The synaesthesia of a blind subject with comparative data from an asynaesthetic blind subject

Wheeler Raymond Holder
Title: The synaesthesia of a blind subject with comparative data from an asynaesthetic blind subject

Author: Wheeler Raymond Holder

This is an exact replica of a book. The book reprint was manually improved by a team of professionals, as opposed to automatic/OCR processes used by some companies. However, the book may still have imperfections such as missing pages, poor pictures, errant marks, etc. that were a part of the original text. We appreciate your understanding of the imperfections which can not be improved, and hope you will enjoy reading this book.
THE SYNAESTHESIA OF A BLIND SUBJECT
WITH COMPARATIVE DATA FROM
AN ASYNAESTHETIC BLIND
SUBJECT

BY
RAYMOND HOLDER WHEELER, Ph.D.
and
THOMAS D. CUTSFORTH

PUBLISHED BY THE UNIVERSITY
UNIVERSITY PRESS
EUGENE
# TABLE OF CONTENTS

I. General Introduction ........................................... 3

II. Reagents, Method, Material ........................................... 7

III. Preliminary Experiments
   A. Introduction ........................................... 9
   B. Typical Introspective Data on A's Entoptic Phenomenon ......... 9
   C. Conclusions Concerning A's Entoptic Phenomenon ............... 10
   D. The Behavior of A's Synaesthetic Visual Imagery Compared with the Behavior of His Entoptic Processes .......... 13
   E. Summary of Preliminary Experiments ............................ 14

IV. Results from Main Experiments
   A. Series 1
      i. Visual Imagery ........................................... 15
      ii. Summary of Introspective Data on Visual Imagery ........... 22
      iii. Visual Imagery of A and B Compared ....................... 27
      iv. The Significance of A's Synaesthetic Imagery in Processes of Visualizing .......................... 28
   b. Auditory Imagery
      i. Typical Introspective Data ................................... 31
      ii. Summary of Introspective Data on Auditory Imagery ......... 34
      iii. Auditory Imagery of A and B Compared ...................... 36
      iv. Significance of A's Synaesthetic Processes in the Field of Auditory Imagery ..................... 37
   c. Tactual Imagery
      i. Typical Introspective Data ................................... 38
      ii. Summary of Introspective Data on Tactual Imagery .......... 42
      iii. Tactual Imagery of A and B Compared ....................... 45
      iv. Significance of Synaesthetic Imagery in A's Tactual Processes .................................. 46
   d. Kinaesthetic Imagery
      i. Typical Introspective Data ................................... 48
      ii. Summary of Introspective Data on Kinaesthetic Imagery .... 52
      iii. Kinaesthetic Imagery of A and B Compared .................. 54

B. Series 2. Early and Recent Memories
   a. Early Memories
      i. Typical Introspective Data ................................... 55
      ii. Summary of Introspective Data on Early Memories ........... 58
      iii. Early Memories of A and B Compared ....................... 61
      iv. Significance of Synaesthetic Phenomena in A's Early Memories .................................. 62
   b. Recent Memories
      i. Typical Introspective Data ................................... 63
      ii. Summary of Introspective Data on Recent Memories .......... 66
      iii. Our Observers' Recent Memories Compared with Their Earlier Memories .......................... 68
      iv. Significance of Synaesthetic Phenomena in A's Recent Memories .................................. 69

C. Series 3. Imagery in Constructive Imagination
   i. Typical Introspective Data ................................... 72
   ii. Summary of Introspective Data on Processes of Imagination .... 75
   iii. Observers A and B Compared .................................. 77
   iv. Significance of A's Synaesthetic Phenomena in Processes of Imagination .......................... 78

D. Series 4. Free Associations
   i. Typical Introspective Data ................................... 80
   ii. Summary of Introspective Data on Free Association ............ 82
   iii. Free Association in A and B Compared ....................... 84
   iv. Significance of Synaesthetic Phenomena in A's Free Associations .................................. 85

