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CLINICAL SENSE*

THE USE OF THE FIVE SENSES

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Clinical knowledge depends upon three processes—observing, recording, and thinking. Each embodies a different use of the word sense. Observing requires a sense of perception—that is, skilled use of the senses; recording depends on the use of words in their correct sense—that is, the art of making sense; and thinking (which includes the processes of consideration, rumination, and deliberation) requires the use of a third kind of sense—the opposite of nonsense—a sense of wisdom. These three kinds of sense—perceptual sense, word sense, and common sense, growing from that one word, form a tripod which supports the whole structure of clinical medicine. In other words the art of medicine depends on the stimuli that enter the mind of the physician (or that structure corresponding to it in the surgeon), the processes that go on in that mind, and the resulting material produced by it.

The stimuli enter by the five senses of perception. The recording and transmission of those stimuli largely depends on the use of words, which, according to their suitability and their arrangement, have a far greater influence on medical progress than is generally recognized. After which the processes going on in the mind, deliberations, rejections and ponderings, depend on sense: sense of perspective, sense of reality, sense of logic, plain sense, common sense, and even horse sense. Is sense of humour a necessity? No, it is not essential; but, like a catalyst, it facilitates and enhances the process; like a flavouring agent, without being essential, it gives taste to an otherwise unassimilable bolus of knowledge. Like the use of catalysts or flavouring agents the use of humour must be restricted, or it will interfere with what it should enhance.

This first lecture is to do with the five senses. Though I shall take them singly, I am sure they are rarely, if ever, used in that way. The clinician, when he tries to find what evil is causing the illness, does not say, "I see some evil," "I hear some evil," "I feel some evil." There are not three distinct processes. They are

FIG. 2.—Speak no evil. See no evil. Hear no evil.

not separated like those three well-known monkeys (Fig. 2) who, by covering appropriate organs, arrived at the virtuous conclusions they desired. They are carried out simultaneously, supplemented by the helpful but less informative senses of taste and smell. Yet the methods depicted by those monkeys are widely used by most clinicians. We shut our eyes to observations which do not agree with our ideas. We close our ears to bits of history which seem out of place, or to noises coming down our stethoscopes which are not included in our catalogue of official sounds. We refrain from speaking about our observations when they are not listed in official textbook descriptions; we refrain from

THE LETTSOMIAN LECTURES

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FIG. 1.—Diagram of the lectures.

The theme of my three lectures, in blunt phrases, can be summarized thus: Lecture 1: Use your eyes. Lecture 2: Use your tongue. Lecture 3: Use your loaf. I also present my theme in a diagram (Fig. 1) which you must study carefully, for I refer to it later.

*The first of three Lettsomian Lectures, delivered at the Medical Society of London on February 9, 1959. The 2nd and 3rd Lectures, "Making Sense" and "Talking Sense," appeared in the *Lancet* of September 19 and 26, 1959. The complete trio "Sense and Sensibility" was published in The Medical Society's Transactions (*Lancet*, 1959, 2, 359 and 417; *Trans. med. Soc.*, 75, 66).

FIG. 3.—Hidden man.

voicing our opinions when they conflict with current thought, or are greatly at variance with the opinions of those we fear. It is probably to our advantage that we do so, but it does not help the forward march of medical science.

In using our sense organs we see what we ought to see rather than what is there. We see what we expect, and unconsciously dismiss the anomalous. I illustrate this by referring back to Fig. 1. In that diagram there are three deliberate mistakes; three entirely wrong words, but those of you who have been fitted with efficient suppressors may have seen none of them. The clinician is both blessed and cursed with this suppressive mechanism—blessed when he detects a significant pattern, but cursed when important trivialities are tidied away without being appreciated. The recognition of significant patterns depends on experience and education. Fig. 3 shows a pattern which is meaningless to those who are inexperienced or uneducated (by which I mean the majority of this audience). Yet if it is shown alongside a picture which teaches you what to see (Fig. 4), you will quickly acquire the skill of interpretation. Now look again at the old pattern (Fig. 3) and you cannot help but see the face of the man. You unconsciously select the relevant, and eschew the irrelevant; you dismiss the meaningless squiggles in the periphery and see only those that experience has taught you to recognize as a man's face.

The Suppressive Faculty

When the experienced clinician takes a history from a loquacious patient, the many irrelevancies are unconsciously dismissed, like the meaningless squiggles in the picture. This suppressive faculty, by producing selective deafness, selective blindness, and other sense rejections, can easily suppress significant or relevant things. The patient with attacks of acute abdominal pain may not be heard while she is describing the chronic rheumatism in her legs, but that very symptom can be the most important clue to the origin of her abdominal pains, because her "rheumatism" consists of acute lancinating pains like red-hot needles being jabbed into her. When her lightning pains are appreciated, it is easy to diagnose the abdominal pains as the gastric crises of tabes dorsalis. That is not an imaginary case. Two laparotomy scars witness to its truth.

