

PSYCHOCHROMAESTHESIA.

An investigation of the nature and development of Coloured
Thinking in Childhood.

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Coloured Thinking ⁱⁿ Childhood.

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1. INTRODUCTION.

Explain why is "coloured smell" or "coloured taste" possible or how?

In this country Galton was the first to investigate the phenomena of Synaesthesia scientifically and to draw attention to the early age at which subjective associations between colours and concepts are formed and their hereditary nature. It is seldom that only one member of a family thinks in colours, the tendency sometimes appearing in the third generation.

Galton applied the term "seer" to all who visualised their concepts. Professor Harris distinguishes between colour aroused by sensation, (2) synaesthesia (coloured hearing) and (3) colour aroused by concepts; for the latter he suggests the term psychochromaesthesia the coloured concept being a psychochrome.

Bleuler, Lehmann, and Müller in Germany, Claparède and Flournoy in France, Calkins and more recently, Professor Harris in America, have reported on a large number of cases of chromaesthesia among adults; but no one has yet traced the development of the tendency in childhood, and yet it is in the first experiences of the child and in his early subjective associations that the genesis of coloured conception is to be found.

In the Western Highlands 2,000 papers were written by children in the elementary schools. Remote schools in Glen Moriston /

new section.

*a little abrupt introduction
papers in reply to questions were written for me*

Moriston and Glen Urquhart, in Iona and Tiree, in Rhum and Skye and in the outer Hebrides were included in order to obtain as many Gaelic speaking subjects as possible.

The number of children who think in colour is larger in Inverness than in Argyle, while in Barra, an island of the Outer Hebrides, more than half the children have some colour associations. In some of the smaller schools on the main land and in Iona no coloured thinkers were found, but the negative result is not significant owing to the small number of children over 10 found in the schools.

In Argyle 17% of the girls and 10% of the boys have some colour associations, in Inverness and Skye 43% of the girls and 28% of the boys, in the North of Lewis and in Barra 47% of the girls and 21% of the boys;^{x1} in Sutherland, in Orkney and in Shetland the percentage is higher but the tests were given in Secondary Schools and contained a larger proportion of children over 12 years of age.^{x2}

There are well marked sex differences in Coloured Thinking; at every age the tendency to associate colours with concepts is more developed in girls than in boys.

^{x1} Note Such figures can only be suggestive, some children will not confess to having colour associations, others are so suggestible that they will invent them; but repeated tests prove that the tendency to think in colours in childhood is neither rare nor abnormal. Some of the teachers, though themselves coloured thinkers, were not aware of the individual differences that exist in visualising. 'Strange to say' wrote one Headmaster 'I thought that everyone visualised figures seasons and months as I did, but these papers show a great difference.'

^{x2} See page 5.

In the Gaelic speaking district, where the children know no word of English till they come to school, the tendency to think in colour is greatest, especially in parts of Skye, the north of Lewis and in Barra. These children were of the crofter fisher class, many living in the 'black houses' typical of the islands. It is possible that the use of colour terms in the Gaelic language is responsible for the coloured concepts of some Highland children. A gale of wind and rain is a 'stoirm dhearg', a red storm, and so the Gaelic child has the psychochrome rain-red. The calm after the storm is a white calm.

A Skye teacher points out that *g^{ea}el* (white) is a favourite intensive in Gaelic, e.g. *Mo run geal*, (My white love;) *Gradh g^{ea}el mo chredhe*, White love of my heart; *Geal geanail*, White and cheerful, i.e. pleasant. White is the Gaelic child's favourite colour for Sunday, a pleasant and calm day, but yellow is a more frequent association for an English child.

It is difficult to accept the theory that the environment has no influence on chromaesthesia - older seers have remarked that in living in towns they lose for the time their colour associations. Children growing up in the grey wynds and closes of the Edinburgh Canongate are found to have no conception of coloured thinking, but the environment of a child of the /

the Western Isles is rich in colour, and the blues and purples of his sea and mountains are frequent colours in his psychochromes. To the Skye child August has not the usual associations with yellow, but with grey or black, for August is the rainy month in Skye. December too is black - seldom white or red, 'the darkness of December is very real indeed to the children here' writes a Skye teacher. The unusual number of concepts associated with purple is possibly the unconscious influence of the distant Coolins.

In England and Wales and the Secondary Schools of Edinburgh 4,000 girls and boys filled up questionnaires, the enquiry in the case of Edinburgh Schools extending over a period of more than four years. Hundreds of cases were re-examined after intervals of one or more years, whenever possible individually; children under 10 were always questioned separately. Interesting racial differences seem indicated which point the way to future research. Coloured concepts are more common in Welsh than in English children, but the Irish and Scottish races have a much wider range of colour associations, and the tendency to think in colour is most strongly marked in those of Highland descent.

There are also well marked social differences, for the percentage of coloured thinkers is without exception higher in schools /

schools where every child comes from an educated home. Age differences are interesting; in a Secondary School of 400 girls the number with colour associations was much larger in the upper school. At six years only 5½% had coloured concepts, at 10 years 40%, above 14 years 70%. It is probable that some of the younger children found it difficult to express their coloured thoughts in words, or were afraid of owning to what might be considered childish; some of the older girls found their concepts difficult to explain too, saying that the colours were always there but they had never thought 'about' them before.

The hereditary nature of Coloured Thinking has been emphasised by all investigators. Sixty per cent of the girls in the Edinburgh Secondary Schools have brothers or sisters, and often one parent, who think in colour. In several cases, the whole family and a grandparent are coloured thinkers. In such families the idea of coloured concepts had generally been discussed at home, but it is not rare to find sisters, even twins, with no knowledge of each others colour associations, for seers seldom talk about their psychochromes, partly because they take them for granted. 'I have always been a coloured thinker' writes an older subject 'but have never mentioned the fact except to three people, a brother a sister and my greatest friend /

friend with whom I had discussed music, people and episodes in terms of colour. None of us ever thought of explaining or apologising for this mode of thought.' Parents are not always aware that their children think in colours: 'My little niece came home from school one day' writes E.B. herself a coloured thinker, 'and described a curious exercise they had been given in school; this was the test you instituted as we afterwards learnt. She did not seem to think it at all strange or odd merely unusual. Her parents then learned for the first time that she thought in colour. My sister thought it all nonsense, her husband was profoundly interested and confessed that he had always thought like that, and on comparing his own colours for the days of the week with those of his little girl, he found that with one exception they were identical.'

Some of the colours too were unusual, ultramarine and fire colour. The child aged 11 has the following psychochromes. Sunday, shell pink, Monday Black, Tuesday, slate blue, Wednesday Vandyke brown, Thursday ultramarine in the morning, sky blue in the afternoon, later becoming black, Friday fire colour, Saturday white. Her father's colours differ from these only for Sunday which is blue, and Thursday which remains ultramarine instead of changing as his child's colours change, during the day.

Such /

Such cases are exceptional though occasionally sisters have some identical psychochromes. Two sisters of 13 and 15 have the same colours for 5 months of the year and three sisters of Highland descent have the following colour associations for the months - none of the three knew that the others had coloured concepts nor that their Mother who was abroad thought in colours too - all three children were born in India.

	I.I. <u>18</u>	J.I. <u>16</u>	B.I.	
			<u>11 years</u>	<u>13 years</u>
Jan.	White	red brown	white	white
Feb.	Brown	Brown	Olive green	grey
March	-	Black	Pale grey	grey
April	Jade Green	Pale Pink & Blue	Pale Green	Pale Green
May	Salmon Pink	Pink	Pale Pink	Pale Green
				Pink & White
June	Pink	Bright Pink	Pink	Rose
July	Orange	Red pink	Pink	Blue
Aug.	Orange	Red yellow	Yellow	Yellow
Sept.	Orange	Yellow	Orange	Deep yellow
Oct.	-	Brown red yellow	Grey	Brown
Nov.	-	Grey	Grey	Grey
Dec.	-	Red	White blue grey.	Red

The psychochromes of the two elder girls are almost identical, only differing in shade, not in colour, for February, May, June, July, August and September; the two youngest have the same colours for six of the months and all three sisters have different shades of pink, orange and yellow for May, June, July, August and September.

In several Scottish subjects coloured thinking is associated /

associated with marked psychical power, automatic writing, and clairvoyance; in two girls ~~the~~ the second sight was possessed by the grandmother and great grandmother, on the mother's side, to an extraordinary extent and the whole family thought in colour.

2. SOME CHARACTERISTICS OF PSYCHOCROMAESTHESIA.

Galton pointed out the chromatic precision with which seers describe their colours 'They are never satisfied' he writes 'with saying 'blue' but will take a great deal of trouble to express or to match the particular blue they mean.' Child coloured thinkers are no less definite, eighteen different shades of blue occur in Highland children's psychochromes for the days and months.— Larkspur blue, windy grey blue, clear light blue, smoke blue, the smoke of a peat fire, purple blue, and so on, and the same detailed description for each colour. Monday is black to one child, a dull brown purplish black, Tuesday grey to another, a crinkled and dull pale grey - Saturday is pink, the pink of sunset - Sunday a pale restful green.— October a golden brown like the last moments of a beautiful sunset.

Children often fail to find words in which to describe their colours, they are so difficult to write down they protest.

'It /

- 'It is non word-seeing' writes a Highland girl of 17 'I do not even know the names of the colours of things that are days and weeks [she visualises everything in shapes], the colours are full and diluted, never brilliant or glaring in the slightest degree, but so blended and mixed that I cannot describe them accurately, but my colour combinations are lovely to me.'
- Another older subject writes 'my colours far from being crude are exceedingly delicate and fine, there are infinite gradations of shade in every colour quite distinct to the inner eye but very difficult to convey in words, and there are some, especially suggested by music, which are quite impossible to describe, being not even new shades of familiar colours but actually new colours for which I can find no equivalent in the outer world at all.'

The colours are often described as luminous, almost transparent, some are elusive, some very bright, and easily recalled, often changing with the mood of the visualiser, for nearly all the child colour thinkers visualise their colours, It is rare for the association to be merely thought of, the colour is actually seen. 'I can't help seeing them, they are so distinct' one child writes of her psychochromes - 'I think of the word' says another 'and the colour comes naturally with it.' 'Thinking and mentally seeing are the same thing' writes a girl of

16 'though I often feel, rather than see the colour.' If a child thinks of the word 'Monday' the word is seldom thought, it is visualised, and if the child is a coloured thinker it is seen written in coloured letters or surrounded by a patch of colour. In one Scottish Secondary School 80% visualised the word Monday, 50% saw it in colours, the number of visualisers increasing in the higher forms. 'I see a blue grey haze with the word Monday in pink in the middle' wrote a child of 12. 'I see the word written but I think of it also as pale green on the summit of a little hill on which all the days are at different stages, Saturday being at the bottom', wrote another of 13.

In the case of adult subjects the colours are often more sub-conscious - 'If I try deliberately to recall my colours' writes E.B. 30, 'they sometimes elude me, but come quite spontaneously if I am not thinking specially about them.' 'All my colours are subconscious to me writes S.H. 25 'but I can be aware of them if I think about it, they always have been rather faint but definite.' C.M. 24 a Highland colour thinker says her colours never obtrude themselves, all words are coloured to her, but she reads without thinking about them.

In childhood especially the colours come quite spontaneously, they are absolutely natural and involuntary. The following extract /

extract from a letter written by the Mother of a small Scottish girl of 9 who filled up a questionnaire illustrates the spontaneous nature of much of a child's colour thinking. - 'I knew she had far more colours in her than E. (her sister) writes the Mother, 'but until yesterday I had no idea of the range of it, all the days of the week, months, and figures are coloured many in a more or less complex fashion; this I knew before, but I did not know they had sex, age, and family relationship, nor did I know of the jolly little bit of country side where her alphabet lives. It was quite spontaneous, dashed on to paper at lightning speed without hesitation and finished abruptly when complete. She said 'I feel as if I was doing some lovely kind of examination paper and that I knew all the answers', her face glowing.'

