous series, according to the presence or absence of the primary sensory elements.