Suppression of sight can be no less important. Fig. 5 shows the conventional nuclear shapes of neutrophil leucocytes we found in our textbooks, but many years of microscopy passed before anyone noticed the little drumstick-shaped appendages shown in Figs. 6 and 7. They were there when we looked at blood films as students, but none of us noticed them, nor were they drawn in many of our textbooks. Davidson and

Robertson Smith (1954) pointed out that these drumsticks occur only in women, and thus discovered a method of distinguishing female blood from that of males which was so accurate that they correctly foretold the sex in 50 consecutive blood films.

It appears that what we see depends not so much on the acuity of our vision as on what we have been taught to see. Sir Francis Galton performed experiments with sailors to find out why they could see a distant mooring buoy when a landlubber could not do so, and showed that the weather-beaten eyes of the sailor were much less sharp sighted than those of the man from the land.

FIG. 5.—Cells of the different groups in the Cooke counts (Whitty and Britton, 1957).

FIG. 6

FIG. 7

FIG. 6.—The characteristic drumstick found in the female neutrophil leucocyte. The thin strand of chromatin joining the head to a nuclear lobe can be seen clearly. (Jenner-Giemsa, $\times 1,750$.) (Davidson and Smith, 1954). FIG. 7.—A female neutrophil showing a bilobed nucleus. Projecting from the left lobe is a characteristic drumstick, and immediately to its right, connecting the two lobes, is a minor lobe. Two trivial projections from the right main lobe are "small clubs." (Jenner-Giemsa, $\times 1,750$.) (Davidson and Smith, 1954).

The visual stimuli reached the retina of the landsman more accurately than they did in the seaman, but did not register at the cortical level. The inexperienced man from the land saw, but he did not notice; he perceived without recognizing, just as you could not recognize the face in the early picture though it was there for you to see, and you failed to see the redundant words in the first diagram because your brains tidied away these irrelevancies without your being conscious of it.

Thus clinical acumen does not vary with acuteness of the senses, though such acuteness is an advantage. The medical student who misses an aortic diastolic murmur almost certainly has better hearing than the consultant who teaches him to recognize it. Clinical acumen largely depends on the unconscious selection and rejection of sensory stimuli. In the plainer words of Polynesia, the parrot who belonged to that legendary clinician Dr. Doolittle, it depends upon being a good noticer.

The Gift of "Noticing"

Two special kinds of noticing occur in the highest form of geniuses and in pioneers. The ability to notice the significance of what seems to be irrelevant, and the ability to detect what is common to several groups of data. An example of the first faculty is Sir Alexander

FIG. 4.—Discovered man and hidden man.

Fleming's enlightened scrutiny of the penicillin mould which polluted one of his culture plates. Trivialities like that might fall on a million sense-organs before they blossomed into interpretation.

A special word for this faculty—serendipity, was coined by Horace Walpole in 1754 and defined as “the faculty of making happy and unexpected discoveries by accident”; but luck alone is not enough. You need to be a good noticer. Jane Austen wrote in *Emma*: “Depend upon it, a lucky guess is never merely luck, there is always some talent in it.”

FIG. 8.—X-ray film of injured shoulder-joint, also showing a portion of lung.

To illustrate serendipity I show the x-ray film of a workman's shoulder, taken after he injured it at work (Fig. 8). As you see, it shows no bony injury. Look again and see if you notice anything wrong.

A little corner of lung is showing, and the late Dr. Whitehead, being fortunately serendipitous, noticed it was abnormal and ordered a full-size x-ray film of the lungs. This remarkable appearance was then revealed (Fig. 9). This chance discovery (or rather chance wedded to perspicacity) led to the discovery of the pneumoconiosis caused by tin oxide dust, now known as “stannosis.” Other workers at the same factory as this man had extensive changes, too, but because the condition produced no symptoms it remained unknown until this shoulder injury brought it to light. This gift of seeing the gold that glitters among the dross may depend upon negative observations; it includes what you do not see as well as what you do see, and what you do not hear as well as what you hear.

“May I call your attention to the singular incident of the dog in the night time,” said Sherlock Holmes. “But the dog did nothing in the night time,” said Dr. Watson. “That,” said Holmes, “is the singular incident.”

In 1897 Sir James Mackenzie was examining an old patient with mitral stenosis who had suddenly developed a rapid irregular action of the heart. He saw that there was no auricular wave in the jugular veins and he heard that there was no presystolic murmur. In fact, he heard and saw nothing. The auricle was doing nothing: that was the significant incident. That was how he discovered auricular fibrillation which he described then as paralysis of the auricle. He wrote: “For many years I speculated as to what the auricle was doing after it ceased to appear in the tracings; when Dr. Lewis

adduced experimental proof that cessation of auricular activity was due to fibrillation I had no hesitation in accepting the term.” Now we know the circus movement of Sir Thomas Lewis does not really take place, Sir James Mackenzie seems to have been quite near the mark with his term—paralysis. The absence of dental caries in fluoride-rich districts and the absence of small-pox among dairymaids are further examples of negative observations which led to enormous clinical advances. When the absence of coronary disease among Bantus is solved even a greater advance may be made.