This child had refused to give any account of her colour associations two years earlier, though her sister, a coloured thinker of 9, was quite sure that the younger sister had colours too. Both the parents who were first cousins had some colour associations especially the father. To many young children their coloured thoughts are so intensely personal that they cannot bear to disclose them to other people, and this may account for the much larger percentage of coloured thinkers found among children over 12 years of age, for in the majority /

majority of subjects the tendency to form psychochromes can be traced to early childhood.

Darwin was the first to make experiments on the power of distinguishing colours in childhood, and showed that it is a late development; his children knew the name of most common objects long before they knew the colours for them. Observers agree that the child only distinguishes colours by name when nearly three years old, but Myers believes that relatively small differences in brightness are appreciated in infancy.

There can be no doubt of the early appreciation of colour in the case of many child colour thinkers. One Scottish boy of 12 had colours for sensations as soon as he could speak, and puzzled his parents by his fancies as they then thought them. This boy and a younger sister, also a coloured thinker, were highly susceptible to the influence of colour from infancy, and learned the names of colours before any one realised it or could have believed it possible that they could recognise them. Another child had colours for the days at the age of two, and some subjects date the beginning of their colour association ^{back} to the age of five or even three years. 'I can't remember before I thought in colour,' 'I have never thought in any other way' are typical answers and the colours are so natural and involuntary that it is often a surprise to find that all do not share their way of thinking. An Animated chromatic discussion frequently follows the /

the filling in of a questionnaire in a class room.

Colour associations develop considerably during the years from 7 to 11 and again from 15 to 17, it is then that colour associations are often formed for abstract qualities, books, people and places. The first concept to acquire colour varies in different individuals; colours for sensations tastes and smells are rare in childhood, but frequent coloured concepts are days, months, letters, names, figures, sounds and music. 41% of Highland children have colour associations for some days and months. Days are often coloured first but there are great individual differences. A.M. 13 acquired her psychochromes in the following order, music at 6 years, months at 9, days at 10 and later a wide range of colour associations. E.A.W. 7 had colours for all the days before she was 3, for numbers up to 100 at 5, for names and the letters of the alphabet, except the vowels at $6\frac{1}{2}$, for places and the vowels at 7. E.D. 14 had psychograms for months and figures at 5 years, for letters and days of the week at 8 and at 14 had colour associations with sounds, music, books, people, abstract terms and odours.

The development of psychochromaesthesia is rapid in some children, in others a very gradual process. M.M. had colours for the days at 8 and no other concepts acquired colours till she was 12 when she had colour associations with the months.

M.R. / these are the most common colours acquired by children

M.R. had colours for the months at 9, not till 11 years for the days. H.L. had ~~had~~ colours for the months ever since he knew their names, but not till he was eleven for music. C.C. had no development of her psychochromes between the age of 5 and 10 - at 5 years all the days were associated with colours, at 10 the months. E.B. had colours for days, letters, months, odours, episodes and events from early childhood, but people and music only acquired colours when she was 19, figures not till she was 25. In her case the development of her psychochromes corresponded to the growth of her interest in the things associated with colours. She was not interested in people as a child, nor did she care for music - later she did intensely, and her colours grew with her appreciation of it; in her case coloured thinking was more than the survival of a childish fancy.

Continue from p. 63
 All through childhood not only does the number of concepts associated with colours increase, but ^{also} the range of colours; - young children use the terms bright, dark, light or pale; but their psychochromes ^(or their descriptions of them) have not the chromatic precision so characteristic of the description of older girls and boys.

Some children lose their psychochromes for certain days or letters, and gain colour association for those that had none a year or two earlier, but very few children lose the tendency to associate colour and concept and there seems no loss of psychochromaesthesia that is measurable during the years before 20; some /

some seers retain a small number of psychochromes throughout life having lost all recollection of any others - One Highland subject of 80 years still associates colours with 4 days but cannot recall whether she ever had colours for the rest. The exact number of adults who think in colour is difficult to estimate owing to racial and social differences, but the tendency to form psychochromes can hardly continue to develop, except in rare cases, when abstract thinking drives all concrete imagery into the background.

3. THE INFLUENCE OF FATIGUE.

There are large individual differences in the effect of fatigue on colour associations, & some subjects say that being tired makes no difference, & to others fatigue makes the colours much more vivid; One subject of 22 said, ^{that} her colours almost pursued her when she was tired; Another aged 15 writes 'when I am tired they become more vivid than ever, but then in an unpleasant way; this is only when my brain is tired, physical tiredness has no effect. Another child writes: 'They come best when I am tired! But on some coloured thinkers fatigue has the opposite effect, & they describe the psychochromes as being blurred or misty, some ^{as} fade, ^{or} become very pale or go grey or are quite impossible /

impossible to recall; in all these subjects their visualising partakes almost of the nature of sensation.

4. THE UTILITY OF PSYCHOCROMES.

Galton held that, on the whole, seers were above the intellectual average. But in childhood there is no correlation between intelligence as measured ^{by tests?} [psychologically] and the tendency to think in colours, not between coloured thinking and such school subjects as English grammar. ^{? pure figures or other instances} Coloured thinkers are frequently the most interesting children in a school, imaginative, literary, artistic, often very musical, but they do not invariably excel in their powers of logical thought.

The use made of his psychochromes by the seer is, however, interesting. Flournoy⁺, while admitting the utility of number forms, considered that colour associations are not only useless, but often a hindrance in thinking, except occasionally, to correct spelling lapses. Galton gives an account of a subject who invariably decided the spelling of a word by its colour not only in English but in foreign languages. Flournoy considers such cases very rare and far outnumbered by those to whom colours are a hindrance. This view was criticised by Müller, though he points out that the part played by psychochromes in learning has never been investigated /

* Synopsis Audition Coloris p. 150.

investigated experimentally.

^{Müller's}
 x G. one of his subjects who had colour associations from early childhood always learnt dates and numbers in colour, the colour meaning more than form to him, his psychochromes being different for each language; 'ten' would call up purple but 'zehn' green because the letter z was green; if he tried to learn a long row of syllables without colour the task was impossible; in learning prose he could remember the position of words by their colour; he saw each colour in its place in the line and the colour recalled the word.

A similar use of this psychochrome is reported by a large number of coloured thinkers in this investigation; many of them like Müller's subject would find it impossible to learn without colours, colour and thought being inseparable to those who visualise all words in colour. One Highland girl writes 'I never think without my colours.' Another 'I cannot imagine what it would be to think without these colour schemes. I learn dates and remember a number of things by them.' Several children learn French and Latin by the help of their psychochromes. One child always learns French verbs in colour, 'Prendre' is brown. Others recall poetry and passages from books by their colour, and a large number learn spelling and dates. Only one, a girl of 15, suggests that her colours do not always help her. 'I do use /

x p. 153 Müller. *Zu Analyse der Gedächtnis-tätigkeit und der Vorstellungswelt*

use them' she writes 'and sometimes they help me and sometimes they muddle me up.'

Nor is the use of psychochromes confined to childhood; an adult subject writes, 'The numbers being coloured have often been useful to me and I still use colours for remembering names. I remember well in an examination recalling the colour of a date which I had forgotten, and then the figures came back to me, the whole date was not coloured but the pink 'two' in it was the predominating colour.' Another subject recognises music by its colour sooner than by ear. She also uses her colour associations to recall past events. 'People frequently express surprise,' she writes, 'at the accuracy of my memory with regard to events and seasons long past; they might be still more surprised if they could see the mental process of recollection. If I want to recall any particular incident in the past, I seem to glance down the years like a procession filing past, and in a flash fix on the year I want, for each year with all its contents is gently but firmly stamped with its own colours. 1911, for instance, that is grey (grey is not a sad colour with me at all); concentrate on it for a moment, and thro' the grey come thronging up other colours - images of scenes and events, colours of thoughts and feelings, all these in a flash yet each distinct from the rest, and all with just the faintest haze of the year colour /

colour hanging over them. I can only compare the process to glancing along a shelf on which are ranged, say, 20 coloured glass globes, 10 different colours, full of different objects; at a glance I can single out the globe containing the thing I want. But that simile gives no idea of the imaginative vision. I can visualise a whole year in an instant, with its number colour faintly and unobtrusively, but quite unmistakably surrounding it, and separating it from all other years.

This subject, unlike the majority of coloured thinkers who use their psychograms^{chromes} to recall the past, has no day, month- or number-form, though she believes that they^{she had them} existed in early childhood. She describes her use of colour as to her a perfectly natural and involuntary process, though expressed in words it may appear deliberate and methodical.

5. THE COLOUR OF LETTERS.

Colour Associations with the letters of the Alphabet date in many cases from early childhood; the letters are individuals to some child coloured thinkers, having even age and sex. This idea of the personality of letters is a childish fancy that survives in the psychochromes of older subjects. E.B. 30 writes, 'nearly all the letters have quite distinct individualities, and the colours seem to correspond to the qualities with which my /

my youthful fancy invested them. As a child the characters of the letters were much more distinct and real than those of any actual people I knew, and acquired colours many years before people did; possibly because people are so complex and changeable, whereas the letters were always exactly the same."

The following letters were the first to have character and colour associations for E.B. and these in adult life are still her strongest letters and tend to colour the words in which they occur if they have no other colour association:-

- A. Pink. Cheerful and amiable.
- B. Deep golden brown. Comfortable, homely and kind.
- C. Sea blue. Earnest and straightforward.
- L. Clear deep blue. Imaginative, honourable, winsome, devoted, beautiful.
- O. White. Quiet, mysterious, strange.
- S. Light yellow. Heartless, but fascinating.
- T. Dark blue. A very gallant gentleman.

Letters that have no colour have less character. P. is colourless and rather weak. K. and Q. generally colourless sometimes ugly shades of brownish pink and reddish prune, are sneaks hated by the subject. V, X, Y, Z, are generally colourless and very rarely mauve, and are weak in character. L and T are favourite letters. L a very noble woman, and T a very noble man. The colours of the letters corresponded to the colours of the qualities with which the letters were invested by the subject. E, F, G, H, I, J, M, N, R, were coloured after the first group.

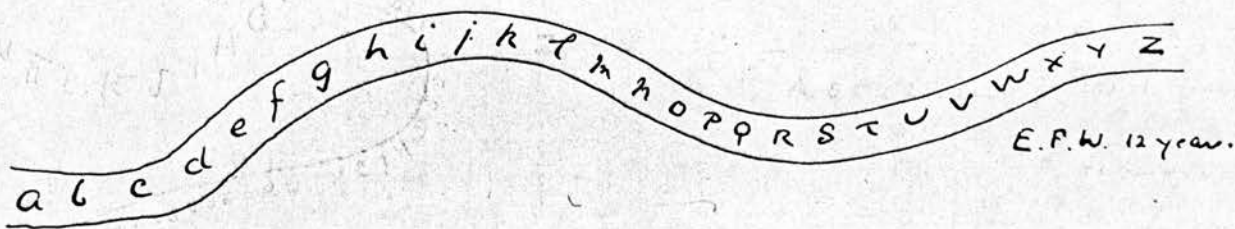
E /

- E. Pale green. Refined and artistic.
 F. Green different from E. Haughty and scornful.
 G. Light red. Rather irascible.
 H. Jade green. Very graceful, gracious and charming.
 I. White or grey variable. (Unobstrusive but very de-
 J. " " " " (terminated and high principled.
 M.)
 N.) Different shades of Brown. Rather Complex.
 R. Bottle Green. Somewhat difficult to get on with.

E.B. has no explanation of the various personalities, she has never consciously associated letters with actual people.

Many coloured thinkers visualise the whole alphabet.

E.F.W. a Highland child of 12 always sees her letters walking along a road.



Another Highland girl of 13 visualises her letters in a brown wooden box with squares marked off for each letter, the colours are white except E which is black, and S which she sees in the form of a huge serpent.

