THE LUMLEIAN LECTURES

ON THE PATHOLOGICAL RELATIONS OF THE VOICE AND SPEECH.

Delivered at the Royal College of Physicians of London.

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LECTURE I.—*March 28th.**

CONSONANTS differ from vowels in being unmusical sounds or noises formed by the interposition of checks or barriers to the free passage of air through the oral cavity, or at any rate by the interposition of more complete barriers than those which are formed during the evolution of the vowel-sounds; at which barriers, instead of in the larynx, the fundamental sounds of the consonants are produced. This fundamental sound, in the case of some consonants, is associated with laryngeal intonation or sound; while in the case of others there is absolute laryngeal silence; but it is always coloured by the characteristic resonances of the cavity or cavities which the barrier limits or divides. In the case of some of these, the barrier to the transmission of air is complete, and the consonantal sound is of limited duration, and produced only, or most distinctly, at the moment of opening or closing the barrier; these are the explosive consonants. In the case of others, the barrier to the passage of air through the mouth is complete, but the communication between the nose and mouth remains open, so that their characteristic sounds, which originate at the chink between the posterior edge of the soft palate and the back of the pharynx, through which the breath is transmitted into the nose, may be indefinitely prolonged; these are the nasal consonants or nasal continuants. In the case of others again, the check to the passage of air through the mouth is incomplete, so that these, like the last, admit of indefinite prolongation. They comprise letters of various denominations, such as sibilants, trills, semi-vowels, and so on, but they may conveniently be termed oral continuants.

The explosive consonants are *p*, *b*, *t*, *d*, *k*, and *g* hard. In the production of the first two, the barrier to the escape of breath is formed by the lips, the position of the tongue being immaterial, provided only it does not interpose another complete check. In the production of the next two, the barrier is formed by the tongue, which is flattened out and so placed that, while its apex touches the hard palate immediately behind the incisor teeth, its sides, sloping downwards and backwards, first press against the upper canines and bicusps, then against the upper molars, and lastly against the folds existing behind the teeth, between the upper and lower jaws. In the production of the last two, the barrier is formed by the contact of the back of the tongue with the palate at the line of union of its hard and soft portions. They thus form three series, of which *p* and *b* are termed labial, *t* and *d* lingual, and *k* and *g* (hard) guttural. Of these, the *p*, *t*, and *k* resemble one another in the fact that they can only be pronounced with the glottis wide open, or, in other words, with unvoiced breath. If it be attempted to utter them with laryngeal intonation, or even with that breezy laryngeal sound which forms the basis of whispered language, they become converted perforce respectively into *b*, *d*, and *g* hard. They may be formed, indeed, altogether independently of the breath by the sharp closure, or still better by the sharp opening, of the irrespective barriers, and obviously are caused essentially, as the crack of a whip or an electric spark, by the sudden displacement of air consequent on a sudden impulsive movement. Their mutually distinctive characters, however, are clearly due to the different superadded resonances taking place in the different sized and shaped resounding cavities which their respective barriers limit. Usually, these sounds are produced in connection with a rush of air from the larynx; and, although (as has been shown) this rush is not essential, it no doubt improves the articulation of the letters by making their associated resonances more distinctly audible. These letters are developed only at the moments of making and breaking contact. *B*, *d*, and *g* hard may be regarded as the letters *p*, *t*, and *k*, modified by the association of the laryngeal sound. They cannot be uttered as *b*, *d*, and *g*, independently of it. But this sound, rein-

forced by resonance in the cavities behind the barriers, is almost sufficient for their production; and they may, indeed, be formed, though somewhat imperfectly, during the closed condition of the cavities, and may be thus uttered as continuous sounds so long as the limits to the distension of the cavities by the admission of air from the larynx are not transgressed. They commence, however, with the closure of their respective barriers, and terminate when they open, and are undoubtedly increased in force and distinctness by the addition of the sounds of these impulsive actions. The characteristic differences, then, between the labial, lingual, and guttural explosive consonants depend upon the characteristic resounding qualities of the cavities in connection with which they are severally formed; and the characteristic differences between their several surd or voiceless and sonant or vocal varieties depend on the fact that the sounds upon which the letters are, as it were, moulded are, in the former case due to the impact or separation of the barriers alone, in the latter case to the sonant action of the glottis associated with that of the barriers.