The second faculty of seeing what is common to apparently dissimilar patterns is of incalculable value, not only in clinical medicine, but also in passing the eleven-plus examination, where a familiar type of question is: “Which of these have something in common,” followed by a diagram or a series of figures.

The first stage in an important clinical discovery is often the observation that a series of puzzling cases, though differing in many ways, possess one factor common to all. The commonest cause of infantile blindness to-day is retrolental fibroplasia, and till a few years ago its incidence was steadily rising. It was noticed that it occurred far more in children born prematurely: that was a factor, but not the highest common factor. The highest common factor was that not only were all the blind children premature, but they had all been given oxygen. The detection of this common factor has protected hundreds of children from blindness.

Here is another puzzling epidemic solved by “noticing” (Kinnear, 1948) a most unusual common factor. In 1947 there was an epidemic of bullous erythema in Dundee. All the cases were women, and all the lesions were situated in a band across the back of both calves in exactly the same place. There were no marks on the stockings, so chemical burns were excluded. At the height of the epidemic one particularly observant patient noticed that her attacks of

FIG. 9.—X-ray film of chest of patient in Fig. 8, showing stannosis.

blistering of the calf always came on a few hours after travelling on a particular tram route; she also recognized many other people affected by the epidemic as fellow travellers on this route. A careful inspection of all the trams was made, and it was found that one tram was responsible for the entire outbreak. In this vehicle there was a longitudinal groove in the slat of wood which held the seats in place. In this groove there was a thriving colony of bed bugs, just where the women's calves touched the wood when they sat down. It was clear that these bugs had reversed their normal mode of life, lying hidden at night when the tram was in the garage, and by day sitting in a row, feeding from the bounteous and constantly changing supply of calves presented to them. The tram was disinfested, the groove planed out, and the epidemic ended abruptly.

The recognition of something common to several patients constitutes a similar kind of clinical sense.

FIG. 10.—Three eunuchs.

FIG. 11.—Patient with myxoedema huddling under a mound of bedclothes.

FIG. 12.—The "gun hammer" position in meningitis.

Anybody who has seen several mongols or a number of patients with myxoedema soon realizes that though individual cases differ widely there is something common to all of them. It is hard to name, but, like a family likeness, extends throughout the group. Fig. 10 shows this kind of common factor. The three eunuchs in the photograph all look quite different and yet clearly resemble each other because of a common factor (testicular hormone deficiency).

So far I have discussed the collective use of the senses: the selection of sense data, the exclusion of irrelevant stimuli, the recognition of familiar patterns and common factors. I now pass to the individual use of the senses.

Sight

Without doubt sight takes first place. The number of clinical data that can be seen is far greater than is available to the other senses. We see colour, shape, movement, position, expression, and a hundred-and-one indefinables. I will mention a few of each, starting with the colour of the face: the plum colour of polycythaemia; the ruby colour of the alcoholic; the yellow colour of pernicious anaemia; and the cyanosis of congenital heart disease with arteriovenous shunt or that produced by inexperienced anaesthetists. I think Keats must have seen anaesthetic cyanosis when he wrote the lines: "With beaded bubbles winking at the brim and purple stained mouth." We also recognize different colours in the urine: (a) the yellow of normal urine, (b) the rose colour of anthocyanuria, (c) the iridescent pink of eosinuria, (d) the opalescent pink of haematuria, and (e) the greenish-blue colour of the urine when a patient is taking de Witt's kidney and bladder pills, which contain methylene blue.

We distinguish shapes, too—the shape of the hands in acromegaly, the hands of arachnodactyly, and the deformed head of hydrocephalus.*

Movements

We also learn much by observing movements: the gaits of congenital disease of the hip, and Parkinson's disease; the different ataxias of loss of position sense and loss of co-ordination; the involuntary movements of Sydenham's chorea and Huntington's chorea; the different tremblings of Graves's disease, Parkinsonism, and alcoholism. There are many other unnamed movements that enlighten the clinician: the restless plucking at the bedclothes called carphology, alleged to be typical of typhoid delirium, but far commoner in senile dementia or blindness; the restless head-turning and lip-smacking of the man with a bleeding-ulcer, and the informative movements made by patients while they give a history; the single pointing finger of the man with peptic-ulcer pain; the circulating spread-out hand of the man with colic, and the sponge-squeezing hands approaching the sternum of patients describing the pain of cardiac ischaemia—a movement that is almost diagnostic of coronary disease. Dr. Byron Evans first called my attention to it.