Coloured thinkers frequently visualise numbers, days and months in a definite form, more rarely the alphabet. The examples /

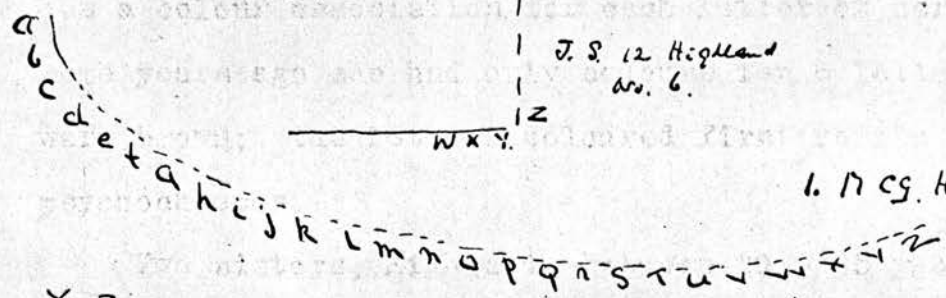
examples given below are all those of Scottish subjects. No. 5 is that of a boy.

g f e d c b a

J. S. 12 Highland
No. 6.

W X Y Z

I. M. C. Highland. 11 years.



M. H. 17.
Shetland Isls.

Z Y X

C B A

No. 3. A. E. C. Lowland Scotch. 12 years

No. 4. 11. 5 yards in length.

A B C D E F

G

H I J

K L M N

No. 5. 14 P. aged 12
Lowland Scotch.

Calkin found only three complete coloured alphabets among 543 subjects.⁺ Fifty Scottish coloured thinkers have specific colours for each separate letter and a large number in addition see the alphabet in one colour, green, brown or red. The letters seldom acquire colours at the same time, one child of 5 has colours for 18 letters, two of eleven years for the whole alphabet /

⁺ A. J. Psy. 1892-3.

alphabet but more than half the subjects with all letters coloured are over 15 years of age. M.N. an English girl of 14 has a colour association for each letter of her alphabet but some years ago she had only colours for 8 letters, the rest were brown; the letters coloured first retain their original psychochromes.

Two sisters, Highland, between 20 - 25 years of age have colour associations for every separate letter. Some of the colours are the same, some complementary. 'It requires no effort to call them up' writes one of the sisters 'the colour belongs to the letter - ever since I can remember it is so, but the colours never obtrude themselves, I read without consciously thinking of them at all. When I think of the letter C for instance I see it in a soft sky blue - not pure blue, but the colour of the sky where it gets greenish towards the horizon. It always has been that colour, and could never be anything else. When I look at a written or printed letter (in ordinary writing the colour is not very distinct, it is more distinct always in printing) in my mind's eye I see it in its own colour. B. is bright yellow like brass; D. primrose yellow; P something between the two. These letters have all a similarity in sound and form, but I don't know whether that accounts for their being different shades of the same colour or not. T which is similar /

similar in sound is deep blue. F. is also blue, but not so deep a shade. K is purplish brown; M. dark chocolate brown; N pure grey. W. is the colour of port wine or rather a little deeper; V a dull, rather dirty yellow.' When the subject thinks of a letter alone she thinks of it as a printed capital in its own colour. All her vowels are neutral colours down to pure white in O, such as A. dark grey, I steel grey. In her psychochromes the colours are simply a mingling of the colour of the letters of the word, the colour of the first letter predominating. The same explanation of her psychochromes is given by another Highland girl; all her concepts are coloured thus— Saturday is grey because the colour of the letters are grey, grey, greyish, pale yellow, dark brown, yellow, grey, white, grey.— July is yellow because u and l are yellow.— June blue because J is peacock blue and n blue.— Wednesday is bluey grey because W is yellow, e green, d pale yellow, n blue, e green, s grey, d yellow, a ^{grey} green-white y grey. So too the word green is a blue word because G is peacock blue r dark brown e green n blue. Professor Fraser Harris writes 'the colour of the concept of the word is only rarely the colour of the letters that form it' but the contrary is found to be the case in this investigation - of subjects with colours for letters 70% have concepts coloured in this way though only for those who visualise /

visualise every word written in colours is it an explanation that holds of all their psychochromes. E.B. who has a coloured alphabet only colours her concepts by the colours of the letters when no other association of ideas has taken place, and the letter colour can of course be never more than a partial explanation of chromaesthesia for only a small proportion of coloured thinkers have complete psychochromes for the alphabet.

The initial letter generally decides the colour of the word, sometimes the chief vowel - Mary^s blue because ^a it is ^{blue} true. Lear['] yellow because E is yellow. — Edith red because i is red. Christian names are the commonest examples of words coloured by the first letter. A child at the age of 6 had colours for the names of each of her sisters - Helen red, Lilian pink, Christian green, and in every name the colour is that of the first letter of the word - for her own name Elsie she had no psychochrome, E being colourless with all the ^{other} vowels in her alphabet; her second name Noel is yellow the colour of N.

Another subject colours names by their initial letter except words beginning with M and R, whose psychochromes are always indistinct, M being blackish red and R dark brown, so while Annie is brick red the colour of A, B — her own name^s grey blue the colour of B, and Lincoln her native town the colour of yellow, names beginning with M and R are exceptions. — Margaret is brown /

brown, Muriel green, Ruth red, and Rebecca is cool grey green. Some of this subject's names are coloured by the second letter if it is a vowel. Gertrude is a dull greenish red, G being flame colour but e light green. James is bright honey colour corresponding to the colour of J, but Jim is strongly tinged by a black i.

Professor Jordan described his psychochromes as arising from the colour of the initial letter of the word, or ^{from the} most conspicuous letter in pronouncing the word; but to him the name of the colour fails to call up the colour by repetition, the word red is seen green, the word blue is also largely seen green. ^x All coloured thinkers are not agreed on this point. A.D.F. a Scottish girl of 18 has colours for all her letters and her psychochromes correspond like those of Professor Tattersall to the colour of the letters composing them. Tuesday is brownish because T is brown, u, e, and s, yellow d palish red, a black, and y brown, but her names of colours, unlike his, keep their own colour, yellow is yellow, scarlet is scarlet, grey is grey.

In the cases reported on in this investigation it is the visual image of the letter that calls up the colour, more rarely the sound. 'If someone says T' writes a Highland schoolgirl 'I see the whole alphabet coloured a very dark red arranged in order. /

order. I look at T and see the other letters stretching out behind and in front into space. I can't think of it without colour but the colour is secondary.' This subject has no colour for the sound of the letters or for any sounds, although all the rest of the thinking is coloured and visualised in coloured forms and schemes.

Galton found that the vowel sounds were more frequently coloured than the consonants, and Clapar^{de} among adult subjects found five out of six had colours for vowels, colours for consonants being five times as rare. Calkin's statistics did not bear out these figures, while among Scottish coloured thinkers twice as many have colours for the consonants as the vowels - among children it is not uncommon to find the whole alphabet coloured with the exception of the vowels, and when a small group of letters is coloured it is almost invariably the consonants.

It is possible that Clapar^{de}'s methods were influenced by the form of questionnaire - the first question is full of detail: Quelle couleur trouvez-vous aux voyelles, a, e, i, o, u, ou? - Indiquer autant que possible la nuance (rouge, blanc, etc) et le degré de clarté (brillant, clair, foncé, etc.). The colour associated with the consonants is asked for later in one question with voices, sounds, music, figures, smells, tastes, days and months. A subject in filling up such questionnaires frequently fails/

fail to give in detail the colour of any concepts which are not made the subject of a definite question, and is content to give merely examples of his other associations in colour. The full extent of the coloured thinking of some of the subjects in this investigation was only discovered at a second or third interview or when ^{they were} asked to write a more detailed account of their colour associations.

Fechner, Bleuler, and Lehmann found yellow the most frequent psychochrome for the vowels. Claparède's subjects had the largest number of associations with red, but in all three investigations yellow, red, white, and blue are favourite colours for vowels. In the Scottish results too yellow is the most common colour association in the case of vowels, followed by black ^x brown, and grey; red and white occur only half as often. It is interesting to note that brown and black are rare colours in the German and French statistics and grey very rare indeed occurring in only 4% of the cases. The favourite colour of each vowel in the four investigations is shown in Table I. given in percentages. Red is among the favourite psychochromes for A in each country's statistics, and yellow for E.

TABLE I. /

^x Black was not included in the statistics when all letters were reported black by the subjects.

TABLE I.

The similarity is striking considering the difference in pronunciation in different countries

	A	E	I	O	U
FECHNER 1876	White 49 Red 28	Yellow 34 Green 21	Yellow 44	Red 30	Black 40 Brown 22
Bleuler & Lehmann 1881	Black 27 Red 23	Yellow 54	White 67	Yellow 26 Red 24	Red 22 Black 20
Claparède 1892	White 24 Red 23 Black 21	Yellow 20 Blue 19	Red 25 White 21	Yellow 23 Red 21	Green 30
This in- vestiga- tion 1923	Red 30 or 42 Blue	Green 40 Yellow 20	Black 48	White 70	Yellow 32

Following the example of M.M. Bleuler and Lehmann, Claparède divides the vowels into three groups, light, medium, and dark, I and e being for the majority of subjects light coloured vowels, a and o medium, and u dark. This division he points out coincides perfectly with that based on the acoustic nature of the vowels, e and i corresponding to the high notes of the musical scale and a, o, u, to the lower /

lower. 'Il résulte* de là' he writes, 'que la clarté de voyelles, telle qu'elle se manifeste d'une manière générale dans l'audition colorée, augmente par-allèlement à leur hauteur, ce qui concorde avec le fait bien connu qu'à presque tout le monde les sons bas paraissent sombres relativement aux sons élevés qui font l'effet clair et brillant. Ces rapprochements entre les impressions de la vue et de l'ouïe reposent évidemment sur leur analogie émotionnelle, c'est-à-dire sur l'identité de leurs effets physiologiques. Les sons élevés, comme les teintes lumineuses, exercent sur l'organisme une action dynamogénique bien différente de celles que produisent les sons bas et l'obscurité.'

On this conclusion Flournoy bases his 'Loi de clarté' and claims that it is upheld by the results of both Fechner and Bleuler and Lehmann. But the Scottish figures support no such law, for while in the German and French statistics i is a light or medium coloured vowel it is black for 48% of the Scottish subjects, while o which Claparède classes as a medium coloured vowel is white in 70% of the psychochromes. U too is not a dark vowel but often a light coloured, yellow for 32% of the subjects.

Flournoy finds one absolute negative rule in the results of Fechner and Bleuler and Lehmann. I and e are never black and o is never white in German psychochromes, but exceptions occur in Claparède's figures, and it has been shown that in this investigation these colours /

colours are the most frequent associations with i and o.

Flournoy traces the 8% of black i's in Claparède's returns to the influence of this latter in the word 'noir', the white i in the German statistics to the pronunciation of the word 'weiss'. The frequent yellow and white e's and the rare black and brown associations he explains by his 'Loi de Clarté', the green and blue e's by verbal association with the name of the colour when e occupies a central position as it does in 'vert' and 'bleu', just as the e in 'gelb' may account for the association of yellow and e in Fechner's statistics. Flournoy would doubtless explain the green e in the Scottish psychochromes by the same train of reasoning, though Fechner was struck by the small part played by verbal associations in the psychochromes of letters and it is an explanation that constantly breaks down. If the white A in Claparède's statistics is explained as Flournoy suggests by the presence of the letter A in 'blanche' and for the association, 'Dimanche blanche' it does not avail for the Scottish association Sunday white, nor does such verbal association throw any light on Claparède's red and black associations with 'a' which are scarcely less frequent, a being coloured white in 24% of the psychochromes, red in 23% and black in 21%. Flournoy makes the further suggestion that the strong colour red may give the same impression to the eye as the sound a does to the ear.

