2. The Case of S.B.

(1) First Considerations

S.B. was born in 1906, of poor parents, and was one of a family of seven, there being three brothers and three sisters. He spent his youth as a resident pupil of the Birmingham Blind School, being admitted in 1915 and leaving in 1923, with a training in boot repairing sufficient for his livelihood and a fair general education.

It is important to note that S.B. received far more education prior to operation than in the previously published cases, with the possible exception of one described by Latta (1904). There is reason to believe that this may be important in evaluating the case. At the time of the corneal grafting - most of the previous cases were for removal of the lens - he was aged 52. We saw him in hospital shortly after the graft operation on the second eye. It is unfortunate that we did not see him earlier, but we did not hear of the case until it was reported in a daily newspaper after the first operation. We were, however, able to get first-hand reports from the hospital staff, who were generous with their time and help, and the surgeon, Mr. Hirtenstein gave us a first-hand report of his observations.

It was from the first clearly of the utmost importance to establish the amount of vision present before the operation, and back to as early an age as possible. The label "congenital cataract" should not be taken to mean that there has been virtually no visual experience preceding operation, or that vision was as limited in the first months or years of life as it was later, when perhaps fuller tests were carried out. A cataract may well increase in opacity during the first months or years, and whether this has happened can hardly be established. There is in fact remarkably little evidence about the extent of early vision in the previously published cases, but it is noteworthy that many of the patients cited by von Senden clearly had appreciable visual capacity immediately prior to operation, and yet still made slow progress in the use of vision after operation.

S.B. was admitted to the blind school not technically as "blind" but as "partially sighted". The word "blind" signifies to the ophthalmologist "insensitive to light", though its lay use is rather an absence of useful vision. Cases of strict blindness are inoperable, the retina being non-functional, and so we should expect any case such as this to be technically "partially sighted". The question - a difficult one - is whether S.B. had useful vision, or more vision than the earlier cases described by von Senden.

It is most important to be clear that where blindness is literally complete surgery is always out of the question. The retina must be functional, and since the tissues and media of the eyes are never opaque, some effective retinal stimulation must always be expected. This point cannot be over-stressed. The word "blindness" may in normal usage cover cases with sensitivity to light, providing appreciation of form is too poor to be of significant use, but to the ophthalmic surgeon (as became clear to us during discussions) "blindness" is used to denote total insensitivity to light. In this sense there are no cases of recovery from blindness. This should be borne in mind when these cases are compared with the findings of experiments in which animals are reared in darkness, for then, and then alone, visual experience has been truly absent.
The most that should be claimed for any of these human cases is that vision has been dramatically improved upon operation, but as anyone can verify by practising "seeing" with the eyes closed, under some conditions - particularly bright sunlight - quite a lot of visual experience is possible under conditions similar to the worst lens cataract or corneal opacity. The direction of bright lights can be seen, as can the movement across the eyes of shadows. It could well be that this minimal vision, which we must suppose even the "best" cases to have had, makes them very different from the strictly blind - those whose retinas are dead - and we know nothing of what would happen if they could be made to see.

In order to test for retinal function in cases of cataract or corneal opacity, use is made of what are called entoptic phenomena. The entoptic perception of the retinal blood vessels can be readily produced in normal subjects by holding a small light source, such as the naked lamp of an ophthalmoscope, in contact with the closed lid near to one corner of the orbit, and moving it rapidly back and forth with a quite small movement, the eye being dark-adapted. The retinal vessels will be seen as a livid red tree-like pattern, which will fade as soon as the agitation of the light is stopped. They appear because the light entering the side of the eye, through the choroid coat, reaches the light sensitive cells (the rods and cones) after travelling through the layers of vessels and nerve fibres, which lie to the front of the retina. Under normal conditions they are not seen because they form an image - a shadow image - upon the sensory cells which moves precisely with them as the eyes move, and selective adaptation cancels out the non-uniformities of intensity. Similarly, an optically stabilised image fades out and becomes invisible within a few seconds. The shadow images do shift across the retina with movement of the light source, however, and this stimulates fresh receptors, and so the image is made visible so long as the light source is kept moving. This technique is used in testing the retinas in order to establish whether an operation is worth attempting. An operation is not attempted unless the patient is able to give satisfactory reports on his entoptically observed retinal vessels.