Position

The position of a patient in bed (the decubitus) can be highly informative; for example, in myxoedema—huddling under a mound of bedclothes (Fig. 11); or in

*During the lecture a series of lantern slides showed the various colours and shapes mentioned in the text.

meningitis—with head flung back (Fig. 12). A common, but little-known, decubitus is that found after a stroke, where the fact that one arm is under the bedclothes and the other outside, coupled with the well-known rotation of the head away from the paralysed side, may reveal a diagnosis missed on routine examination; this position is often found even in quite mild hemiparesis.

Though nobody has dignified the sitting position with a name, the *deseditus*, as it could be called, may be equally revealing. When a patient is giving a history her anxiety can be measured roughly by the distance of

her sacrum from the back of the chair. As anxiety mounts so does the distance increase until she is perched on the edge in imminent danger. I once impressed my houseman by solving a mysterious case of P.U.O. purely by means of the *deseditus*. Ten days' high fever had followed a straightforward pneumonia, although the chest had cleared after penicillin. As I encountered this lady on my round I noticed she was sitting crookedly in her bed, and I asked her why. "I've got a pain here," she said, and rolled over

FIG. 13.—Patient with institutional neurosis.

to display a large abscess of the buttocks caused by a contaminated penicillin injection. This was literally the seat of the trouble.

While talking about the value of posture in diagnosis, I wish to describe the characteristic posture which occurs in a dreadful disease of which I have only recently become aware. It is an old disease which most physicians have encountered, but, until Dr. Russell Barton pointed out to me the characteristic posture and told me his views about its causes and treatment, I had observed it without being properly aware of its significance. Figs. 13 and 14 show patients suffering from this condition. Can you recognize it? It is institutional neurosis—that syndrome of submissiveness, isolation, loss of individuality, automaton-like rigidity, and loss of all initiative which occurs in people who have been in institutions for a long while. If it occurs in a mental hospital it is often believed to be an end-result of mental illness. This is not so. This dreadful thing is caused by institutional life and nothing more. It is not confined to mental hospitals, but is found all over the world in orphanages, prisons, convents, homes for displaced persons, prisoner-of-war camps, and the chronic wards of municipal hospitals.

Because this disease has a characteristic posture, I include it in the use of sight in diagnosis. If I say more about it than other diseases with characteristic postures, it is because I believe it is less well-recognized than the other illnesses I have mentioned.

People afflicted by this man-made disease have no resentment at what has been done to them; indeed, when the disease has got its grip on them they often resent efforts made to cure it. They are not interested in the future; they have developed a resigned acceptance that everything will go on as it is (Fig. 15): inevitably, unchangingly, and indefinitely.

Characteristically, the hands are held across the body or tucked behind an apron, the shoulders are drooped, and the head is held forward. Entries in the notes, if any are kept, give further confirmation of the diagnosis thus: "Dull, apathetic, and childish" . . . "Mute, dirty, and withdrawn"; or alternatively, "Has settled down well" or "Is co-operative, and gives no trouble."

The causes of this illness are: (1) lack of contact with the outside world; (2) enforced idleness; (3) lack of personal possessions; (4) regimentation by nursing staff; (5) drab, colourless institution atmosphere; (6) absence of prospects outside the institution; (7) excessive sedation.

FIG. 14.—Another patient with institutional neurosis.

FIG. 15.—Patients showing resigned acceptance of institutional life.

Though mostly afflicting those who lack initiative and energy, the illness is not a primary condition. It can be prevented and it can be cured, but this needs unflagging energy and strength of purpose in those concerned.

I am greatly indebted to Dr. Russell Barton for telling me about this disease. Both the facts about it and these pictures illustrating it come from his monograph on Institutional Neurosis.

I will only refer to expression briefly because I have discussed it here* before. Fig. 16 captures the profound misery of melancholia, a diagnosis supported by the

FIG. 16.—The profound misery of melancholia.

FIG. 17.—The cold smile of schizophrenia.

neck scars from a past attempt at suicide. Fig. 17 shows the cold smile of schizophrenia — remote, childish and eerie.

Hearing

Hearing is next in importance. I only consider the use of the naked ear unaided by instruments.

The most important sound heard by a clinician is the voice of his patient. With myxoedema, the quality of the voice may be more diagnostic than the history related by that voice; it is low and thick and slow, with a croaking fumbling quality that is unmistakable.

The speech may be clinically diagnostic in cleft-palate, diphtheritic palatal palsy, and myasthenia gravis; the myasthenic voice shows weakness and increasing nasal intonation as speech tires the palatal muscles. The immediate change after an injection of neostigmine is one of the most dramatic sound-changes in medicine.