The nasal consonants *m*, *n*, and *ng* are closely related to the labial, lingual, and guttural explosive consonants respectively. Everyone knows that if he endeavour to pronounce the words "mouth", "nose", "tongue" while his nares are stuffed from catarrh or closed artificially, he says "bouth", "dose", "tug". The only differences between the formation of the nasal consonants and that of the explosive consonants to which they severally correspond are, that in the former case the soft palate is so arranged as to leave a narrow passage between the nose and back of the mouth, in the latter case this passage is closed; and that in the former case the fundamental sound of the consonants results from the passage of air through the naso-pharyngeal chink, in the latter case it arises in the mouth by the action of the barriers. The recognised nasal consonants are like *b*, *d*, and *g* sonant; and their distinctive sounds, therefore, are reinforced by the laryngeal voice. They receive, however, their specific colourings from the combined resonances of the oral and nasal cavities. The qualities which distinguish them from one another are due to the resonances of the oral cavity; those which distinguish them severally from *b*, *d*, and *g*, on the other hand, are due to the resonance of the nasal cavities. But, besides the recognised varieties of *m*, *n*, and *ng* (which are sonant), voiceless or surd varieties of them can be formed. These do not, so far as I know, exist in the English or any other language as acknowledged letters. And, indeed, from the absence of laryngeal sound and from the extreme feebleness and close resemblance among themselves of the resonances which attend their utterance they are scarcely, if at all, distinguishable from one another.

The remaining consonants are sometimes termed oral continuants. They are all produced by the passage of the breath past or through an incomplete barrier, and hence are all, like the last group, continuous. But in their utterance the septum between the nose and mouth is completely closed. Further, like other consonants, and especially like the explosive consonants, they form two parallel series: one, surd or voiceless, of which *f*, *th* in "thing", *s* and *sh* are examples, the other comprising their corresponding sonant modifications, *v*, *th* in "the", *z* and *zh* or *z* in "azure". The surds, as in other cases, can only be uttered with unvoiced breath, the association of breath carrying sound from the larynx converting them at once into their sonant equivalents. In the utterance of the English *f* and *v*, the parts in the interior of the mouth have the same position that they present during the pronunciation of *p* and *b*, but the lips are slightly parted, the upper teeth rest on the lower lip, and the breath is driven with some degree of force through the lower portion of the interdental spaces and between the teeth and lip. In pronouncing *th* in "thing" and *th* in "the", or, as it may be better represented, *dh*, the tongue is flattened and its margins are pressed against the whole semicircle of the upper teeth, its tip projecting even a little beyond into the interval between them and the teeth of the lower jaw. The sound of these letters is evoked by driving the breath through the intervals between the upper front teeth and between them and the tip of the tongue. To form the sounds *s* and *z*, the organs of articulation must occupy almost exactly the same position that they do in the utterance of *d* and *t*. The only differences are—first, that the tip of the tongue, instead of resting against the hard palate immediately behind the teeth, is slightly withdrawn from the palate in this situation, so as to leave there a narrow chink for the passage of the breath; and secondly, that the labial aperture is diminished in size and somewhat modified in shape, partly in consequence of the lower lip being a little elevated and pouted, and (as in whistling) rendered concave in the mesial line, partly from elevation and arching of the middle portion of the upper lip. In order to effect the pronunciation of *sh* and *z* in "azure" (or, as it may be more consistently represented, *zh*), the teeth are brought a shade nearer together than they are in pronouncing *s* and *z*, the lips are more obviously protruded, the oral aperture, however, presenting the same general form and size. The tongue is brought very

* Concluded from page 539 of last number.