Although /

Although the colour for the vowels in this investigation is not in accordance with Flournoy's 'Loi de Clarté' yet it is true that the association between high sounds and bright colours and low sounds and dark colours is a constant one in synaesthesia, and the difference between the French and Scottish statistics in the correspondence between the acuity and luminosity of the vowels can be explained by a difference in the mental imagery of the subjects. Claparède's subjects were adults, the Scottish subjects, with few exceptions, of School or College age, for whom it was the image rather than the sound of the letter that was coloured - in the rarer cases where the sound of the vowel was associated with colours the luminosity of the vowel does correspond with Flournoy's law.

M.E.R. 17 associates colours with the sound of the letter. O is purplish black when pronounced as in only. A is dark green when pronounced as in father. S when pronounced as in see has ^{such} ~~just~~ a brightness that the colour is indescribable, when pronounced like z, it is orange. High sounds have always very bright pale colours, deep sounds purple, red and black. I is pale yellow when pronounced as in pit.

Here we find the dark o and the light i of Claparède's statistics. The I of another subject who has colours for vowel sounds is flame colour, corresponding to the yellow I, so characteristic /

characteristic of Fechner's subjects, not the black I of the majority of subjects in this investigation.

Another Scottish girl of 16 has two shades of colour for each vowel, the shade varying from light to dark according to the sounds, her colours are as follows:-

A ^{red} and ^u pinkish, E deep yellow, ^e lemon yellow, I flame colour, ^y pink, ^o white ^o brown, ^{ow} ^{yellow} white ^u pinkish yellow, oo yellow, oi orange, ow white.

The letters of this subject are seen blackish brown or blue grey against a dark background. Some of her words are coloured by the chief vowel in them, the rest by associations such as the association of yellow with August from the idea of green leaves with sunlight coming through them.

A ^{possible} ~~third~~ explanation of psychochromes for letters is the influence of a coloured alphabet when learning to read, and ^{this} was given as the origin of their colour associations by a number of subjects.

H.W. a Highland subject who visualises every word written in colour and has a specific colour for every letter remembers learning her alphabet in colour, each letter having its own colour. Another younger subject had a coloured board for the alphabet, the letters were black but each letter had a different coloured background. An Irish boy of 14 with colour associations for the letters /

letters had a coloured A.B.C. when he learnt to read. A.B. 15 had a primer in which all the letters were coloured and her psychochromes for letters with few exceptions retain those colours. On the other hand some coloured thinkers reject the idea of a coloured alphabet as no explanation at all of their psychochromes, and it is clear that all such colours cannot be traced to reading books. J.C. aged 6 had psychochromes for all his vowels except i and had more than one colour according to the sound, yet all the vowels in his primer were red.

6. THE COLOUR OF DAYS AND MONTHS.

Psychochromes for days and months are more frequent than any others; and, except in early childhood, it is rare to find coloured thinkers with psychochromes for days or for months not for both. Days as a rule are coloured first, probably because the child knows the names of the days long before he uses month names. Binet places the age for the test of the former at 6 years, the latter not till 9.^{x2} In some of the subjects of this investigation colour was associated with the days at three years of age, occasionally earlier, and the months only after an interval of several years - though there are instances of the months acquiring colour first.^{x3} The psychochromes for days and /

1. Days & Months 41%; days only 5%; months only 6% Highland children under 14.
2. Burt's Revision. 3. (See) pp. 13 14.

and months are almost invariably visualised, often in some form or outline - L.H. 18 visualises her days, not as written words but as designs of colour, square or round - the whole scheme of days is seen in a bluey white except the day she is thinking of, which becomes clearer and greener in colour, the date being often seen on the colour. Sunday is white, much more elaborately designed than the other days and acts as a landmark in counting. She never thinks of the name of the colours and it is impossible for her to describe them; some are blended, some full colours, the whole scheme of colour and form stretching into space; L.H. has no recollection of the beginning of her psychochromes, the scheme never changes but the surface of the colours change with her mental atmosphere; her Mother and sister have similar colour forms but much vaguer, and her forms become vague too if she is tired. In thinking of a day it is always seen in its place in the form, only by a concentrated effort can it be visualised alone. For some subjects the days are only coloured if they ^{have} ~~have~~ an emotional colouring, for instance a tiring day would be black or grey, ^{for} ~~for~~ dull and tiring days are associated with dark colours or are colourless. An unpleasant association has always a black psychochrome - 'Wednesday is black because I hate it' writes an Irish girl of 13. March in many Scottish children's colour association is black because /

because of the Intermediate examination which is held that month. Flournoy draws attention to the grey and black Mondays in the French statistics, a contrast to the remarkable brightness of Sunday.

White is a rare colour for days in this investigation with the exception of Sunday, though Claparède found it also the favourite association for Friday and Tuesday. Black and grey are rare colours too for the days except Monday. Yellow first, then red and green are the favourite psychochromes for the other days, this being especially true of Saturday.

The colour of a day may change during the day. 'Thursday seems to come to me in a green excited colour that changes very quickly' writes a girl of 14. Saturday is grey in the morning, yellow in the afternoon, to another; Monday a dull grey, in the morning pale blue in the afternoon, to a third; while to a child of 11 Thursday changes twice, the day having three distinct psychochromes.

The Colour associations of some subjects change too according to the time of year. Sunday is grey in winter, greyish yellow in Summer for one coloured thinker, has a different colour association in the holidays for another, for the yellow becomes black at school. The child's favourite colour is often the explanation of the psychochrome for days and months as it is of all colour /

colour associations, e.g. C.C. 16, colours six days by the colour of the initial letter, but Sunday's psychochrome is that of her favourite colour green - Saturday is Mauve for another child because it is both her favourite day and her favourite colour.

The sound of the word is a less frequent explanation, though some subjects colour their months and days according to the vowel sounds as when June is yellow because u is yellow. J. McG. 27, has dark colour associations with days which have a broad deep vowel and light bright colours for days having a high short vowel. Sometimes within their limits the particular colour may change. Monday may be dark blue, black or red, Friday white, yellow or pale blue, it is the name of the day not the idea of the day itself that has an association for her. Another subject has warm colours for some of the months because the names sound warm, and cold colours for a few that sound cold.

When subjects have colour associations with the letters of the alphabet the psychochromes for days or months are frequently those of the initial letter of the word. E.P.'s, an English subject, had colours for the months ^{which} ~~date~~ from the age of seven, directly she could read. With two exceptions the month takes its colour from the initial letter. Her colours have never changed /

changed.

The two exceptions are interesting. The letters S and O have no colour associations so her psychochrome for September is grey while green, her favourite colour is given to October.

January	red.	J.	red.
February	orange.	F.	dull orange.
March	red pink.	M.	red.
April	light blue.	A.	blue.
May	pink.	M.	red.
June	dark pink.	J.	red.
July	red.	J.	red.
August	light blue	A.	blue.
September	grey.	S.	no colour.
October	green.	O.	no colour.
November	light brown.	N.	light brown.
December	no colour.	D.	grey.

For another subject Sunday is smoke colour, the psychochrome for S, Tuesday and Thursday green because T is green.

M.M.A. Highland subject of 15, who has psychromes for all her letters, also colours her days and months according to the first letter of the word with two exceptions - August is Yellow and Sunday is White.

F.	light green.	February	greyish green.	Friday	green.
M.	Red	March	red	Monday	red
		May	pink		
A.	blue	April	pale blue		
W.	orange			Wednesday	orange.
S.	yellow			Saturday	yellow

We have seen that Professor Fraser Harris suggests that the psychochrome of a word is seldom that of its component letters, but /



but such examples are not rare in the case of the months and days. For S.M. 17 all the colours for days months and years originate in this way. January is rich brownish yellow, the letters having the following colours:-

J. Yellow orange
 A. Black
 N. Brown
 U. Dull yellow
 A. Black
 R. Prussian blue
 Y. Brown black grey.

Tuesday is also a brownish colour:-

T. Brown
 U. Dull yellow
 E. Dull yellow
 S. Bright yellow
 D. Pinkish red
 A. Black
 Y. Brown black grey.

March is reddish brown and white:-

M. Red
 A. Black
 R. Prussian blue
 C. White
 H. White grey

The most frequent explanation of psychochromes for the months of the year is however that of the association of ideas. The dark or grey colours of the early months, the bright green, blue and pink of early summer, the rich yellow, orange and brown of Autumn, followed by the greyness of November and December, all these the majority of coloured thinkers agree in tracing to the influence /



influence of seasonal associations. The part played by such associations in the concepts of young children has already been pointed out, and, for some adult coloured thinkers too, the months suggest concrete associations, not colours. The following are those of a Scottish subject I.H. 25:-

January	Yellow aconite
February	Red dog wood
March	Green new leaf
April	Violets and a rainbow
May	Hawthorn
June	A garden
July	Yellow daisy flowers
August	Poppies
September	Autumn leaves
October	Leaves and roses
November	Old man's beard
December	Snowdrops and holly

Some of these explain colour associations that are frequently found in children's psychochromes. Rainbow coloured for April, white for May, brilliant yellow for September, vivid greens for March.

Psychochromes for the days of the week are sometimes very changeable - one child said her colours were different every week, but those for the months seldom vary, though sometimes a colour association with some month is lost and others gained in the course of a few years. G.B. had seven months coloured at 15, 10 at 17, but while January, February, March, May and August had then acquired colours, July which was blackish red at the age /

age of 15 and September which was golden had both become colourless. Sometimes there is only a slight change in the shade of the colour as in the psychochromes of J.I. given below - her colours at the age of 16 and at the age of 18 are the same except August, which has changed from dark blue to orange, and July which is also orange instead of deep crimson, while March formerly wet yellow, has no colour association:-

	<u>J.I. age 16</u>	<u>J.I. age 18</u>
January	white	white
February	light brown	light brown
March	wet yellow	no colour
April	pale green	jade
May	red pink	salmon
June	dark pink	pink
July	deep crimson	orange
August	dark blue	orange
September	gold	orange
October	dull brown	dull brown
November	grey	grey
December	grey and red	red.

The psychochromes for days of the same girl at 16 and 18 are interesting, she described her colours at the age of 16 as often changing and two years later only ~~Friday~~^{Monday} grey and Wednesday red remained of her earlier associations.

	<u>at 16</u>	<u>at 18</u>
Sunday	pale yellow	white
Monday	blue grey	blue grey
Tuesday	pale gold	light green
Wednesday	light red	brick red
Thursday	navy blue	brown
Friday	no colour	orange
Saturday	primrose	blue