Slurred speech, classically described in G.P.I., is rarely diagnostic, because it may be caused by drunkenness, a sore tongue, or only slovenly articulation. A distressingly slurred, spastic speech, painfully crawling from one word to another, may be heard in disseminated sclerosis.

A cough may be as revealing as the voice: the short painful cough of lobar pneumonia; the unique cough of pertussis—a diminuendo trail of little coughs with an apnoeic climax followed by the unmistakable, unforgettable whoop; and, commonest of all, the familiar sound of chronic bronchitis.

The sound of breathing does not need a stethoscope to hear it. The expiratory sibilant wheeze of asthma, the short jerky breaths of pneumonia, the deep slow breathing of diabetic coma; and lastly, that strange monotonous cycle of Cheyne-Stokes respiration; pianissimo, crescendo, fortissimo, diminuendo, pianissimo, tacet, da capo al fine ad infinitum.

Snoring usually signifies little; it is independent of the depth of sleep, occurring often during a light doze. But loud snoring in a hitherto silent sleeper is a little-recognized symptom of myxoedema, and its disappearance after treatment with thyroid is not only gratifying to the patient and her husband but a help in confirming the diagnosis.†

On rare occasions noises originating from the chest and the heart can be heard at the bedside without any amplification.

William Bean (1954) collected some striking examples of sounds heard at a distance from the chest. One patient, who had a pneumo-pericardium after acute pericarditis, developed such a loud exocardial murmur that it not only prevented him sleeping but also kept his wife awake; she had to sleep in another room. Another case of pneumo-pericardium reported by Bean had a more unusual cause (though the sound effects were similar). It followed a careless performance by a professional sword-swallower. Other patients who developed sudden noises in their chests had ruptured aortic valves, a condition that usually occurs when sudden exertion is performed by a man with diseased aortic valves. A man moving a piano downstairs suddenly felt something "go" in his chest, and those around him immediately heard a noise like that made by a young frog. Another man, while engaged in a drunken brawl, was interrupted by a sudden cooing noise like that of doves. In this case, too, the patient's wife complained of the noise at night, despite its traditionally soothing quality.

The most dramatically audible case of ruptured aortic valve was told me at the lunch-table by my friend Dr. Keith Ball. His patient also felt something "go" while he was doing heavy work in a saw-pit, and his work-mates assisted him home with a sound of machinery coming from his praecordium, a sound so loud that his wife heard it from her front room and came to see what was going on.

Loud endogenous noises are rarely of great diagnostic help, but Allen reported a lady with obscure anaemia who developed a rhythmic splashing sound like a water-mill which led to the discovery of a large hiatus hernia which had caused her anaemia. The churning noises were caused by her heart beating against the intrathoracic stomach.

I became interested in the subject when I was convalescing from virus pneumonia which was complicated by a physician exploring my chest for non-existent pus; this gave me a moderate-sized pneumothorax. Five days later, when I was beginning to get my breath back, I became conscious of a satisfying, twanging sensation arising from my left chest accompanied by a loud click, which I heard quite easily. To my delight two hospital doctors came to see me shortly afterwards and I made them stand at the foot of my bed and

†During the lecture tape recordings were played to illustrate the voice changes, coughs, and breathing noises referred to in the text.

*Asher, R. Face Values, *Trans. med. Soc.*, 1957, 73, 48.

solemnly witness that they could hear my heart beating from where they stood. I was twanging away like a rather loud clock. The sound lasted for two or three days; I found it was loudest when I held my breath about three-quarters way through inspiration and lay tilted towards my right. I thought at first that I was unique, but I soon learned that spontaneous pneumothorax is a common cause of cardiac noises audible at a distance. I have not heard of iatrogenic pneumothorax being reported in this context, perhaps because those "iatres" who puncture the lung are not anxious to publish their work.

Another sound easily heard without a stethoscope is the splashing noise of a hydropneumothorax. The patient himself will often comment on it because he perceives an internal turbulence of rushing waters within his chest; he can feel as well as hear it. One of my patients with a hydropneumothorax complained that when he cleaned his teeth he felt like a human launderette. The vigorous lateral movement as he plied his toothbrush had the same effect as the clinician eliciting the sign gets by vigorously shaking the patient.

When I was a student the late Dr. Theodore Thompson told of a hunting squire with a chronic hydropneumothorax who regularly hunted three days a week. The only noticeable result of this action was that whenever he jumped a hedge the rest of the hunt thought he had landed in a ditch because of the splashing of mighty waters which accompanied his descent. Soon after Dr. Thompson taught me these interesting hydro-acoustics one of my cases appeared to be suffering from hydropneumothorax. I can still remember the ward-sister watching with mild astonishment as I seized the frail young man and shook him to and fro. To my delight there came an unmistakable gurgling and splashing. As I was glorying in this diagnostic *tour-de-force*, the sister asked me quietly: "Would you like me to take this bottle out of the bed, doctor? It's making rather a mess."