A study of these entoptic phenomena in cases of congenital "blindness" could prove rewarding, for the study should reveal perception of form where there has been the least possible previous visual experience. Should it be technically possible, it might be of interest to stimulate the central visual system of a totally blind person. We know from the work of Penfield [Footnote 4] that visual experience can be elicited by electrical stimulation of the occipital cortex, in the course of certain brain operations'. Would it be possible to stimulate the visual mechanisms of the totally blind? The effect of hallucinogenic drugs might also be of interest in this connection, for they may stimulate directly the central components of the visual system, and in the case of the totally blind this might perhaps be accomplished for the first time in the individual's life.

(2) Amount of Pre-Operative Vision

It will be appreciated that on admission to the blind school, S.B. would have seemed no exceptional case, since his vision at that time was evidently insufficient to be of use to him. As we shall see, we find no reference to useful vision anywhere in the school reports.

Since the matter of degree of sight is now so important to us, we shall give all the evidence at length, and try to assess it. It falls into four classes.

(A) The testimony of S.B. with particular regard to his visual memories.
(B) The testimony of S.B.'s older and surviving sister.
(C) The medical and school reports of the blind school he attended as a boy.
(D) The expert opinion of the surgeon, based on the observed state of the eyes at the time of operation.

The available evidence will be given under these headings, and an attempt will then be made to assess it.
A. The Testimony of S.B.

We questioned him on his early visual experience on several occasions, but particularly at our first interview, (on 26th January, 1959) while he was still a patient in hospital. We asked him to describe just how much vision he had before the first operation. He told us, firstly, that he believed he became blind at the age of ten months - the age given in the records of the blind school - and, secondly, that the only visual memories he had before the operation were of three colours - red, white and black. He claimed, then, and later, that he remembered no other visual phenomena.

We ascertained that he was able to name these three colours immediately after the operation, but that he tended to be confused over other colours. It is possible that he would have had experience of these three colours as an adult suffering from undoubtedly extremely severe corneal opacity, for some awareness of light and dark would be expected and very brilliant red is, as described above, seen entoptically during the standard ophthalmological examinations. No doubt the ophthalmologists would tend to use the word "red" in trying to communicate under these conditions. This does not, of course, diminish the probability that he also experienced these colours as a small child, as he thinks he did, but this might be overlaid by later experience.

How far can we trust S.B.'s testimony? It may be appropriate to say here a word or two on his character as it appeared to his teachers, and much later, to us.

The school character reports indicate that S.B. was bright and intelligent, if sometimes lazy. There are criticisms of his sense of the truth; thus for: Midsummer 1920: "Unreliable and unstable in character. Sometimes works v. hard (mainly to please!) and then has slack periods. Plausible manner and a clever excuser... has no fixed purpose, and seems bent on doing things with a minimum amount of work attached". By Xmas 1920: "Has improved in conduct and school work. Character more stable". July 1921: "... Appears to be trying to overcome unstability but has a crooked streak which 'wangles' out of things". And finally: Xmas 1921: "... Has worked hard for is anxious to get into the shops. Strong, sturdy, and pleasant. Plausible and not thoroughly trustworthy".

We do not know what correlation there may be between school reports of "untrustworthiness" and the ability to tell the truth over important matters in later life. Any estimate we may make for normal children and adults might well be misplaced for the specially handicapped.

So far as we could judge, when talking with S.B. or when giving him the various perceptual tests to be described, he was trustworthy. He made his perceptual judgements with unusual care, and was perfectly co-operative in every way. Our tests were performed in the hospital which had just given him sight: he appeared to identify us to some extent with that hospital and the people who had helped him. He seemed to us to be remarkably stable and balanced in his opinions, in his attitude to his experience, and in the interest that was being taken in him. On no occasion did we find that he had told us an untruth (except by omission on one personal matter of no importance to our enquiry) and his remarks or reports seemed not to be biased towards or against what he might have thought we desired from him. Such judgements are bound to be subjective but we state them for what they may be worth. We believe him to be entirely honest in stating that he had no visual memory of form.