The /

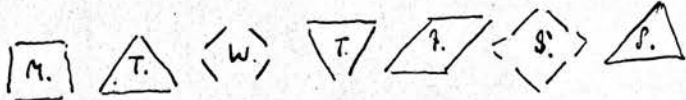
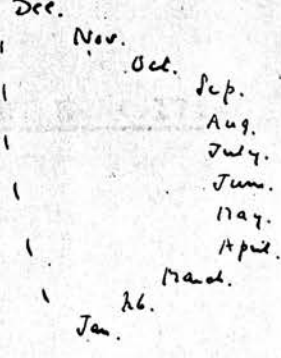
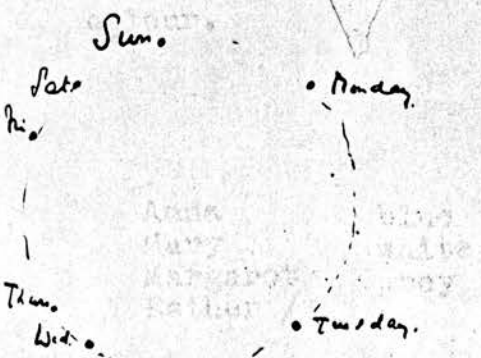
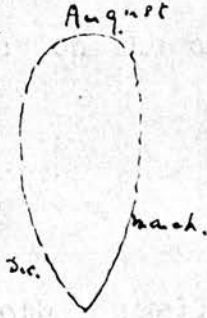
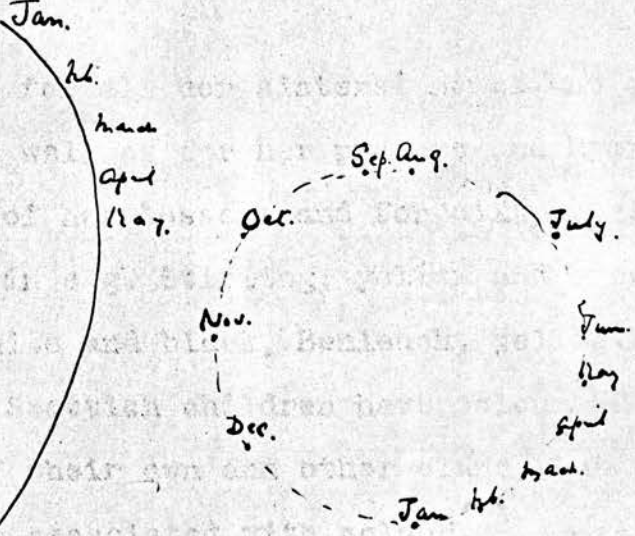
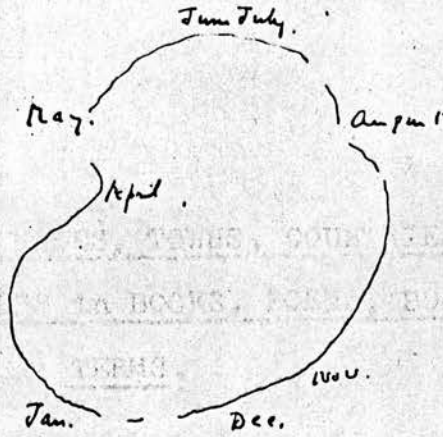
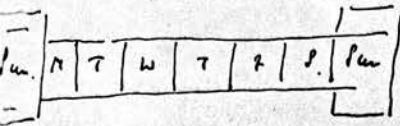
A

The similarity of the psychochromes in the case of sisters has already been mentioned, one more example is given below. These sisters were the eldest of four who thought in colour but the third sister had no psychochromes for the months and the youngest aged 10, only for January, March and April.

	<u>D. S. 16</u>	<u>I. S. 15</u>
January	grey	white
February	green grey	grey
March	green	pale green
April	yellow green	rich green
May	green and blue	all colours
June	red, blue, white	all colours
July	pink and helio	all colours
August	yellow	yellow
September	-	brown red
October	brown red	gold
November	grey	grey
December	white	white

A large number of coloured thinkers visualise their days and months in some form or outline; examples of the chief types are given below; these have little of the originality of the number forms, a circle being the most usual form. Some children personify the days or the months; one Highland girl thinks of the latter as a group of maidens, as well as ^{having} her colour associations, her drawing of the months is given in plate 4.





7. COLOURS for PEOPLE, NAMES, TOWNS, COUNTRIES, HISTORICAL PERSONAGES, CHARACTERS in BOOKS, POEMS, BOOKS, ABSTRACT TERMS.

Some child coloured thinkers have colour associations with names, people, their favourite character in fiction and in history, their games, lessons and books, as well as abstract qualities.

E.N.W. aged 7 had colours for all her sisters' names and a few others at the age of 6, as well as for her prayers and hymns. At 7 she has colours for most of her lessons and for six places, those she has lived or stayed in e.g. Stirling, yellow and brown Manchester, black, Rangoon, white and black, Benleuch, yellow. She was born in India. Some Scottish children have colour Association with the names of their own and other clans, but Christian names are more often associated with colour.

The following psychochromes are those of two Scottish sisters. In their case the letter colours have no influence on the name colour.

A. M. K. 17.

Anna
Mary
Margaret
Esther /

blue
white
grey

Elizabeth yellow
Marjorie red
Catherine blue

Esther	white	Jean	greyish brown
Kathleen	blueish purple	Nora	greyish green
Patty	blue	Peter	bright red
Ray	brown	John	white
Joan	white	Charles	green
Jenny	yellow	Dudley	greyish white
Evelyn	blue	William	green
Rachel	brown	Henry	greyish green
Helen	pale blue	Cecil	palest blue
Murray	brown		

M. E. M. K. 15

Elizabeth	blue	John	white
Mary	white	Peter	yellow
Helen	yellow	Arthur	red
Anna	red	Eric	brown
Janet	brown	Edward	red
Kathleen	blue	Thomas	yellow
Catharine	white and blue	David	red
Christian	white	James	blue
Bluebell	blue	Kenneth	brown
Marjorie	yellow and brown	Harold	grey
Margaret	brown	Hugh	grey
Evelyn	green	Oliver	brown
Esther	white	Ernest	white
Doreen	green	William	yellow
Joan	white	Richard	white
Primrose	yellow	Dick	white

These sisters' psychochromes are the same only in the case of 4 names.

People are not often associated with colour except by older girls. In the case of young children the association is that of ideas, a child of 10 has colours for all the people she knows, her favourite colour blue, is given to one teacher in her school.

With /

With older subjects the association is more interesting, they describe the colours as actually visualised, especially on seeing people for the first time. M.P. 22 on first meeting people sees them outlined in colour, on entering a room full of strangers she seldom fails to have this impression. The following account is given by another coloured thinker.

"In the moment of meeting a person for the first time one often gains a swift subtle impression of personality, so elusive that it may be gone in an instant, in my case the first swift impression is accompanied by a sense of colour, if I afterwards become familiar with the person the colour fades and sometimes vanishes entirely but if we meet again after a considerable interval the colour leaps up afresh as the first occasion."

This subject's psychochromes for people only date from the age of 19 or 20, very few people she knew before then have any colours, her colours for people represent abstract qualities and have the same colours as such qualities, she has explained changes in some of her psychochromes for people by a change that has taken place in their characters.

In some cases there is a remarkable agreement about the colour associated with a given person by quite independent subjects the colour being in no way suggested by anything in the appearance or dress of the individual.

Characters /

Characters in novels have colour associations for some of the subjects. Rochester in Jane Eyre is brown to one, Lorna Doone is white and green to another, while books have frequently colour associations, such as the Pickwick Papers, blue, The Talisman, gold, Ivanhoe, green; so have poems, and even Shakespeare's Plays, the Kings of England, and characters in History. The following are those of a girl of fifteen :- Wolsey, red; Napoleon, Blue; Drake, brown, Captain Cook, blue; Catherine & Medici, Green, Columbus, Blue, George V, Red; Edward I, red, Richard I, brown; Richard II, Blue, Edward VI, brown.

Towns and countries are frequently associated with colours by children and so are their lessons and games. Dumfries is warm brown orange - Dundee, red, Edinburgh dark green to a girl of 16.

Abstract terms afford the strongest argument against Galton's views, already quoted, on the lack of agreement among seers as to their psychochromes - Truth is most frequently white or blue, sometimes white and yellow, patience grey, or colourless, not a virtue that appeals to a child, joy, blue or gold, courage bright red or blue.

Table I gives the psychochromes of girls of very different ages.

Table 1

	<u>TRUTH</u>	<u>JOY</u>	<u>PATIENCE</u>	<u>COURAGE</u>
E.C.S. 18		Sapphire blue	grey	deep royal blue
M. K. 17	white & gold	blue	grey	deep royal blue
M. B. 17	white	gold	grey	blue
M. N. 15	white	blue	grey	scarlet
E. P. 14	white	blue	green	red
J. J. 14	blue	golden	grey	scarlet
U. S. 15	white	gold	grey	red
E.N.W. 7	red	blue	colourless	red brown

In table 11 is given a further list of psychochromes of adult subjects. Truth as in the children's psychochromes is white or blue, patience is a grey blue, joy is blue, and courage a deep blue. Two of the subjects E.B. and E.I.J. are friends and often use colour terms in their letters, but have never before made any list of their psychochromes or compared the specific colours they ascribe to any one concept. The third subject A.S.C. is a complete stranger to the other two.

Table II.

	<u>E.I.J. English</u>	<u>A.S.C. Scottish</u>	<u>E.B. Scottish</u>
COURAGE	Deep dark blue	blue purple	intensely blue
PHYSICAL do.	red	crimson	dark red
NOBILITY	white	cornflower blue	white
TRUTH	white	cornflower blue	clear dark blue
HONOUR	white	cornflower blue	shimmering blue or white
LOVE	intense white		shining white
JOY /	sometimes red		

TABLE II. CONTD.

	<u>E.I.J. English</u>	<u>A. S.C. Scottish</u>	<u>E.B. Scottish</u>
JOY	blue (opaque)		speedwell blue
PEACE	soft pale blue	blue grey	shimmering grey blue or mother of pearl
FAITH	blue or white		pearly grey
HOPE	clear blue	white	light sky blue
PATIENCE	bluey grey	grey blue	soft blue grey
MERCY	white		shimmering green
KINDNESS	pale creamy tint sometimes rose or lavender		pink
SELFISHNESS	red gold		yellow ochre
UNSELFISHNESS	white		rich brownish crimson
SACRIFICE	red may be white		red: in highest degree white
GRIEF	grey		steel grey
BEAUTY	elusive but vaguely-deep blue	saxe blue	opalescent rose sometimes blue
PLEASURE	blue	pink	shimmering pink
GLORY	gold, blue, or green blue		
LAUGHTER	pure gold	scarlet broken into fragments	deep gold shot scarlet and gold

The colour associations of these subjects for abstract terms and emotions are not consistent with the view that a psychochrome is invariably and markedly individualistic.

8. SYNAESTHESIA

It is exceptional to find a child who associates colour with a large number of concepts who has not also Synaesthesia or coloured /

coloured hearing; only 27 such cases occurred in this investigation, but coloured hearing often develops later than other colour associations, only eleven subjects had synaesthesia before they had coloured concepts. In the Secondary School children the associations with sounds and music came next to those for days months and letters in order of frequency. Highland children had less synaesthesia only associating colours with a few sounds such as the song of birds, the notes of the scale, the pipes and a few of their native songs.

The colours called up by music are sometimes difficult for the subject to convey in words. E.B. 30 writes of her colours

'The colours for days, letters, and numbers are all quite simple and ordinary. But when it comes to music and abstract ideas, they become much more subtle and varied, often quite impossible to describe. There may be an infinite number of different shades in a single colour, the distinction being quite clear to the inner eye but hopeless to convey to another. I could perhaps get nearest to the truth by attaching to each the name of some flower that resembles it - e.g. for blue, lupin blue; cornflower blue, speedwell blue, forgetmenot blue, etc. etc. but even this would scarcely be exact, as some of the colours appear clear and sparkling like jewels, some transparent like /



like glass, some indefinably clouded or misted over, some burning like flames even blues and greens can be on fire; and many have a curious shimmering, or an iridescent effect which I can only compare to opals or moonstones, where one colour usually predominates in a changing glow of soft minor tints. Some of the colours suggested by music especially, while inexpressibly lovely are absolutely nameless and indescribable, being unlike any I have ever seen with my physical eyes, and there are many which I feel rather than see especially in modern Russian music, colours which I really do not believe exist in our spectrum at all. If I deliberately look for the colours (in music, people etc), they fade and even disappear or do not come at all; but if I abandon myself to the music itself and close my eyes, the colours come spontaneously and flow past, or grow and change and fade before me as when one watches a sunset. Some instruments have more colour than others; an organ has more than a piano; violins and 'cellos most of all. The most perfectly and delicately coloured piece of music that I know is Tschaikowsky's 'Slow movement in D major'".

The colours are visualised, "Sometimes like colours changing and melting into one another like a sunset sky; sometimes a single colour starting out of a neutral background, sometimes like threads in a piece of tapestry."

'They /

'They are sometimes so vivid,' writes another subject, a girl of 15, 'that the seeing becomes almost physical, so real that sometimes they startle me and then they are all gone in an instant.'

'Music has more colour than anything' says a Scottish girl of 15 'It stirs up all the colours love in me and I love myself ~~most~~ ^{more} in listening to music.' To another music calls up a perfect maze of colour but quite indescribable, while one girl says her colours never force themselves into consciousness while listening to music but give a pleasing colour picture without any real definition.