V. A Theory of Synesthesia ........................................... 87

VI. Summary ......................................................... 97

VII. Conclusions .................................................. 101

Note ............................................................... 103

VIII. Bibliography ................................................ 104
The Synaesthesia of a Blind Subject with Comparative Data from an Asynaesthetic Blind Subject*

1. General Introduction

In a recent monograph (11) the senior writer reviewed the general subject of synaesthesia and described a very complicated case in a blind reagent. In that investigation it was found that the reagent not only associated a color or a certain degree of brightness with every sensory experience other than the visual but also that these same colored associates invariably appeared in his processes of thinking wherever imagery was employed. The investigation here reported is largely concerned with a description of these analogous associations in certain of the higher intellectual processes.

Out of the vast amount of literature on synaesthesia we find very little mention of the existence of synaesthetic phenomena in connection with mental processes other than that of perceiving. In no instance has a case in the realm of thinking been fully described. In fact we do not know to what extent, in the same individual, synaesthetic phenomena appear both in perceiving and in thinking. So far as our knowledge goes no case has ever been reported in which colored associates or allied associated imagery appeared in thinking but not in perceiving. There seems to be good reason for believing that where such phenomena appear in perceiving, they likewise occur in thinking and that the failure to report this fact, generally, in the literature on synaesthesia has been due to superficial investigations of the phenomena.

A survey of previous studies in this subject reveals the following generalizations:

1. Synaesthesia consists of the appearance of a certain stereotyped image with a given sensory experience. The phenomenon exists in a variety of forms the most common of which is

---

*The term "asynaesthetic" is used throughout this monograph to mean non-synaesthetic. We are indebted to Professor Edwin G. Boring for suggesting this term and likewise for carefully reading the entire manuscript. To him we wish to express our gratitude for many valuable suggestions and criticisms. We are also indebted in no small degree to Professor Lewis M. Terman who read the manuscript and made many valuable suggestions. To Dr. Harold R. Crealnd we wish to express our thanks not only for his kind suggestions but for his generous assistance in reading proof.
The Synaesthesia of a Blind Subject

the appearance of colored visual images in connection with sounds, tastes, smells and tactual experiences. Where tones appear colored, the experience is called colored hearing. The associated image is sometimes called a photism or chromatism. Usually the associated image is derived from a sense modality other than that of the sensory experience itself. The following is a fairly complete list of the known varieties of synaesthesia:

A. Of acoustic origin
1. colored hearing of tones, noises, chords, melodies, sounds of vowels, consonants, words and the like;
2. gustatory audition in which tastes are associated with the sounds of words;
3. figured audition in which geometrical forms are associated with the sounds of words;
4. pain audition in which toothaches or other pain images are associated with tones of a certain quality.

B. Of visual origin in which visual perceptions of lines, forms, figures, letters, digits and words are accompanied by colors.

C. Of gustatory origin
1. colored tasting;
2. colored taste, smell and cutaneous complexes.

D. Of olfactory origin
1. colored odors.

E. Of cutaneous origin
1. colored pain, pressure, temperature sensations;
2. colored tactual and kinaesthetic complexes;
3. auditory pain in which the sensation of pain is accompanied by imagery of a sound.
4. Auditory-pressure in which sensations of pressure are associated with imagery of sounds;
5. cutaneous or kinaesthetic taste in which cutaneous or kinaesthetic sensations are accompanied by images of taste.

E. Of kinaesthetic origin in which kinaesthetic sensations are accompanied by
1. an image of color or brightness;
2. an image of taste.

G. Of organic origin in which affective or emotional experiences are accompanied by
1. an image of color or brightness.

H. Personifications or dramatizations of ideas, letters, digits or words.

This classification represents roughly the order of frequency in which the various forms of synaesthesia are found.