B. The Testimony of S.B.'s Elder Sister

We did not for some months know that any friend or relation who might be able to provide evidence on S.B.'s vision as a small child was still living. Finally, S.B. informed us that he had an elder sister, but that as she wished to avoid the publicity the case was attracting in the Press, he had not told us about her. (It might be added that he probably did not realise the importance we attached to finding such witnesses, and it became quite clear that the sister did in fact wish to avoid publicity for a personal reason). It must suffice that S.B.'s sister is some four years older
than S.B., that she is married and has a considerably higher standard of living than he had, and that she seemed to us a sensible forthright and honest person. We could see no motive for any deception or exaggeration especially as she was anxious to remain anonymous. We spent an evening at her home, during which she gave us the following details:

She remembered him clearly as a small child. She used to take him weekly to the clinic, to have his eyes washed. She emphasised that his eyes were in a shocking state, and that there was a severe running discharge. She remembers his head covered by a large bandage, under which the discharge used to seep. Apparently he wore a bandage more or less continuously as a small child.

The family used in effect to test S.B.'s vision, when the bandages were removed, as a game. Her recollection is that as a small child he could "point roughly to large white objects". She thinks that his vision was limited to appreciation of fairly bright large surfaces, apparently without any appreciation of colour. She is confident that his vision was too rudimentary to be useful when the bandages were removed, and he was blind-folded throughout his young childhood, so that what vision he had was generally not available. There seems no doubt, from her statements, but that he led the life of a blind child. This story of the bandages is born out by the report of the Matron of the Blind School for Xmas 1915, which reads:

"Admitted this year - eyes in shocking state of discharge. With care and treatment they soon begin to appear quite normal. The condition of his eyes gets much worse during the holiday, and on his return make one feel sick to look at him...."

And also her report for July 1916: "... Eyes always look exceedingly bad after a holiday". This is strong language for a Matron of an institution devoted to diseases of the eyes; discharge from the keratitis must have been unusually severe. It is worth adding that the testimony of S.B.'s sister is independent of the medical report, since she had not access to it. On the cause of S.B.'s blindness, she thought that he went blind at the age of ten months as the result of an infection following vaccination. This was also the belief given in the two medical reports (almost certainly not independent) at admission, but the cause is not known with certainty. According to the Medical officer's report for 1st June 1915, the mother had poor sight, and this was confirmed by S.B.'s sister. It is possible that there was some hereditary factor, but we have no further evidence on the matter.

C. The Medical and School Reports of the Birmingham Royal School for the Blind

We are very fortunate in having full medical and school records, in the original handwriting, for the period 1915 - 1923, when S.B. was at the Birmingham Blind School as a full time student. We now quote from the Progress Book of the Birmingham Royal Institution for the Blind, by kind permission of the Superintendent.

<table>
<thead>
<tr>
<th>Date of Birth:</th>
<th>30.5.06.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Admission:</td>
<td>2.6.15.</td>
</tr>
<tr>
<td>Condition of Blindness</td>
<td>Partial</td>
</tr>
<tr>
<td>(partial or total)</td>
<td></td>
</tr>
<tr>
<td>Cause of blindness</td>
<td>Keratitis</td>
</tr>
<tr>
<td>as certified by the</td>
<td></td>
</tr>
<tr>
<td>Institution's Ophthalmic</td>
<td></td>
</tr>
<tr>
<td>Surgeon</td>
<td></td>
</tr>
<tr>
<td>Position in school on</td>
<td>placed in lowest class.</td>
</tr>
<tr>
<td>admission</td>
<td></td>
</tr>
<tr>
<td>Estimate of attainments</td>
<td>has never attended school before; knows practically nothing</td>
</tr>
<tr>
<td>on admission</td>
<td></td>
</tr>
<tr>
<td>Mental condition</td>
<td>Appears to be a bright intelligent lad.</td>
</tr>
</tbody>
</table>
Physical condition Normal but for sight.