nearly into the same position that it occupies when long *e* is sounded; but the passage between its anterior half and the corresponding portion of the palate is more contracted, in consequence of the greater degree of elevation of this part of the tongue, which organ therefore becomes a little less flattened and a little more cuboidal than it is during the utterance of the vowel. The remaining oral continuants have features of more or less special interest, and I shall discuss them briefly, but in no particular order. The letter *l* presents two distinct varieties: one, the ordinary *l* of our own and continental languages, which is sonant; the other, the Welsh *ll* in "Llanberis", which is unknown in English, but which is simply the voiceless form of the common *l*, and, as such, uttered without accompanying laryngeal sound. In order to pronounce either, the point of the tongue is pressed against the palate just behind the upper incisors, but an interval is left on each side between the tongue and the double teeth, through which the air is made to pass. But for this lateral separation of the tongue from the teeth, the position of the organs of articulation in sounding *l* is identical with the position they assume for the utterance of *t*. The English *r* has two very obvious varieties, the one being the trilled, the other the untrilled *r*. In the former, as it is usually sounded (in the word "error", for example), the lips and teeth being well separated, and the tongue having generally the same position as it has in the pronunciation of *t* or *s*, its tip, anterior to the front bicuspid (with which it is contact), is stretched horizontally forwards towards the upper incisors, remaining separated from them, however, by a widish semilunar interval. Then, by a very forcible expulsion of vocalised breath, this edge is thrown into slow, irregular, and very visible vibrations; slow, that is to say, in comparison with the rate of vibrations, which for the most part produce musical tones. Donders has estimated them at thirty in the second. In the untrilled *r*, as it occurs in the word "rain", the tongue is arched in such a manner that its upper surface is rendered concave from before backwards, while its tip, which is thus a little reverted, points to the highest part of the palatal arch. The sound of this letter is due to the passage of the breath through the narrow aperture which is left between the tip of the tongue and the palate, but in no degree, as in the other case, to coarse vibrations of the tongue. Although the two varieties of *r* are represented by the same sign, and although they are to a considerable extent employed indifferently in speech, it is obvious that there is a real and marked difference between them; and, indeed, the untrilled *r* has at least as close an affinity to certain vowels—to *a* in "far", and *a* in "all", and especially to *u* in "fur"—as it has to the trilled *r*. I believe that the untrilled *r* has much the same relation to the *ur* vocal as the consonant *ng* has to the French nasal vowels; or, to adduce yet more apposite examples, as the consonant *v* has to the vowel *oo*, or the consonant *y* to the vowel *e*. The curious tendency which uneducated persons show to confound these several groups of sounds seems to me to be a confirmation of this peculiar relation. I need scarcely call attention to the frequency with which the untrilled *r* is dropped in conversation, or is unconsciously added to the *ur* vocal when this ends a word followed by another vowel, as in the combinations "idea-r of", "yelle-r ochre", and the like. The varieties of *r* which I have mentioned are sonant, but each has its unvoicelised or surd representative, and these were not improbably the aspirated *r* of the Greek alphabet. They are not English letters.

The true labial and guttural continuants are specially interesting, among other reasons because they include *y* and *w*, which have been classified as semi-vowels, and have severally a very close relationship to certain vowels. By many grammarians and physiologists, indeed, they have been regarded as vowels, or perhaps rather as the primary factors of certain diphthongal sounds which it is assumed they make with the aid of the vowels which succeed them. Thus *w* is intimately related to *oo*, and *y* to long *e*; and it has been assumed that such words as "wail", "weed", "wind" might properly be spelt "ooail", "ooeed", and "ooid", and such words as "yacht", "youth", and "yoke" be spelt "eacht", "eouth", and "eoke". It must be admitted that in passing rapidly from the sound of *oo* or *e* to that of some other vowel, there is a very great tendency in the organs of articulation to utter, in the one case the distinctive sound of *w*, in the other that of *y*; but that the consonantal sounds of *w* and *y* are distinct from the sounds *oo* and *e* is obvious when we compare the sounds of *woo* and *ye* with those of their supposed equivalents *oo-oo* and *e-e*, or when we contrast such words as "ooze" and "woos", and "ear" and "year". There can be no doubt that *w* and *y* do really represent true and peculiar consonantal sounds.