2. Much of the experimental work on synaesthesia has been devoted to the task of ascertaining what factors determine the origin, the variety and the behavior of the associated image. No satisfactory conclusions have been reached concerning the origin of synaesthesia although it is generally believed that the phenomenon is congenital. The modality from which the associated image is derived in any one case was thought to depend
upon certain physiological conditions in the brain; and the quality of the associated image was thought to depend, in many instances, upon laws of association. The behavior of the associated image is undoubtedly determined for the most part by the same factors as control the behavior of the original sensation to which the image becomes attached. That is, the associated image appears at once with the primary sensation; it persists as long as does the primary sensation and disappears when the primary sensation disappears; it fluctuates in intensity or varies in quality as does the primary sensation, and so on.

3. While numerous experimental methods have been employed in former investigations of synaesthesia (11, page 34) in no instance was the reagent a thoroughly trained introspector nor were detailed introspections resorted to in an effort to ascertain the laws of the behavior of the associated imagery.

4. Detailed analyses of large numbers of individual cases have revealed alleged evidence in favor of a physiological explanation of the phenomenon in terms of such processes as irradiation or lack of differentiation of function in cerebral centers. Other evidence, however, pointed to an association theory (11, pages 36-39). A combination of these views is highly unsatisfactory for two reasons: (1) It presupposes two radicelly different species of synaesthesia—a state of affairs which is unwarranted by the facts; (2) neither view does justice to the functional aspects of synaesthesia itself but merely describes the conditions under which the phenomenon occurs. In other words neither view gives us a clue as to what the act of synaesthesia is. Only casually has it been mentioned that synaesthesia may be a form of reflex.

5. The phenomenon itself is relatively rare, appearing in 8-10 per cent of individuals, according to some investigators. We believe, however, that these figures are too high and that 5 per cent or a number slightly exceeding the frequency of color blindness is more accurate. While in certain individuals synaesthesia appears to be of no particular value, in others it has been found a distinct advantage. From time to time attempts have been made to trace the significance of the phenomenon in the poetry of synaesthetic writers (11, page 26); and certain musicians have endeavored to introduce colors in connection
with musical productions (11, page 60) but owing to the fact that most readers on the one hand and auditors on the other have no synaesthetic phenomena of their own and hence do not understand or appreciate them in other people, such attempts have invariably produced negative results. Should synaesthesia be more common it could not be used in the arts for the reason that the phenomenon varies in content and in complexity from individual to individual. There is no uniformity in the quality or form of the image which happens to become associated with a given sound, letter or object.

6. Whether synaesthesia is a unit trait which follows Mendel’s law of inheritance has not been ascertained. There seems to be no definite evidence that the phenomenon is inherited. In some instances it appears to run in families but in a greater number of instances it apparently does not. The early origin of synaesthesia in the life of the individual who possesses it points to the fact that the phenomenon is congenital.

7. Synaesthesia is apparently more common among children than among adults. Probably at least 50 per cent of the total number of cases existing in childhood disappear during the mental changes of the adolescent period. In such instances, however, in which the phenomenon persists over long periods of time and in which the individual has been subjected to repeated tests, the striking fact has been revealed that the associations have remained constant. For example where in early childhood a flute tone appears blue, a flute tone will appear that same quality of blue many years afterward. Of what changes take place in synaesthesia during senescence we have no knowledge.

8. Owing to the fact that the majority of recorded cases of synaesthesia have been perceptual phenomena with only a scattered report now and then of similar associations in processes of thinking there has arisen among psychologists a predisposition to regard true synaesthesia as a peripherally aroused process. Since related phenomena do exist in dreams (12) and in processes of thinking (11, page 39) it is evident that more light may be thrown upon the nature of the perceptual variety from a detailed study of the latter. Moreover, in the latter we find that it is an image of the original sensory experience which now has the same colored associate as did the sensory experience itself.
The Synaesthesia of a Blind Subject

This leads us to the conclusion that "imaginal synaesthesia" is derived from "perceptual synaesthesia" and therefore has as much claim to the term synaesthesia as its parent phenomenon.