Medical Officer’s Reports

Admitted 1st June, 1915

Family History: Parents living and healthy; father, good sight. Mother, not good. 3 brothers in Army. 3 sisters healthy.

Personal History: Measles and chickenpox. Eyes bad since 10 months old.

On examination: Heart and lungs negative. Submaxillary glands enlarged. Skin rough.

Feb. 1918
Complains of pain over front of chest. Heart -irregular (tachycardia). No history of rheumatism. No cardiac murmur.

26th Feb., 1918
Two days ago went out with friends - had more exercise - was followed by an attack of pain in precordia for 36 hours. There is now a definite mitral systolic bruit - increased when lying down. Slight irregularity, but tachycardia better.

8th March 1918
Again complained of pain over heart - now no tachycardia, but heart irregular.

Restrictions during this period:

1st July, 1918
Influenza - 8th July, convalescent. 20th July. General health much better.

3rd Sept., 1918
Returned looking well - eyes much clearer and cleaner.

6th Sept., 1918
To have drill included now, and to be carefully watched for symptoms of previous attacks. Headmistress informed.

Ophthalmic Surgeon’s Reports... taken from the Progress Book.

(Late Mr. Jameson-Evans).


16th June, 1915: Vision: fingers at one metre.


27th Jan., 1916: Left cornea vascularised and fleshy.


22nd Jan., 1917: Rt. and Lt. vascular keratitis. No regurgitation from lac. sacs.

11th Oct., 1917: Left mucopurulent discharge from lac. sac.


13th Feb., 1923: Eyes quiet. Xerosis conj. Vision 2/60?

From these reports it seems that at that time he had some ("finger") vision when his eyes were free from discharge which, it appears from the sister's testimony and the Matron's report quoted above, was not generally the case at home. We may gain further information from the reports of his school progress, which will also be given in full.

**School Reports:**

*July 1915*

Elementary education: has only been in school a few weeks, so no report is possible at this stage. Conduct: good.

Signed: S. Robinson.

*Xmas 1915*

Reading. BRAILLE: Failed to learn anything for some time, but is making some progress now.

Writing: Too careless to obtain any result.

Arithmetic: Working of sums, slow; but very quick at mental arithmetic.

Composition: Fair.

Literature and recitation: Very good progress made.

History, geography, nature, etc.: This boy is very interested in his work and answers well.

Handwork: Works well and has shown great improvement.

Conduct: Very good.

Signed: J. I. Falconer.

*July 1916*

BRAILLE: Making satisfactory progress in infant reader. Writes Grade 1. Has mastered the signs and can now write them perfectly.

Has done excellent work this term, and now sets his sums down nicely too, in the Taylor Frame.

Composition: Has done excellent work.

History, geography, nature: Answers splendidly and does good work. He takes a keen interest in these subjects.

Handwork: A good little handworker - a careful boy.

Conduct: This boy has gained the class prize this year. A most polite well-mannered boy, and an excellent worker.

Height: 4 ft. 2¾ins.

Weight: 4 st. 8¾ lbs.

Signed: J. I. Falconer.

*19th December, 1916*

BRAILLE. Reading: Making satisfactory progress - sometimes gets somewhat "mixed".
Writing: Writes Grade 2 to the 6th line.

Arithmetic: Tables to 12 times. Pence tables. Long measures reduction.

Composition: Tells a story well.

Recitation: A most marked improvement to this subject. Enunciation and pronunciation specially improved.

History, geography, nature: Answers well - tries very hard.

Handwork: A good worker.

Cane-seating: Careless - little progress.

Conduct: This pupil's conduct continues to be excellent.

Height: 4 ft. 3½ ins.

Weight: 4 st. 9½ lbs.

Signed: J. I. Falconer.

25th July, 1917

BRAILLE. Reading: Prep. Temple Reader; could do better, but sometimes careless. Out of class two mornings for music.

Writing: Fairly good.

Arithmetic: Has not mastered Long Division; finds a difficulty in "setting down". Two sums right, out of four, in exam.

Composition (Oral): Tells a story well, also retells his lessons well.

Recitation: Excellent.