The true labial continuous consonants are the English *w* and the German *v* and *z*, which latter are respectively very closely related in sound to the English *v* and *f*. In the utterance of the German varieties of *v* and *f*, the lips are brought into close approximation, leaving only a longish linear chink between them, through which the breath is

emitted with sufficient force to produce a manifest rustling sound. The German *w* is a sonant letter, of which the German *v* is the surd modification. The sound of the English vocal *w* differs from that of the vowel *oo* mainly in the fact that the fundamental vowel-sound is produced in the larynx and receives its colouring from the oral cavity, whilst the special sound of the consonant, though also coloured by the resonance of the oral cavity, is manufactured at the labial orifice; it differs from the sound of the German *w* in its less sibilant character, and from both vowel and consonant in its mode of production. In the pronunciation of *w*, the lips have an intermediate position between that which they assume in uttering the German *w*, and that which they present in sounding the vowel *oo*. They are a little less pouted, and the orifice between them is considerably narrower from above downwards, than for *oo*; but the orifice is neither so narrow nor so elongated as it is for the German letter. The common English *w* is sonant; but a distinct surd variety exists which, though common among the Irish in such words as "which" and "what", is getting into disuse amongst Englishmen.

The true guttural continuous sounds are probably four in number. The two best known and most agreeable of the group are the German *ch*, or, as it may be properly represented, *kh*, and our own *y*. *Kh* and *y* are, as regards their mode of formation, mere modifications of *k* and *g*. The general arrangement of the organs of articulation is almost identical in both cases; but, in the utterance of *kh* and *y*, the back of the tongue and the back of the hard palate, instead of being in contact, leave between them a narrow aperture, by the sharp passage of the breath through which the special sounds of the consonants are produced. The sound of *kh*, as in the German *Ich*, is generally considered to be absent from the English language. Its presence, however, has been recognised by some writers (and there is no doubt of their correctness) in the initial sounds of such words as "hew", which might properly be spelt *chy-oo*, and "huge", and "Whewell". As regards *y*, I feel no doubt that it is, as J. Müller, Max Müller, and some other writers maintain, simply the sonant form of the surd *ch* or *kh*. The other two guttural sounds are, I believe, the surd Scotch *ch* in "loch", which seems to be rougher and less musical than the German *ch*, and to be produced, as Max Müller observes, between the base of the uvula and the tongue, or further back than the German *ch*; and the sound of *g* in the German word "Tage", which is sonant and certainly related to *y*, but is rougher in sound and more guttural than it, and, like the Scotch *ch*, seems to be produced far back in the throat.

Other consonantal sounds besides those which have been considered no doubt exist or can be uttered; but they are probably little more than modifications of them. Thus *p*, *b*, and *m* can each be pronounced, though with some impairment of character, with the upper teeth resting, as for *f* and *v*, upon the lower lip, or with the upper lip resting on the teeth of the under jaw; and so, again, *t*, *d*, and *n* can be uttered with slight modification either with the tongue in the position which it assumes when *th* or *dh* is pronounced, or by bringing the tongue into contact with the roof of the mouth somewhere between the normal point of contact for *t* and that for *k*. Further, other trills can be effected besides the ordinary trilled *r*: one, for example, with the lips, which has a natural affinity to *w*, but more especially to the German *w* and *v* and to *b*; another at the back of the mouth, produced apparently between the uvula and the tongue, which is very rough and disagreeable, and is evidently specially related to the *g* of "Tage", and possibly also one due to the coarse vibrations of the aryteno-epiglottidean folds.

The so-called consonant *h* I have reserved for special consideration. It is the *spiritus asper*, or true aspirate, and is generally regarded as a simple unvoicelised rush of air through the glottis opened to its full extent, which in our own language, and more or less in other languages, is, under certain circumstances, made to precede the utterance of vowel sounds. It is also said to precede the sounds of certain consonants, as in the occasional pronunciation of *wh-ich* and *wh-at*, and in the Greek *h*. In our own language, the letter *h*, standing at the beginning of a word or syllable, usually indicates the aspirate; but, when present in other situations, it is either silent or has a conventional value. It need scarcely, perhaps, be added that the aspirate necessarily ceases at the moment at which the sound of the letter it ushers in commences. A little consideration, however, will show that the letter *h* is not a mere unvoicelised rush of air, but that it is an unvoicelised rush of air which acquires sound and character as it passes through the mouth; and, further, that for every vowel, and indeed for every consonant, which it precedes, it is attended with a special arrangement of the oral canal, tongue, and lips, which is just that of the particular vowel or consonant with which it is associated. In other words, the aspirate which precedes an ordinary or sonant vowel is the surd, voiceless, or aspirate form of that vowel; and the aspirate which precedes a voiced or sonant