H.P. an English girl of 15 has definite shapes for the scale passages and light music, while chords and heavy orchestral music are blocks of solid colour e.g. Wagner is purple green and red. This subject had synaesthesia before she had coloured concepts. One girl said that her colours came best if she was herself playing. To many it is only music that ^{in an an} appeals which has colour.

Whole pieces of music are coloured, different composers calling up different colour associations. Chopin is described as 'misty blue with a silver haze' - Beethoven so rich and deep that you cannot see the bottom of it. A trill in a Beethoven Sonata a pale mauve becoming deep purple. To one subject Beethoven's /

Beethoven's Sonatas are brown, Chopin a watery blue, to another Chopin is misty blue and misty green. Mendelssohn's 'Spring Song' has associations with grey and yellow for one girl, pale green and lemon for another, Handel's Largo red and the Slow Movement of Beethoven's Sonata Pathetic, red.

A Welsh subject of 15 has the following colour associations with music: The key of C white, D. flat blue, D pale blue, E flat orange, E yellow, F green, G. flat dark brown, G light brown, A flat dark red, A pink, B flat grey, B grey; Soprano voices white or light yellow, Metzo soprano orange; Tenor very light yellow, Bass dark red; some of her colours for music date from her fifth year. To E.L.N. 17, C major is white, C major upwards gets gradually transparent, downwards the scales get black - her colours only come when notes are played in harmony. Two adult subjects remember having colour associations with the scales and different composers as children but have little synaesthesia now.

One family of Scottish children 3 boys and a girl have all well marked synaesthesia; one brother of 9 associates tartan with the sound of the Edinburgh cable cars; the girl at 15 has the following colours for Orchestral music: 'Flutes and oboes and clarinets are different greens, trumpets are red and yellow, violins bright whitish blue like sulphur flame and 'cellos plum coloured /

coloured; Staccato scales on the piano are silver, broken chords water coloured and other chords different sorts of blue'. For Highland children the sound of the pipes have colour associations yellow or often tartan. Some have colours for their songs 'Ho no leanan' white; 'Sound the Pibroch' blue, and Macrimmon's Lament' black.

Sounds are frequently coloured, the wind, the sound of the sea, the whistle of the mail steamer. A Highland child of 12 has these associations; the curlew's cry, grey blue, black bird's song, dark green, the thrush, light blue, the cock crowing, scarlet, a dog barking, brown; the ~~two~~ ^{two} last are not infrequent associations. For two of Flournoy's subjects red was associated with the crow of the cock. The cuckoo has often a colour association for Highland children, yellow, blue, purple, or grey.

A child of 12 whose first colour associations were with sound had the following colours for birds notes: cuckoo, purple, blackbird orange, linnet, red. Another child associated a gunshot with yellow - the cuckoo's note purple, the lark's song blue, a cow mooing blue. A dog's bark is frequently associated with brown, a robin's song with white or silver, the ticking of a clock with grey, the wind howling grey or purple. Flournoy found red the most frequent association with sound, but he had no identical associations with sound except two each for the cock's crow /

crow, red, a cat's miau yellow, a flute blue, and the whistle of a train red. Blue or grey for a cat's miau and yellow for a whistle is an association given by Highland children, while yellow, not red, occurs more than any other association with sounds. The following are frequently yellow; harsh and shrill voices, creaking noises, footsteps, a rap, whistling, a gun shot, a door banging; many birds songs are yellow and brown, and footsteps at night yellow and black.

Voices sometimes call up colours; the priest's voice has a colour association for one Highland child, fairies' voices for another. Orange, mauve and pure purple are the colours called up by voices to a Scottish subject of 22. Here too coloured thinkers sometimes agree quite spontaneously on certain colours; one subject related that, listening to a choir of boys practising some Anthem, she drew a friend's attention to a certain amethyst voice which the friend instantly singled out ~~and~~ afterwards identified^{him} the singer.

Cases where vowel sounds are associated with colour have already been discussed in the colours of letters. Colour associations with sounds and music are sometimes regarded as strong evidences of the physiological origin of Chromaesthesia. Young suggests, owing to a lack of differentiation, the two functions of sight and learning being to some extent ~~proved~~^{fused}. Langfield however /

however rules out the physiological explanation in cases where the associations are mainly the result of the experiences of the individual called up through the mediation of the feeling tone.*

In the cases reported on in this investigation, it is not all sound or all music that has colours, but those that make a special appeal to the subject - music to several coloured thinkers is colourless unless it fulfils that condition.

One Highland subject of 18 only sees colours for slow mysterious music, other music calls up not colour but sensation, such as the taste of sour things which is associated with music in a minor key, an association so vivid that the sensation of sourness is actually experienced.

Psy. Bulletin 11. 1914 p. 110 A Case of Chromaesthesia

PSYCHOCROMAESTHESIA IN MEMBERS OF THE SAME FAMILY.

The marked tendency for all the members of a family to think in colour has already been pointed out - the following cases illustrate this tendency in 4 families; it was not possible to obtain full records except of the younger generation.

1. The I. family, Highland Scottish. Three sisters aged 13, 16, 18, the mother has also colour associations.

E.R.I., 13, had colours for the months, for six days, and for some letters, figures, and music before she was eleven. She could not remember the beginning of her psychochromes, but the months were the first to acquire colour. The colours, which are very bright, are always visualised, and never difficult to recall, fatigue makes no difference. This child did not know that her two older sisters had colour associations, even when retested in 1923. They had never discussed them. She has both number and alphabet forms.

Psychochromes for months, 11 years.

Jan.	white	May.	pale green, pink & white	Sep.	orange
Feb.	grey	June	pink	Oct.	grey
Mar.	grey	July	pink	Nov.	grey
April	pale green	Aug.	yellow	Dec.	red.

At 13 the following changes had taken place.

Feb., olive, May, pale pink, July, blue, Oct., brown, while
June /

June was rose instead of pink, and September deep yellow instead of orange; she knew her colours had changed a little.

Psychochromes for days, 11 years.

Mon.	grey	Wed.	green	Sat.	red
Tue.	mauve	Fri.	blue	Sun.	red

At 13 Thursday had become orange. Friday had changed from blue to mauve, Saturday from red to lavender.

Letters, 11 years.

A. white, B. blue, C. red.

At 13 years A. had become green and the rest of the vowels coloured. e yellow, i red, o blue, u orange.

Figures, 11 years.

9. brown, 4. blue, 7. blue.

Music; 11 years.

Sad music, pale mauve, bright music, blue, march tunes, red.

At 13 these were all the same, while some smells and noises had acquired colours, and the following abstract concepts: Truth blue, Patience lavender, Joy orange, Courage green, Hope mauve.

112 113 114 115 116 117 118 119 120.
121
100

A B c d E F G
h i j k l m n o p q r s t u v
W X Y Z.

30
29
28
27
26
25
24
23
22
21
20

Jan Feb. March April May
June
July Aug. Sep. Oct. Nov. Dec.

12 13 14 15 16 17 18 19

10
9
8
7
6
5
4
3
2
1

E.R.I. 11 years. Test 1.
13 - - 2.

The second sister J. I. was tested at 15 and at 16. She has had all these coloured concepts ever since a very early childhood. The colours do not change. The colours are visualised and are never difficult to recall.

Psychochromes for days.

Mon.	blue grey	Thurs.	brown
Tue.	blue	Fri.	pink
Wed.	orange red	Sat.	black
Sunday is yellow.			

Psychochromes for months.

Jan.	red brown	April	pale pink and blue	July	red pink	Oct.	brown & yellow.
Feb.	brown	May	pink	Aug.	red yellow low	Nov.	grey
Mar.	black	June	bright pink	Sep.	yellow	Dec.	white & blue grey

Psychochromes for letters

A white, B blue, C yellow, D grey, E greenish blue, F pinkish red, G red, H black blue, I blue, J pink, K red, L grey, M red brown, N dark brown, O white, P grey, Q pink, R yellow (orange), S yellow, T green, U grey blue, V yellow, W dark purple, X orange gold, Y grey striped, Z sparkling stripes of gold and yellow.

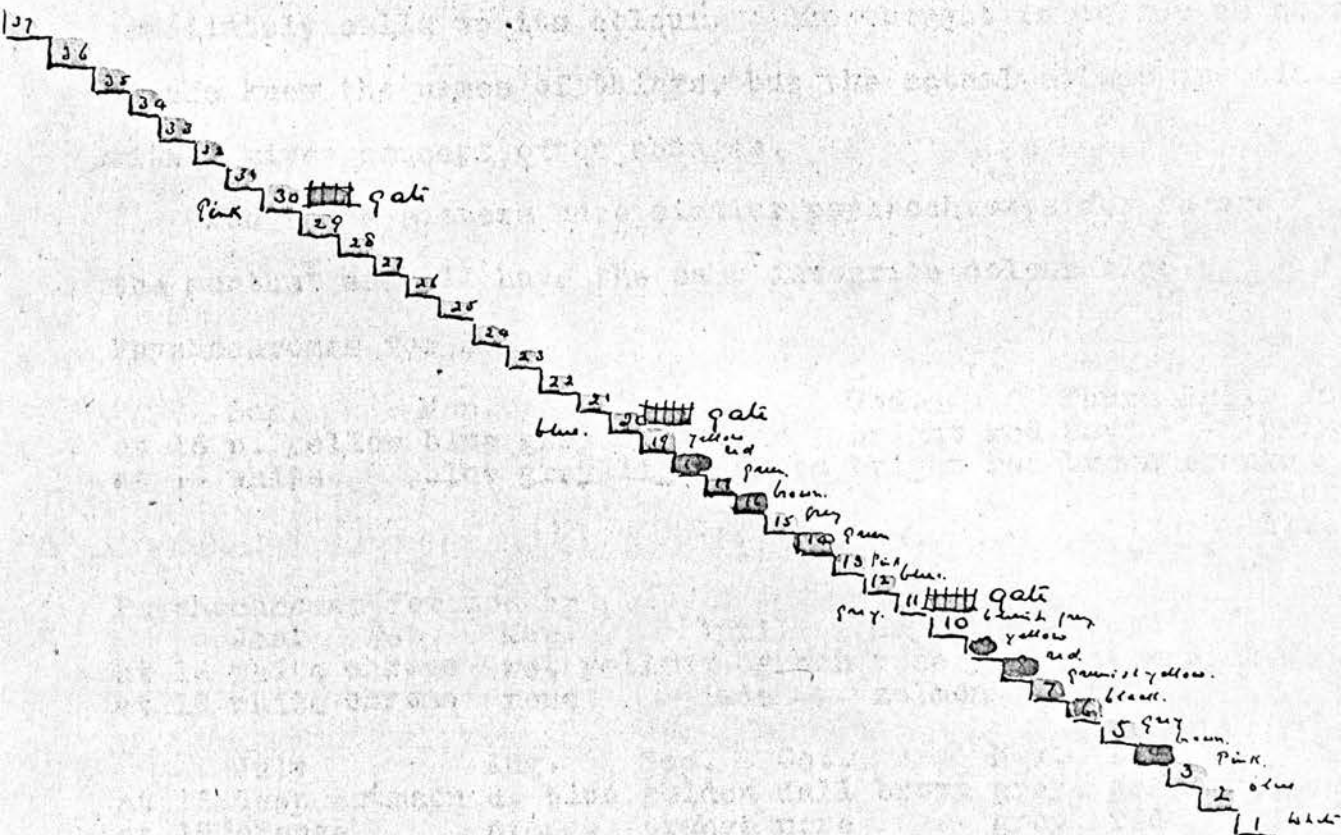
Psychochromes for figures.

1 white, 2 blue, 3 pink, 4 brown, 5 grey, 6 black, 7 greenish yellow, 8 red, 9 yellow, 10 blueish grey, 11 grey, 12 blue, 13 pink, 14 green, 15 grey, 16 brown, 17 green, 18 red, 19 yellow, 20 blue, 30 pink, 40 brown, 50 grey, 60 black, 70 green, 80 red, 90 yellow, 100 white.