History, geography and nature: Answers well in all oral lessons. History not so good as other subjects.

Handwork: Cane seating; started double frame. Carpentry: good.

Conduct: This boy still is very little trouble. A good little boy.

Height: 4 ft. 4½ ins.

Weight: 4 st. 10¾ lbs.

Signed J. I. Falconer.

Xmas 1917

BRAILLE. Reading: "Guy of Warwick". S. has improved much this term.

Writing: A marked improvement shown.

Arithmetic: Seems to have more idea of "setting down" now. Factors and their uses learnt. Multiple of £.s.d. factors.

Composition (Oral): Still very good.

Recitation: Excellent.

History, geography and nature: Answers intelligently and thoughtfully.

Handwork: Satisfactory progress shown.

Conduct: A good boy in school, but he sometimes has to be checked for talking too much.

Signed: J. I. Falconer.
July 1918

BRAILLE. Reading: Reads nicely - just a little inclined to guess sometimes.

Writing: Quite good. Grade ii, with a few abbreviations.

Arithmetic: Has done v. good work; all four rules and reduction of money.


Conduct: A useful boy with plenty of "esprit de corps". Works well. Has not been v. strong this Term (see med. report). Rather disobedient over small rules, otherwise a good boy.

Signed: J. I. Falconer and L. H. Best.

Xmas 1918

BRAILLE. Reading: Oxford Reader 4. Has done very satisfactory work.

Writing: Writes Grade 2 with fair amount of accuracy; more contractions used.

Arithmetic: Has done excellent work. Difficult examples with four rules in money, length and weight.

English subjects: Shows much thought and interest in these subjects; has a good fund of information regarding present day affairs. Greatly interested in machinery.

Handwork: Does v. good work in knitting and chair-seating when care is taken; needs to be checked occasionally for hurrying too much.

General: A very helpful and smart boy.

Signed: J. Falconer and L. H. Best.

July 1919

BRAILLE. Reading: Shows slight improvement, but is still far from being good.

Writing: Fair; improving. Composition: plenty of ideas, but cannot express them. Spelling weak.

Arithmetic: Mental, fair; has made some progress with fractions, practice and areas.

English subjects: Interested in these subjects, and satisfactory progress has been made. Literature: inclined to be lazy, and not sufficiently interested.

Handwork: Plasticine, V. good. Cane work, good. Chair-seating, V. good.

General: Good. A smart lad in appearance, and v. anxious to help.

Signed: J. Falconer and G. W. Bloomfield.

Midsummer 1920

Reading: Not much progress; touch poor.

Writing: Revising all braille rules, as written work is v. poor.

Composition: Mainly oral. Anxious to give a good impression - usually shallow.

Arithmetic: Good work done. Improved in fractions. Fairly strong in Unitary Method.

Literature: Has shown interest. Recitation has made more effort.; nice voice.

History and Geography: At times v. good. Lack sustained effort. Sometimes unusually thoughtful.
Reading: A weak subject, but touch slowly improving.

Writing: Has revised all contractions in braille to abbreviated words.

Composition: Memory much improved.

Arithmetic: Very pleasing progress. Fractions, percentages, etc.

Midsummer 1920

General Comments:

Boot-repairing: good work for a beginner.

V. active at all sport - a good footballer.

Unreliable and unstable in character. Sometimes works v. hard, (mainly to please!) and then has slack periods. Plausible manner and a clever excuser.

Nice mannered boy, and affectionate but has no fixed purpose, and seems bent on doing things with a minimum amount of work attached.

Signed J. Falconer.

Xmas 1920

Medium progress-should do well, if more attention were expended.

Still v. keen over games - v. active and alert.

Has improved in conduct and school work. Character more stable.

Is improved in general behaviour and has made decided effort in class work.

Signed: J. Falconer.

July 1921

BRAILLE: Continues to improve, but slow touch. Not yet fully contracted, but still works steadily. Spelling fair. Mental and practical arithmetic fair. Has shown a fair grip of decimals.

Other subjects: Has developed a keen interest in books, but must read more for himself. Concentration improved, but not much activity in class work.