consonant is the surd or voiceless representative of that consonant. In this point of view, the letter *h*, placed before a vowel, implies that two vowels are sounded consecutively; namely (first), the unvoiced vowel, which, by the closing of the glottis in the progress of its utterance, becomes converted into (second) its vocal equivalent, or that which alone is usually regarded as the vowel. Further, it implies that, wherever a consonant is supposed to be aspirated, its sonant form is simply preceded in utterance by its surd form; or in some cases, perhaps, that the surd form of the consonant is alone pronounced. Thus, in the case of the aspirated "which" or "what", the *wh* is either the surd *w* followed by the sonant *w*, or the surd *w* alone; and, in the case of the word "hew", the sound which *h* represents is in reality that of *ch*, or the surd equivalent of the *y*, which, in the pronunciation of the word, follows it. I am not aware that any other consonants are aspirated in English; but all the continuant consonants admit of aspiration, in the sense of having the sonant consonant preceded by its surd variety. It is thus, I think, in regard to the Welsh *ll*, as ordinarily uttered; and it was probably thus that the Greek *β* was pronounced. It is stated that, in Sanskrit, consonants were often followed by aspirates; and it need scarcely be said that, though such combinations are unknown amongst ourselves, it is just as easy to continue the pronunciation of a sonant vowel or consonant into its surd equivalent as it is to convert, in the course of its utterance, a surd into its correlative sonant.

Having now pointed out the mechanical processes by which the sounds of consonants are produced, and in some degree how consonants fall into groups, partly from resemblances in their modes of formation, partly from resemblances in sound, and partly from these conditions combined, it will be convenient to tabulate them, so that the affinities which I have endeavoured to establish may be recognised at a glance. A reference to the table will show that I have arranged consonants in three vertical groups, the labial, the lingual, and the guttural; and have placed beneath each the vowel which seems to me to have a special affinity with it. Each of these groups comprises explosives, nasal continuous and oral continuous consonants, together with trills, of which all present surd or voiceless and sonant or vocal varieties, and of which all the sonant excepting the explosives may, like the vowels, be aspirated, or, in other words, be associated in continuous pronunciation with their respective surd equivalents. It will be observed that, of those letters for which no specific characters exist, some I have represented by those combinations of letters which commonly stand for them, while to others I have assigned combinations which may be assumed from analogy to represent them; and that the aspirated sonant letters have placed before them their surd-equivalents, which, as I have explained, I regard as their proper aspirates. Among labial consonants, *p*, *b*, and *m* have an obvious and generally acknowledged connection; and the letters *f* and *v* are frequently regarded as the oral continuous modifications of *p* and *b* respectively. It is clear, however, that there is a closer relation between the German *v* and *w* than there is between the English *f* and *v* and these explosives, inasmuch as the German letters, like the explosives, are formed simply with the lips. The surd and sonant forms of the English *w* are equally true labial sounds. I have, therefore, placed the German modifications of *f* and *v* (*v* and *w* respectively) and the English *w* in the same linear series with *p*, *b*, and *m*; and the English *f* and *v*, which are formed by the lip and teeth, I have put in a subordinate collateral (labio-dental) group. Among lingual consonants, *t*, *d*, and *n* have an universally admitted affinity; and the sounds represented by *th* and *dh* are usually taken for their oral continuant representatives. But the relations of the other continuants which I have placed among the linguals have generally been less distinctly defined. I venture to regard as the true linguals those consonants in the formation of which the tip of the tongue is brought into contact or close relation with the anterior portion of the palatal arch; and, as nearly allied series, first those letters which are formed by the approximation of the tip of the tongue to the teeth, and second and third those which are produced by the convergence of the anterior or middle portion of the tongue to the summit of the palatal arch. The first and most complete of this series comprises, obviously, *t*, *d*, and *n*; and (as having the same relation to *t* and *d* as the German *v* and *w* have to *p* and *b*) the sibilant sounds *s* and *z*, together with the consonant *l*, which has no equivalent in any of the other groups. The first of the lingual subseries is the linguo-dental, comprising the consonants *th* and *dh*, which are evidently related in character to our *f* and *v*, and in the utterance of which the tip of the tongue is applied to the upper teeth. The second subseries includes the untrilled and trilled *r*; and the third subseries consists of *sh* and *zh*, in which the position of the tongue approaches to that characteristic of *y* and *kh*, and of which the sounds have a very close resemblance to those of these guttural letters. The guttural consonants, *k*, *g* (hard), and *ng*, again, are obviously in close relation; and the consonantal sounds indicated by *kh* and *y*