Everybody knows that noises from the abdomen are often audible outside, but, except for the borborygmi of carcinoid tumour, their importance is social rather than clinical. It is the absence of borborygmi rather than their presence which is significant, and a belly which is silent even to the inquiring stethoscope is likely to contain paralysed intestines. The most startling noise that ever comes from the abdomen is the cry of an unborn child. Numerous cases are reported when everybody in the obstetric theatre has distinctly heard the cry of the intrauterine child. The sound is usually short and muffled, but Livy reported that an infant of the Marrucini, while yet unborn, cried out in a loud voice from his mother's womb: "Io triumphe," which roughly translated means "whoopie." This case is not so well attested as the earlier examples to which I referred.

Noises from joints are often and easily heard, so they should be mentioned here, but they have very little clinical value. A joint is capable of producing a great deal of noise with little disability. Another joint may be extremely painful on movement and yet produce no sound. All the same, I believe noisy joints are more commonly diseased than silent ones are, and a noisy joint is more likely to be the site of osteo-arthritis than rheumatoid arthritis. The sound made by moving a Charcot joint is supposed to resemble that of crunching

snow; it is the feel of this noise rather than the sound of it which is characteristic, just as the sound produced by walking on crunching snow is felt through the boots as well as heard in the ears.

As percussion of the chest involves unaided hearing, it deserves to be considered here. There is no doubt that stony dullness is a reliable indication of the presence of fluid: careful percussion of the chest may reveal fluid better than the chest x-ray film does. When there is little radiological evidence of fluid, but the percussion note is stony-dull in one place, then it is well worth aspirating for fluid there. Though percussion is considered with the use of hearing there is as much justification for inserting it in the section on the use of touch. In stony dullness the sign can be felt as much in the finger as it can be heard with the ear, and more in the finger that is struck than in the striking finger.

I have difficulty in judging other grades of dullness. If I find that the right chest gives a less resonant note than the left, I would, if the history suggested right-sided pneumonia, consider there was an impaired percussion note on the right; whereas if the history suggested a left-sided pneumothorax I would accept that the left side was hyperresonant. Percussion gives me information about the relative resonances of the two sides rather than absolute information about one spot. I am aware that when one side is duller to percussion than the other I am sometimes only observing that the pitch of the note is higher and that both sides give an equally loud and equally resonant note. I doubt whether many clinicians can distinguish alterations in pitch, tone, and volume; and even if they could be trained to do so I do not think great benefit would accrue, because, except for stony dullness, there is so little constant relation between the change in percussion note and the disease beneath. On the vexed question of percussion of the heart, I was taught that if I ever found an area of cardiac dullness when percussing a heart then there was a pericardial effusion. I think that was sound teaching.

Touch

Touch is equal in value to hearing, and here I include all sensations detectable by the clinician's exploring hand. First, temperature. Although it is better to use a clinical thermometer than to place an old-fashioned hand on a fevered brow, quite often a clinician feeling the chest for expansion or palpating an abdomen for tenderness is struck by the abnormal warmth. The temperature may have been normal when the chart was filled in, and feeling the hot skin may convey an important change in temperature which might otherwise have been missed. The extra warmth of a bone affected by Paget's disease is also of diagnostic help. The feel of the skin in certain rare conditions can be diagnostic. In Cushing's syndrome the superficial layers of the skin can be pinched up separately, giving a sensation as if picking a thin fold of oilskin between the fingers. A grosser degree of skin levitation is both felt and seen in the rare familial Ehlers-Danlos syndrome.

In scleroderma the opposite obtains and the skin feels adherent, inelastic, and immobile. Alan Read, an ex-registrar of mine, pointed out to me that in facial scleroderma this shows when trying to inspect the

conjunctiva for anaemia. The lower lid will not turn down as it should. In gross myxoedema the combination of dryness, roughness, and corpse-like coldness gives the observer an unforgettable impression as if he were touching a lizard. In subcutaneous emphysema the sensation of palpating small amounts of air beneath the skin is strange and unique: the crinkling flickering tingle imparted to the finger-tips is both diagnostic and satisfying. The old physicians attached great importance to the feel of the pulse, perhaps exaggerating its importance, but the feel of a collapsing pulse remains a valuable sign, though it feels nothing like a water-hammer. Few clinicians have felt a water-hammer, and I am lucky to possess one. I admit I enjoy playing with it, but it feels nothing like a collapsing pulse.*

In feeling vibrations the palpating hand can gain much information because some sounds are easier to feel than to hear. The deeper notes are generally palpable, whereas the higher notes are audible. I have noticed that vocal fremitus may be decreased over solid lung even though the resonance is increased; this obtains when there is rather high-pitched aegophony. Fluid in the pleura seems to damp down the palpable vibrations which produce vocal fremitus, although breath sounds and vocal resonance are little diminished. To expect breath sounds to be absent over pleural fluid is a mistake.