Boot-repairing and making: Work is developing in quality and speed.

A thorough boy where games and mischief are concerned. Rather too talkative and self-opinionated. Appears to be trying to overcome unstability but has a crooked streak which "wangles" out of things. Helpful, obliging, observant. Upright in physique.

Signed: J. Falconer.

Xmas 1921

BRAILLE. Reading: Good - deliberate. Writing: Improving; spelling fair.

Composition: Needs developing. Arithmetic: V. good - quick and accurate.

Other subjects: Pays attention, and is anxious to show that he has understood a lesson. Science: Good.

Boot-repairing and making: V. good progress.

Rather aggressive in manner, but has worked well.
Less noisy but still self-opinionated. Has worked hard for he is anxious to get into the shops. Strong, sturdy, and pleasant. Plausible and not thoroughly trustworthy.

Signed: J. Falconer.

It may be noted that there is no mention of any useful vision. It is only braille reading which is mentioned, and his aptitude for manual skills does not suggest the help of residual vision. This is confirmed by technical training reports for the final year at the blind school when he was taught boot repairing and making as a trade by which to make a living.

**Technical Training: (Full Time - resident pupil)**

July 1923

Boot-repairing and Boot-making:

Started full-time training in January, 1922. Training proceeding satisfactorily, and may be completed by Xmas 1923.

Quality: ¾

Speed: ½

Independence: 4.

Assessment: 14/- per week (rate of an average sighted worker £2.10s.).

Conduct: Fairly satisfactory. Rather boisterous at times, and over assertive.

Signed: J. Falconer.

Xmas 1923

Boot-making and repairing

Training now completed. To become a home-worker under our auspices, at Burton-on-Trent. Shed and equipment to be provided.

Quality: 7/8

Speed:


Character: Noisy. Self-opinionated. Active. Showy in appearance - loves finery, Difficult to convince, and will rarely make the "amende honorable". Likes to be first, but has not sufficient self-control or balance to be a good leader.

Signed: J. Falconer.

The assessment of 14/- per week against the rate of £2 10s. for an average sighted worker is evidence that his vision was not of an order to be useful even in this comparatively simple trade. This is a point which may be made with some confidence when it is remembered that he was undoubtedly an intelligent boy, and certainly as an adult he has always taken great pride in making things with his hands, as was very clear to us when we visited his workshop and his garden.

**D. Expert Opinion on the Immediately Pre-Operative Condition of the Eyes**

We now quote from a letter written to us by Mr. Hirtenstein dated 24th November 1959.

"When I first examined him in November 1957 both cornea were completely opaque with heavy superficial and deep vascularisation; in addition there was bilateral band-shaped keratinisation in the inter-
palpebral areas. He had thickened lid margins, with poliosis; the eye movements were full. There was no nystagmus (either before or after the operations.) The iris and pupil could not be visualised on slit-lamp examination nor could the depth of the anterior chamber be estimated. Trans-scleral retinal stimulation produced a normal pattern of retinal vessels in the left eye and this was the main reason I decided to try the operation. The vision in the right eye was reduced to hand movements in front of the eye. The left eye had accurate projection of light only."

(3) Assessment of the Evidence for Early Blindness.

It is clear that S.B. as a child was not blind in the strict sense of being entirely insensitive to light, and this we should expect, given that a successful operation was possible. There is strong evidence to suggest that he wore bandages entirely covering his eyes during most, and possibly virtually all, of his childhood. There is evidence that his vision was not sufficiently good to be of any material use to him for orientation or recognition of objects. He appears from all accounts to have led the life of a blind person throughout his life.

Can we conclude that the case of S.B. may be taken as an example of "recovery from blindness" in the sense used by von Senden or Hebb? It cannot be claimed that this is equivalent to a previous life of total lack of retinal stimulation, as in the case of Riesen's chimpanzees, but was S.B.'s vision at all times after about the tenth month too rudimentary to be his dominant sense, and too rudimentary to aid him appreciably in any task or skill?