clearly belong to the same group. Of the harsher varieties of these continuous guttural sounds I have made a subseries. Finally, in each series I have included trills which I regard as mere modifications of certain letters which I have already specified.

ABSTRACT REPORT OF LECTURES ON THE COMPARATIVE ANATOMY OF MAN.

Delivered at the Royal College of Surgeons of England.

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LECTURE III.—THE NATIVES OF THE ANDAMAN ISLANDS.

IN seeking for a natural classification of the races of man, the characters afforded by the hair are so obviously distinctive that they have often been used in preference to all others in defining primary divisions of the species. The closely curled or frizzled hair of the negro, elliptical in transverse section; and the straight, stiff, or lank hair of the Mongolian, more or less cylindrical in section, form the opposite extremes. The names *Ulotrichi* (woolly-haired) and *Leiotrichi* (smooth-haired) were given by Bory de St. Vincent to the groups of men thus characterised. The frizzly or woolly-haired races are divided by the geographical regions they occupy in the present distribution of man upon the earth into two groups, the African and the Oceanic Negroes. It is only with the latter that we are occupied in the present course of lectures. They inhabit various islands in the Pacific Ocean, extending from Tasmania in the south, northwards through New Caledonia, the New Hebrides, the Fijis, to the great island of New Guinea, and, though greatly mingled with other races, various isolated spots through the Malay Archipelago, as far west as the Andaman Islands. All these Oceanic negroes have commonly been supposed to belong to one race, and the name *Papuan* has been given them, a name derived from a Malay word alluding to the curly nature of their hair. The more extended information obtained in recent years has shown that there is great diversity in physical characters, as well as language and customs, among them. The Tasmanians had characters so distinctive as to raise them to the rank of a subrace. The remainder are clearly divided into two groups, very different from each other; 1. The true Papuans, or, perhaps, more conveniently termed Melanesians, who inhabit the greater part of New Guinea and the islands to the east and south, who are of tall or moderate size, and have long, narrow, and high skulls; and 2. The Negritos, who mostly dwell to the west and north of New Guinea, a people of diminutive size, with short round heads.

The Negritos are found, at present, in the more inaccessible mountainous regions of the interior of some of the Philippine Islands, the Malay Peninsula, and probably other parts of the great Indo-Malayan Archipelago, but everywhere more or less mixed with Malays and other races, who appear to have supplanted them in the greater part of the territory they once occupied. In the Andamans alone, of all the islands they formerly inhabited, have they remained, at least until very recently, the sole inhabitants, and have hence retained their primitive characters. The people of these islands are, therefore, of greatest interest to the anthropologist, because they may be taken as the types of a race once widely spread in South-eastern Asia, but now verging upon extinction. The islands lie in the Bay of Bengal, 590 geographical miles from the Hoogly mouth of the Ganges, and only 160 miles from the nearest part of British Burmah. The main group is a narrow band of four islands closely adjoining end to end, and called "Great Andaman". The axis of the band is 156 miles long; 28 miles to the south lies "Little Andaman". The earliest notices of these islands are contained in the accounts of Arab voyages of the ninth century, where the ferocious hostility of the inhabitants to all strangers, and their reputed cannibalism, were described in glowing colours. It is to this character that they have owed their long isolation, although situated close to the track of a great commercial navigation. In 1788, the English Government of Bengal endeavoured to establish a penal colony on the islands, but it was abandoned a few years later, and the natives were left to themselves until 1857, when the project was revived with greater success, and a settlement called Port Blair established, at which upwards of