In order to keep these two forms clearly differentiated we shall speak of the perceptual or sensory form, which is peripherally aroused, as "synaesthesia" and shall call the same phenomenon, as it appears in the realm of the higher intellectual processes, a "synaesthetic phenomenon."

We have here introduced as "check data" results from a second blind subject who has no synaesthesia of any sort. Thus the data from the synaesthetic subject will be emphasized in contrast with the data from the asynaesthetic reagent.

II. REAGENTS, METHOD, MATERIAL

The reagents in this investigation were Thomas D. Cutsforth, observer A and joint author of this monograph; and Leslie C. Blades, observer B. A is now 28 years of age. He lost his sight by accident at the age of 11. His right eye was at that time so badly damaged that it was removed and an artificial eye was substituted. Sufficient musculature remained, making it possible for the subject to move the artificial eye slightly in any direction. The left eye became inflamed immediately following the accident, and has remained badly out of focus since that time. The left retina, however, was not destroyed and is still slightly functioning, as our preliminary experiments will reveal. A graduated from the University of Oregon in 1918. Since that time he has taught in a high school. At present he is a graduate student and assistant in Psychology at the University of Oregon.

Observer B graduated from the University of Oregon in 1916 and obtained an A.M. degree in 1917. He lost his sight by accident at the age of 9. He was 25 years of age when his introspective data were obtained.

The data for this investigation are entirely introspective and were throughout obtained under standardized conditions. B's introspections were given during the winter of 1916 while the reagent was a major student in the psychology laboratory, and
The Synaesthesia of a Blind Subject

were at that time edited by the reagent himself. In introducing this material as data, here, great care has been exercised in keeping them as closely as possible in their original form.

The introspections from observer A were obtained during the winter of 1921. Unless otherwise mentioned, the sets of data from both A and B were obtained under identical conditions and under similar instructions. The senior writer, throughout, was the experimenter.

After the instructions had been given to the observer and the task had been fulfilled, the observer dictated his introspection in as great detail as possible to the experimenter who wrote it down in full. Then, at times, the experimenter asked carefully worded questions in order to obtain greater detail here and there in the introspective descriptions. All such questions, however, were carefully presented in order to avoid any possible influence of suggestion. Rarely were such questions necessary and in no instance was a leading question asked.

Details concerning apparatus and instructions will appear in connection with the presentation of the data. In general the reagent was instructed to assume a comfortable position in his chair and to prepare himself for the instructions. Such a preparation consisted of assuming a receptive attitude toward the instructions and of waiting for any distracting thought or other minor disturbance to pass away before the instructions were finally presented. The reagent then announced when he was ready whereupon the instructions were read to him. In no instance, unless it was particularly desired otherwise, was the reagent warned in advance as to what the nature of the instructions would be. This procedure was followed in order that the resulting mental processes might be as spontaneous as possible and that they might not be affected by antecedent processes. Each series of experiments was separated from the others either by a period of adequate rest or by performance on successive days.
The Synaesthesia of a Blind Subject

III. PRELIMINARY EXPERIMENTS

A. Introduction.

Observer A is not totally blind. His vision, however, is confined to a certain form of entoptic phenomenon. While on a clear day when the sun is high and the reflection of light from objects in the environment is at a maximum, A can obtain vague glimpses now and then of objects near him. Such vision is very uncertain, is always mingled with visual imagery and entoptic phenomena and never exceeds an area larger than the palm of one's hand. Since such experiences are exceedingly rare we need not describe them in detail. That light does at times penetrate to the retina is confirmed by other facts. If A's left eye happens to be turned in the proper direction toward a source of artificial light one corner of a vague visual field is at times dimly and momentarily brightened. Owing to the distortion in the shape and direction of the eye-ball such light as does reach the retina always falls upon the periphery and not upon the fovea. A's experiences of seeing, as far as external stimuli are concerned, therefore, are confined to blurred and dimmed peripheral vision.

On the other hand A is constantly aware of a "field of vision" before him, which is filled with colors and brightnesses of innumerable varieties of quality, size and form. In order to ascertain if possible whether this was synaesthetic imagery or actual visual sensation, A gave complete introspective descriptions of these visual experiences.