In palpating cardiac vibrations the palm of the hand provides invaluable information. The low diastolic murmur of mitral stenosis may be felt as a thrill more easily than it is heard as a murmur. Not only can the diastolic murmur be felt, but the slapping first sound may be felt so clearly as well that the observer feels almost as if he heard the whole cardiac cycle with his palm.

I am interested in which part of the hand is most sensitive to thrills. I have conducted trials with many students and found it remarkably constant. In every one I have tested it has been sited as the junction of finger and palm, mostly on the palmar aspect of the metacarpal heads. Try moving your hand over a faint thrill and you will find that is where you will feel it most easily.

With grosser thrills there is no need for finesse, and any part of the body can feel it. In one unusual case I first noticed a thrill in my right knee. I was interviewing a chronic schizophrenic who had just told me that the B.B.C. were continuously transmitting radio vibrations throughout her body. As I approached her my knee touched the end of her bed, and I immediately felt the most intense vibration coming from her right leg, which was touching the bed-rail. She had multiple arteriovenous communications as a result of an accidental shot-gun wound several years previously. Her views about the B.B.C. were both inaccurate and coincidental.

Apart from vascular thrills there is the fluid thrill, an invaluable sign of ascites more reliable than shifting dullness. I doubt the need for a third party to partition the abdomen with the side of the hand, except when an examiner is watching. Nothing else but fluid can mimic the short flickering vibration which greets the left hand about one-third of a second after a light tap has been

administered by the right. With hydroceles, too, the fluid vibration is diagnostic and reminiscent of the water-bombs we made in our childhood from balloons, or finger-stalls inflated with water.

Another thing that can be felt is the tone detected by manipulating a relaxed limb; the flaccid unresponsive tonelessness of a limb newly paralysed by a stroke is often the most informative sign in a deeply unconscious patient; when released from the observer's hold it drops with a dead-weight flop quite different from the more leisurely descent of its unparalysed counterpart. Detecting increased tone is more difficult. There is a difference between the feel of spastic hypertonus and wilful contraction, but it needs skill to distinguish it. I find that a normal patient (and even more so a sub-normal patient), when asked to let his leg go loose while the examining hands gather the limb into position for the knee-jerk, immediately gives muscular contractions of tetanic strength which hold the limb as straight as a rod until, with a mixture of persuasion and Judo, the clinician manipulates it into the position he wants. Why the ability to let the limb go loose at will should be denied to all except those of the highest intellect is unknown to me, but I commend this observation as a possible screening test for selecting students.

The most valuable of manual sensibilities is that obtained by palpation when feeling for swellings, an entirely different thing from palpation for vibrations, though called by the same name. Here we are using a combination of touch, sense of position, deep pressure, and joint sense. We do not perceive a constant sensation, but a change. We cannot palpate except with movement. The movements required, whether for palpating axillary glands or for the detection of splenomegaly, are highly skilled and developed only by experience and instruction. They are not amenable to description in the lecture room; so I do not discuss the art of palpation except to say two things about palpation of the abdomen.

First, the convention of leaving the genitalia covered by bedclothes is kind to the patient but unhelpful to the clinician. The angle of the palpating hand is distorted by the heaped bedclothes. There is no elbow-room. The difference if all the bedclothes are pushed right back (leaving only a sheet if necessary) is remarkable.

The second thing is that in a warm bed patients relax much better than on an out-patient couch. I have noticed several times when I have admitted someone from the out-patient department that a few hours later I can feel much more than before, and find lumps which I had previously missed.

With instrumental manipulation much information is imparted by "the feel" given to the hands: the "give" of a needle as it enters a spinal theca or an antecubital vein; the satisfying snap of a dislocated shoulder returning to its place; and the particular resistance imparted to the instrument when a urethral stricture is encountered.

I suppose that judging weight ought to be included with information that can be felt. Quite small differences of weight can be detected. As I have an old-fashioned plate camera I find this faculty useful in deciding which of my plate-holders are loaded. But I can think of no clinical use for it, except that a carcinoma of the testis, it is said, can be distinguished from a gumma because of its greater weight. I can only

*The medical term "water-hammer" derives from its use in hydraulics to describe the concussion of moving fluid meeting still fluid in a pipe. A water-hammer pulse thus refers to the "slap" of resurgent blood in the artery and not to the laboratory instrument at all. (See *O.E.D.*)

remember encountering one gumma of the testis, and I cannot remember whether it felt light or heavy.