We want to know how S.B.'s early vision compared with that of the previously reported patients, but this is difficult to discover as the earlier case reports tend to be exceedingly sketchy and often virtually non-existent, and little trouble seems to have been taken to form any estimate using more indirect evidence. There are plenty of indications that in some cases there was considerable residual vision immediately prior to the operation, and yet progress in using vision was often slow. In his chapter "The Significance of Residual Vision in Cataract Patients for their Consciousness of Space" von Senden (1960, pp. 71 - 86) refers to patients having prior to operation awareness of (1) brightness; (2) brightness and colours; (3) brightness, colour and shape. He says: (pp. 71 - 72) "Unfortunately the details as to the vision of the patients before and after operation are extremely fragmentary. . . ." and considers that there are only four cases which can definitely be classed as having only brightness vision prior to operation. (These are: Wardrop II (1826): Nunneley (1858): Ahlström (1895): Latta (1904).) Thus von Senden thinks that only four out of nearly seventy cases can be said to have had only brightness vision before operations, (and at least one of these (Latta, 1904) developed useful vision comparatively fast, being comparable with the case of S.B.).

There are several cases in which pre-operative vision was clearly superior to S.B.'s and yet vision was extremely slow to develop after operation. Von Senden attributes this to "their intelligence and will to live . . . since they were accustomed to make use of everything and had thereby already acquired extensive schematic notions of space, they also made use of their visual capacity and tried experiments on their own account. . . . This may indeed have been partly a game at first, as with Ware and Home; but the important thing was that they thought about impressions gathered from this game, and did not merely enjoy them as qualitative stimuli and accept them as such" (op. cit. p. 85, considerably condensed). We see nothing to disagree with in von Senden's view of the matter (though we might not wish to follow his arguments concerning the essential difference between tactual and visual space, with which he is concerned in this section of his book) and we feel that too little weight has been given to the probable importance for visual development of making effective use of the information available through the impaired visual channel. To disagree with this, one would have to argue that visual learning is very different from the other kinds of learning we know something about; where progress depends upon use, reward, and relating things - building up, in Bartlett's word, schema. [Footnote 5] This involves active processes of selecting and relating and depends largely upon intelligent interest. It is a tragic fact that blind
people (particularly before there were good schools for the blind), tend to be generally lacking in intelligent interest. To take a striking illustrative example, the case of a seven year old boy [Footnote 6]: "The boy appears initially to be devoid of all concepts relating to knowledge of objects, mathematical figures, etc. He cannot even tell by feeling whether a thing is round, square or triangular; here too it is primarily a deficiency in his mental upbringing." (Uhthoff, 1890, quoted by von Senden op. cit. p. 112).

We consider that although S.B. was once reported as having finger vision in early boyhood, his residual vision was certainly less than in the cases described by von Senden, including many which took months to gain useful vision. Our main reason for this conclusion is that although S.B. was of at least average intelligence and education he did not, according to the available records, get any assistance from residual vision. This we believe for two reasons: (1) The absence of any comment in the school report of any help from vision in reading, crafts or other skills, combined with the rather low final assessment; (2) The fact that throughout his life he lived the life of a blind man, and developed the special skills, such as orienting himself by echoes, which are necessary to those who lack effective sight if they are to live active lives. S.B.'s residual vision was apparently insufficient, even for a man of his intelligence and training, to serve him in any simple or complex task, and so we conclude that the case of S.B. may be considered with the classical cases.

The following differences from most of von Senden's cases should be noted.

1. The operation was for opacity of the cornea and not for cataract of the lens, as in most of the earlier cases.

2. So far as we know, S.B.'s vision was entirely normal up to the age of ten months. [Footnote 7.]

3. S.B. had the advantage over almost all the previously reported patients in that he received specialised and careful education, including the reading and writing of braille.

4. So far as we can judge, S.B.'s general level of intelligence, and also his sense of curiosity were above average.

5. A most unusual feature was absence of nystagmus, both before and after operation. No reason is advanced for this, unless it be his visual experience as a baby, though this seems unlikely. Nystagmus is an almost invariable feature in these patients, though occasionally it is absent.

We shall now describe our observations on the case.

continues with Section 3.1 Observations at the infirmary