All sounds call up colour, also music - the colour for high sounds is yellow and light colours, for low sounds dark colour.

The coloured number form given below was drawn in 1921, and in /

in 1922 there was no change of any kind. She uses her form, and it usually becomes clearer when recalled; it begins in front of her eyes and gets larger until the numbers are too big to realise. The form never changes, and dates from the time she learnt to count, but she can give no explanation of its origin.



The third sister I.L.M.I. 18, has no number forms and fewer colour associations, she has never had colours for letters and figures, but sensations, names, sounds and music are always coloured, especially music. She visualises all her colours, seeing them whenever the concept is mentioned. The name of a day immediately calls up its colour. She thought in colour as soon as she knew the names of things, but the actual colour associated with a given concept often changes.

The three sisters have similar psychochromes for several of the months^x and all have the same favourite colour blue.

Psychochromes for days.

	Sun.	Mon.	Tue.	Wed.	Thurs	Fri.	Sat.
at 16 p.	yellow	blue	grey	p. golden	bright red	navy	- primrose
at 18	white	blue	grey	light green	bright red	brown	orange
							ricket's blue

Psychochromes for months

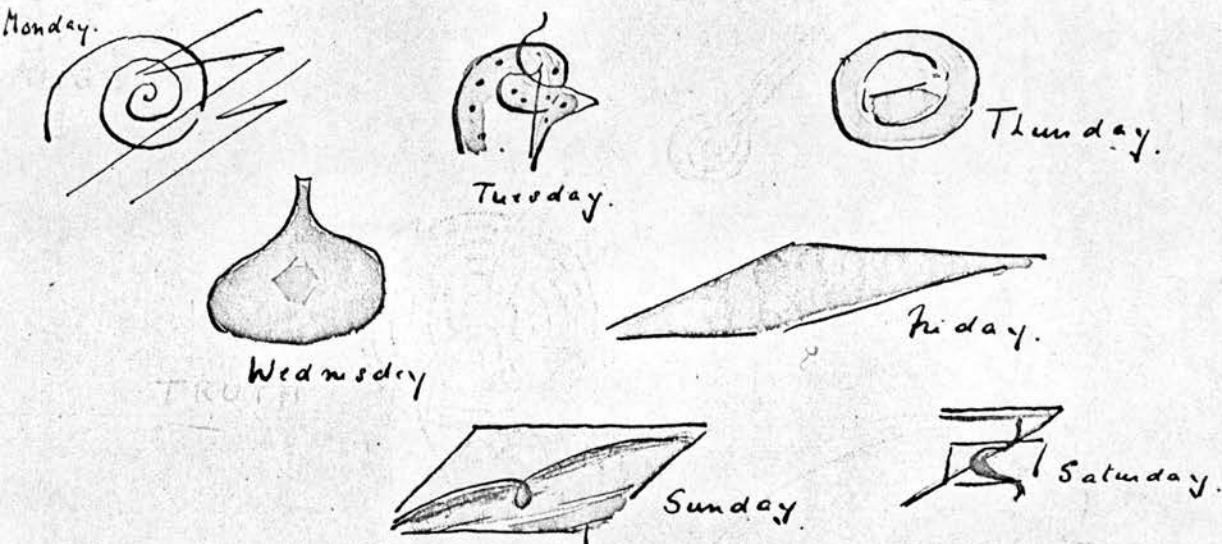
	Jan.	Feb.	Mar.	April	May	June
at 16	white	chrome	wet	yellowp.	green	rose
at 18	white	chrome	none	jade	salmon	pink
						dark pink
						pink
	July	Aug.	Sep.	Oct.	Nov.	Dec.
at 16	deep	crimson	d. blue	golden	dull	brown
at 18	orange		orange	orange	none	grey
						grey and red
						red

2. The R. family, Roumanian, Buckarest.

Helen I. R. 19, J. R. 15, (sisters) Noell R. 14, cousin.

The youngest sister filled up a questionnaire when at school at Oxford in 1921, she was then 13. She sent a further list of of her coloured concepts from Buckarest in the present year with those of her sister and a cousin - whose mother is also a coloured thinker/

according to the mood of the seer.



Psychochromes for months.

Jan.	light grey, orange	July	green
Feb.	orange	Aug.	blue and mauve
Mar.	yellow and pink	Sep.	mauve
April	blue and pink	Oct.	yellow and orange
May	saxe blue	Dec.	dark grey & burnt sienna
June	green		

Psychochromes for letters

A. light blue, B. violet, C. J. and T. Z. bright yellow, D. brick red, P. mauve, F. deep blue, G. W. pale green, H. dark green, Q. U. Y. orange, R. prussian blue, S. fawn colour, M. & V. burnt sienna, N. X. pale grey.

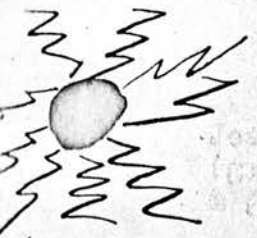
The vowels

A. deep & pale blue, E. mauve, I. dark rust colour with yellow flashes, O. orange with green, U. mauve with tinges of orange.

Psychochromes for Books, Names & Towns.

Carlyle's Sartor Resartus, Orange, Hugh Walpole's Fortitude, Green, Jane and Elizabeth, blue, Richard, Helen, George, Jean /

9 of Apr 85



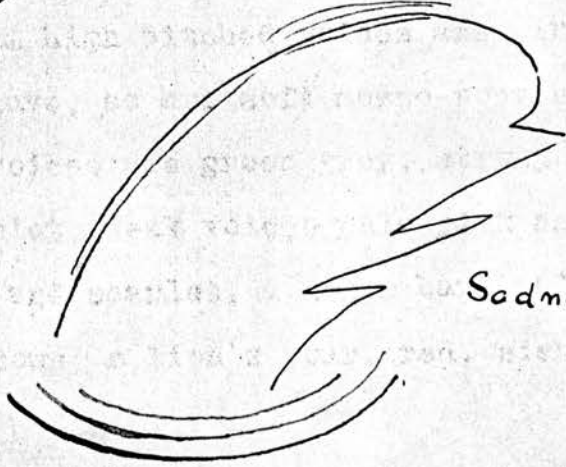
ANGER.



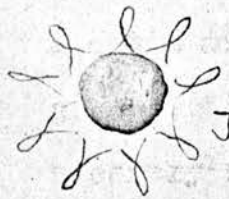
HOPE.



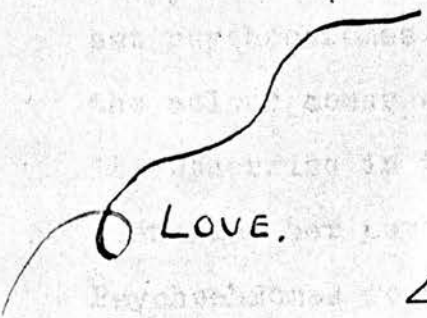
TRUTH.



Sadness.



Joy.



LOVE.



SHYNESS.



SIN.

H. I. R. 19. Roumanian.

Jean, green, Lydia, Mary, Maud, mauve, London, orange, (grey, green, blue,) Bucharest, burnt sienna, Oxford, blue & green.

Psychochromes for abstract terms and emotions.

Anger, red background, black lightnings edged with yellow. Sadness, green grey black and pale blue with prussian blue and mauve. Hope, Shyness, Joy, Truth, Sin, Love, are all coloured in a more or less complex fashion and visualised in the forms given below.

Annoyance is pale yellow with grey and red lines.

H. I. R. has also colour associations with voices and a few animals' cries. Shrill high pitched voices are pink and yellow, deep voices blue and mauve, so are soft mezzo-soprano and soprano voices. Hoarse voices are green grey, strong pleasant voices deep blue or violet, weak voices pale pink and yellow. A cat's miau is yellow and scarlet, a dog's bark pale blue or green. A cow's moo brown, a lion's roar, red, sienna, orange, a canary's song blue.

J. R. 15, associated colours with names before she was 8 years old. The names that first acquired colours are still her brightest psychochromes. Names coloured later are seen less vividly, the colour comes quite spontaneously if she is not thinking about it, otherwise in thinking of her colour associations she does not visualise her psychochromes.

Psychochromes for the days and months.

These are the same at 13 and at 15, with changes in the shade, Friday, dark grey and green becoming moss green and Tuesday and Sunday /

Sunday described as dark colours, becoming dark grey blue, but three months that had colour at 13, May, June, and July, are colourless. December is now white.

Mon.	white	Thurs.	yellow
Tue.	dark colours	Fri.	dark grey or green
Wed.	brownish orange	Sat.	red
	Sun.		dark colour.

Jan.	dark	May	black	Sep.	brownish yellow
Feb.	yellow	June	greenish blue	Oct.	yellow, dark
Mar.	purple	July	orange	Nov.	brown
Apr.	blue	Aug.	green	Dec.	grey

Psychochromes for Letters.

	A.	B.	C.	D.	E.	F.	
at 13	blue	red	yellow	dark grey	yellow	reddish yellow	
at 15	grey	red	yellow	grey	blue	reddish yellow	
	blue					yellow	
	G.	H.	I.	J.	K.	L.	M.
at 13	green	p. yellow	red	dark blue	brown	light white	dark brown
at 15	d. blue	brown	red	-	burnt sienna	pink	brown
		yellow					
	N.	O.	P.	Q.	R.	S.	T.
at 13	dark brown	white	yellow	-	dark	red	green
at 15	brown	black	yellow	orange	black	red	green
	U.	V.	W.	X.	Y.	Z.	
at 13	dark	green	-	-	light	dark	
at 15	black	green	-	-	-	-	

At 15, in addition to the colours for days, months, names, the alphabet, J. R. has acquired colours for some sounds, music, numbers, and abstract terms - Courage is red, Joy yellow or pink, The odd numbers are red, yellow or brown, the even numbers green grey or blue. In music A is blue, B red, C yellow, D grey, E brown /

E brown yellow, F yellow, G green, flats are brown and yellow, Very mellow sharps have no colours. To J. R. it is not the sound but the name of the notes that are associated with colour, and her colours are the same as for the letters of the alphabet. Noëlle R. 14 whose mother also thinks in colour, has psychochromes for 6 days and 2 months, the vowels, numbers, some tastes and some music. Her colours have changed since she was six, but now remain the same, they are generally faint but always visualised. Psychochromes for months and days.

June, brick, August brown and red.

Monday, grey,	Friday, grey and blue,
Tuesday brown,	Saturday -
Wed., blue,	Sunday, brown
Thurs. blue.	

Psychochromes for the vowels.

A blue, E yellow, I white, O black, U brown.

Numbers are coloured up to 100.

1 2 grey, 3 4 brown & blue, 5 6 7 8 9 yellow, 20 blue, 30 pale green, 40 blue, 50 yellow, 60 70 80 90 grey.

3. The De.S.S. Family, Scottish, two sisters of 16 and 20 and one brother of 13. The father, and the grandmother and great grandmother on the mother's side, all thought in colour, the grandmother has the second sight which was possessed by the great grandmother to an unusual degree. All the family are marvellously gifted ^{musically} mentally, and both the sisters have unusual psychical powers of clairvoyance and automatic writing.

Bruce /

Bruce L. S. 13. 11 months has had colour associations since the age of 4, another brother also thinks in colour. He first associated colour with the days and the colours have not changed; the colours are visualised and are often used for remembering things; being tired never makes any difference. B. S. has colour for some names, but not for sounds or voices. The numbers are coloured up to 9.

1 black, 2 ^{green} black, 3 white, 4 black, 6 yellow, 7 dark green, 8 red, 9 white.

The days.

Monday	black,	Friday	black
Tuesday	red	Saturday	red
Wednesday	blue	Sunday	red
Thursday	green		

The months.