B. Typical introspective data on A's entoptic phenomenon.

[Note: The numbers which appear before each introspection are introduced for the purpose of reference. In parentheses () are to be found A's own interpretations of his introspections, given during the act of introspecting; in brackets [ ] are to be found the authors' subsequent comments. These comments are intended to bring out the important or highly significant features of the preceding introspective data.]

1. "Outstretched bidimensionally before me at a distance of what appears to be but a few centimeters is a spacial field about as large as one ordinarily sees before him, oval in shape, but with indistinct limits at the periphery. This field is not a flat surface, as if one were looking at a sheet of paper, but resembles, I think, what one would 'see' if he suddenly entered a dark room, so far as depth is concerned. This field is filled with changing colors and brightnesses which are shifting about in kaleidoscopic fashion.
The Synaesthesia of a Blind Subject

At one instant these colors and brightnesses are irregular blotches which are constantly changing in size, shape and outline. They change so rapidly that it is utterly impossible to describe them in minute detail. The center of this visual field tends to be dominated by yellows, ‘pinks,’ reds and light greens. The next instant these colors become streaks or ‘spatters,’ as if they had been sprayed upon some invisible surface, and what corresponds to this surface is a background of changing greys, sometimes real dark, or almost black, and sometimes more of a neutral grey. The background itself is constantly changing in brightness. Farther out from the center of this visual field are darker greens, bluish greens and blues, and still farther, toward the periphery, are dark and very poorly saturated ‘bottle’ greens or ‘navy’ blues until, at the very edge, colors and forms alike become indistinct, duller and darker, merging into nothing but shades of black. Again, colors may entirely disappear momentarily and the entire field becomes a mottled grey. At times there appear very suddenly, covering the entire field, fine networks of white or yellowish streaks which resemble flashes of lightning. These flashes whirl about and constantly change their position and direction. Then again I see powdery whirls of fine, grey specks on a darker background, or dark specks on a lighter background, the whole visual field becoming a scorching mass of ‘molecular-like dust.’ There are no reds beyond a limited area in the center of the field; there are no colors in the far periphery. The whole field is characterized by rapidity of change in color and brightness, by sudden and continuous shifting in the form, shape and outline of the colored areas. All the colors and brightnesses appear the same distance from me and since they are constantly changing in shape and quality hardly ever are there any distinct outlines to these forms. (I believe that they resemble spatterings of different water colors or shades of black and white as they would appear if painted at random upon a wet surface, upon which the different colors and brightnesses would ‘run’ together.)”

The following is an account of A’s remembrance of this phenomenon which extends back to the years 1904 and 1905:

2. “It was in the winter of 1904 that I first noticed this phenomenon and it was during the time that my left eye was recovering from its inflammation. I used to sit by the hour and watch these changing colors and I noticed, at the time, that physical exertion brightened the colors and made them more variable. (This was evidently due to changes in circulation which resulted from physical action.) As I recall the colors as they appeared then, I think that the blotches and irregularly colored areas were at that time larger than they are now and there were larger areas of grey between the colors. Now the forms are smaller and more thickly distributed with resulting smaller areas of grey background.”

[Introspection (1) resembles so closely other introspections on this phenomenon that additional data is unnecessary. It is interesting to note that the distribution of colors in this visual field described by A corresponds to the distribution of colors in the retinal zones. Reds and greens appear only at or near the center of this visual field; blues and yellows appear toward the periphery and beyond the reds and greens. At the very margin of this visual field there appear only greys and blacks. White streaks may be distributed over the entire field, or at least very close to the margin. This distribution of colors and brightness suggests at once that the phenomenon is sensory, and peripherally aroused.]

C. Conclusions concerning A’s entoptic phenomenon.

These introspections describe almost exactly the phenomenon which the normal seeing person can at any time observe when he closes his eyes and presses upon the eye-balls. One often ob-