Taste

I remember about 10 years ago a baby had ascites of such milky whiteness that some of the wondering doctors thought it was milk which had leaked from a breach in the alimentary tract. Others believed it was chylous ascites secondary to blocking of the thoracic duct. Dr. John Humphrey, our biochemist, was called in to settle the problem. He looked thoughtfully at a specimen of the fluid for a few seconds, and then gravely took a generous sip. Without hesitation he shook his head and said: "That is not milk." That is the only time I recollect the faculty of taste being of clinical use. But Matthew Dobson (who, we know, was a member of this Society) wrote these words in 1776:

"*Experiment V.*—After evaporating two quarts of urine to dryness by gentle heat, there remained a white cake, which was granulated and broke easily between the fingers. It smelled like brown sugar, neither could it from the taste be distinguished from sugar."

That is the first time sugar was demonstrated in the urine of a diabetic, and provides a vivid example of the use of taste and smell in clinical science.

Smell

The range of olfactory stimuli is large, but the information they convey is relatively small. Alcoholic breath is easily recognized, but may be misleading in unconscious patients because it is often the associated head injury and not the alcohol which causes the stupor. Acetone in the breath in diabetic coma and in children who have been vomiting is easily detected by those who have the gift. I am not able to smell it at all, and yet if somebody is taking off nail polish with acetone two rooms away, I am in no doubt about it. There is no doubt some people can smell something in diabetic coma. Two months ago a child operated on for suspected appendicitis vomited over the anaesthetist, who commented on the strong smell of acetone, and so revealed that diabetic pre-coma was the cause of the abdominal pain.

Sir Eric Riches told me he does not believe that uraemia can be recognized by the smell of the breath, but the smell of urine inseparable from prostatic cases perpetuates the belief. I am convinced that this is true, for a continent patient dying of Bright's disease may have a grossly elevated blood urea with no uraemic smell about him. Has any scientific work identified the substances excreted in the breath of diabetics to establish which, if any, can be smelt. Is the acetone-like smell of diabetic breath due to acetone or some other volatile ester? Is the ability to smell this substance transmitted genetically like the abilities of "tasters" and "non-tasters" which are clearly distinguished by the use of phenylthiocarbamide? If the breath from patients with diabetic coma is bubbled through a liquid, will that liquid give a positive Rothera test? I am bothered that so little is known about these matters which might be settled experimentally, when other things of less moment are thoroughly investigated: for instance, it is well established that the urine of patients with the Lawrence-Moon-Biedl syndrome not only has a melanophore-expanding action on frogs, but produces in the minnow (*Phoxinus laevis*) a reddish discoloration around the bases of the fins.

The sickly faecal smell of melaena is diagnostic, but rarely of importance; the same applies to the pungent smell of paraldehyde in the breath. It is alleged that there is a mouse-like odour in typhus fever, but I have not enough experience to know if this is so. It seems likely to me that as typhus thrives among dirt and poverty mice are likely to thrive in the same place, and so the smell of mice may be due to mice making a smell.

It is a common delusion among paranoid psychotics that a fearful odour emanates from their bodies. A foundryman attended my out-patient department complaining that a month previously a new and rare chemical was tried in the smelting process experimentally and that it had contaminated his blood so the fumes were still coming out all over his body. As I sat listening to him, tactfully angling for evidence of other delusions, the students behind me began to sniff restlessly, and I was uncomfortably conscious of an unpleasant, garlic-like smell which grew so strong the window had to be opened. His story was true in every particular. The chemical to which he had been exposed was tellurium, rarely used in the steel industry because of this distressing complication. If a minute amount of tellurium is absorbed, the body continues to excrete the noxious gas dimethyl telluride for many weeks afterwards.

With that account of an occasion when the sense of smell saved a man from possible certification, I bring to a conclusion my account of the use of the five perceptual senses in clinical medicine. Along these five routes comes the raw material which we fashion into clinical knowledge. We fashion it by means of the words we use in recording and describing it, and also by the thoughts, sensible or foolish, which we devote to its contemplation. The other two lectures deal with the sense of those words and the wisdom, or otherwise, of those thoughts.

Fig. 5 is reproduced by permission of Dr. C. J. C. Britton and J. and A. Churchill Ltd.

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The first international directory of medical equipment using radioisotope sources for treatment of malignant tumours has been issued by the International Atomic Energy Agency. The new publication gives all the necessary specifications of 46 models of teletherapy equipment produced by 18 manufacturers in Canada, France, Germany, Italy, Japan, Netherlands, Sweden, the United Kingdom, and the United States. The information is presented in such a manner as to enable the reader to make a quick reference to the main specifications of various units and to compare them and choose the most suitable one. The directory also contains a supply section in which prices of both teletherapy units and the radioisotope sources for such units and the names and addresses of the suppliers are given. The directory may be obtained in the United Kingdom from H.M.S.O., P.O. Box 569, London, S.E.1. (Price 12s.) *Radioisotope Teletherapy Equipment*. International Directory. International Atomic Energy Agency, Vienna, 1959.