Jan.	red	July	red
Feb.	black	Aug.	black
March	white	Sep.	red
April	black	Oct.	white
May	green	Nov.	yellow
June	red	Dec.	white

Psychochromes for the vowels.

A black, E white, I white, O white, U white.

Numbers are visualised as follows, but the form is never used.

etc.
10 —
9 — white
8 — red
7 — dark green
6 — yellow
5 — red
4 — black
3 — white
2 — green
1 — Black.

The form of M. de S. S. is given below, it is quite unlike that of her brother; the father has also a number form.

①6. 15 14 = 13 ← 12 ← 11. 10. 9. 8. 7. 6. 5. 4. 3 2 1
green.

M. de S. S. Scottish. 18 years.

^{16.}
M. de S. S., associated colour with music as a very young child, since then the following concepts have acquired colour: Days, months, letters, books, places, names, and abstract terms. The concepts except those of the days and months are coloured in groups. M and Z are bright blue, all other letters green. 16 is ^{dark} green, all other numbers black. Names are green or white, all boys' names are brown. The frequency of green is explained by the favourite colour. The psychochromes are affected by fatigue, losing their colours.

Psychochromes for days.

Mon.	Black	Thurs.	black
Tue.	grey	Friday	brown
Wed.	green	Satur.	blue between 3 lines pink.

Psychochromes for months.

Jan.	white	April	gold	July	sky blue	Oct.	purple
Feb.	grey	May	pink	Aug.	yellow	Nov.	-
March	white	June	sky blue	Sep.	-	Dec.	a yellow star.

The /

The elder sister J. A. 20, has associated colours with names and people since about the age of ten.. The colours have remained the same. She has ^{as} ~~synesthetic~~ ^{is} for music, not for sound. The colours often help her to remember certain passages in music, in opera especially. The colours are visualised, usually very clear and well defined; during fatigue, however, the colour becomes muddy. G. A. has colours for voices, but is unable to name the colours.^{x'} Things that are disliked are grey and brown, pleasant smells and tastes are yellow. Colours for people depend on her feeling for them. Abstract terms such as Truth and Hope are pure white with yellow across. Only favourite books have colour associations.

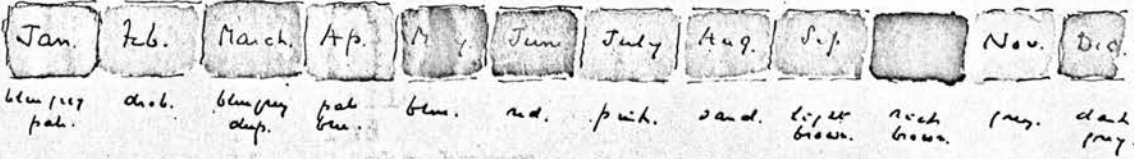
The days of the week and numbers have no psychochromes and only the months from January to April, which are shades of subdued misty red. The alphabet is a series of discordant, jarring, bright, unnamed colours.^{x'}

4. The H. family, Scottish-English, aged 24, 22, 21. Both parents have colour associations so the whole family thinks in colour. All three sisters have number and month forms.

M. S. H. 24, has thought in colour always. She remembers thinking of her age as red when she was four years old, and ^{red-four} is still her psychochrome ~~for red~~. Her colours are very clear, sometimes luminous, almost phosphorescent, always visualised, and become /

Not in the spectrum.

become much more vivid under the influence of fatigue. The first impression of books, places, people and character is always accompanied by a feeling of colour. The days, months, and centuries are visualised in a row, the subject standing on which ever day or month it is, looking backward or forward over the adjacent weeks and months.



Psychochromes for Letters.

A. blue, B. yellow, C. green, D. chocolate, G. and H. green, L. and M. duol red, N. brownish red, O. yellow, R. brown, S. green.

Psychochromes for Abstract Terms and Emotion.

Joy yellow, Courage blue, Patience green, Hope yellow, vulgarity, a horrid dull purple.

Psychochromes /

Psychochromes for places, historical characters:-

London red brown
 York pale orange
 Byron copper
 Abraham red
 Henry VIII. green, etc.

Numbers are coloured and visualised as below - those above 12
 taking their colour from the unit part of them

1 -
 2 blue
 3 yellow
 4 red
 5 brown, light
 6 slate
 7 greenish yellow
 8 green
 9 orange
 10 yellow
 11 dull brown
 12 blue grey
 13 yellow
 14 red
 15 light brown
 16 slate
 17 greenish yellow
 18 green
 19 orange

80 etc ↑

70

60

50

40

30

20

- 12
- 13
- 14
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- 18
- 19
- 20
- 21
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- 90
- 91
- 92
- 93
- 94
- 95
- 96
- 97
- 98
- 99
- 100

This number form becomes clearer if recalled. Its origin is traced to learning to count in French from a blackboard, the list of numbers being arranged as they are in this number form; it dates from first learning to count. ^{and} 8 is always used, the numbers never move from their places. In sums or multiplication tables she sees the answer in its proper place in the form after she has jumped, as it were, from number to number. The form is very large - big enough to walk on and can only be /

be diminished by a great effort of concentration, otherwise it becomes very big and vague.

The second sister, A.H. 22, has only colour association with numbers and occasionally, not often, with music. Her numbers are arranged in calendar form; light electric blue figures on a deep purple or red brown ground - the blue is luminous. The figures are not clear beyond 21, though the form stretches out infinitely, and except the beginning can only be called up by a special effort of will; it is about 12 inches in height, ^{12 cm} immediately in front of the eyes. The length depends on the required number; it is used in adding and subtracting small sums. *see yellow,*

1	11	21	31	41	51	61	71	81	- - -
2	12	22	32						
3	13	23	33						
4	14	24	34						
5	15	25	35						
6	16	26	36						
7	17	27	37						
8	18	28	38						
9	19	29	39						
10	20	30	40						



(a)



(b)

(a) colour of numbers only the blue is luminous
(b) nearest pink colour of background.

M.W.H. 21. The youngest sister has colour association with ^{some} the same days, months, letters, places and authors and with some abstract terms. Her ^{colour} ~~psychochrome~~ for music is misty blue - the days of the week were the first to be coloured at the age of 6; these colours are used by the subject in recalling the days. The colours are visualised and vary in density, but tiredness has no effect on them, unlike those of the eldest sister.

The colours are as follows:-
 a. blue,
 e. green,
 o. orange yellow,
 j. blue,
 t. blue
 s. blue.

Psychochromes for Places, Names etc.

Alaska - bright yellow,

India - brown,

England,- green,

Wales - blue,

China - deep yellow,

Japan - pink,

Charles I. pale blue,

Keats /

Keats - green,

Coleridge - peacock blue,

Wordsworth - brown.

Psychochromes for Abstract Terms:-

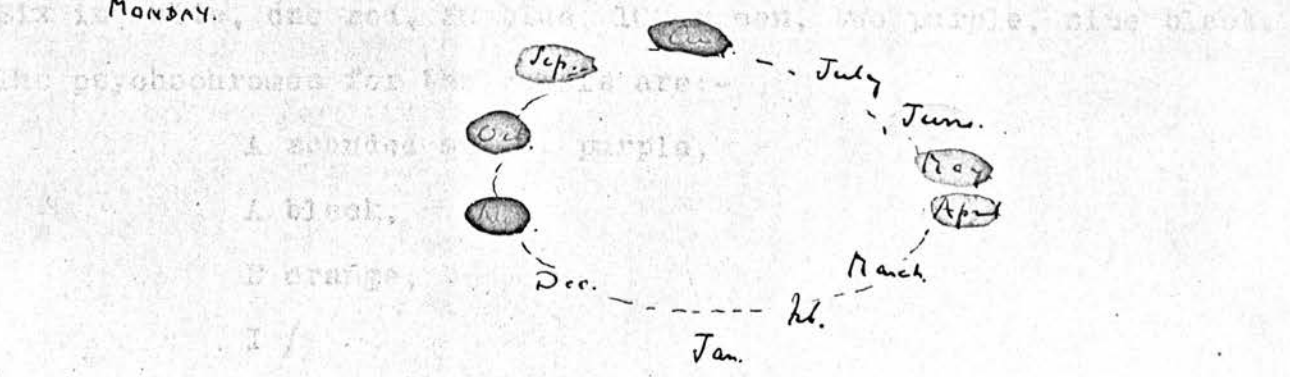
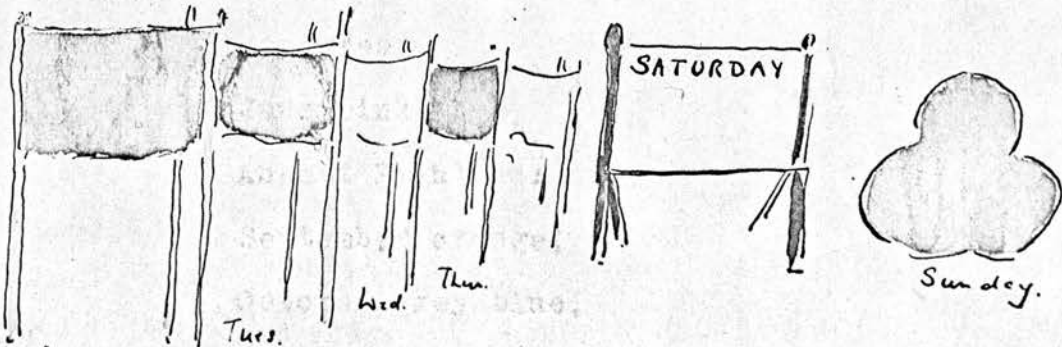
Truth - deep blue,

Joy - pale pink,

Hope - pale yellow,

Patience - blue.

Numbers have lost their colour associations but the days and months are visualised in the form given below. Blue the subject's favourite colour is one of the most frequent associations with her concepts.



THE DEVELOPMENT OF PSYCHOCROMAESTHERIA WITH AGE.

The development of the tendency to associate colours with concepts can ^{be} but be shown by a detailed account of the psychochromes of subjects of very different ages, and the example given in the following pages are representations ^{of} of coloured thinkers at each age from three to ~~thirty~~ ^{twenty-two} ^x.

D.B.C. Scottish, aged 6 has colour for ⁴ days of the week, 9 months, the vowels, 6 numbers, associates colour with two sounds, the sighing of the wind - black, the mewing of a cat, white.

January is yellow,

February dark grey,

March black,

April orange,

May green,

June pink,

August light purple,

September orange,

October grey blue,

Six in white, one red, 20 blue, 100 green, two purple, nine black.

The psychochromes for the vowels are:-

A sounded as ah. purple,

A black,

E orange,

I /

^x
Note. Elementary School children are marked thus x.

I nil.

O pink,

U blue.

All vowels are red in his primer.

The boy is the youngest of five children, 4 boys and a girl who all have colour associations with sounds, and a number of coloured concepts, and he visualises numbers in a horizontal line.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.

D.B.C. 6 years.

E.N.W. 7 years - Scottish Lowland.

This child is an exception to the rule that coloured thinking is generally found in members of the same family for none of her three older sisters, nor her parents have any coloured concepts. She had colours for the days of the week in India before the age of three, and at five years had in addition colours for all the numbers up to 100. Her early colour associations have changed very little:-

Monday - white

Tuesday - dark blue

Wednesday - bright green

Thursday /

Thursday - crimson

Friday - scarlet

Saturday - bright green

Sunday - black.

- | | |
|---------------|---------------|
| 1. white | 15. grey |
| 2. dark blue | 16. blue |
| 3. green | 17. green |
| 4. red | 18. red |
| 5. yellow | 19. pale blue |
| 6. dark blue | 20. brown |
| 7. green | 30. green |
| 8. red | 40. pink |
| 9. light blue | 50. grey |
| 10. yellow | 60. blue |
| 11. red | 70. green |
| 12. crimson | 80. red |
| 13. green | 90. pale blue |
| 14. pink. | 100. black. |

Friday is, at 7 years new brown, 8 brown, 40 red, 50 yellow, 80 brown, the other colours are unchanged.

At 6½ years she had acquired the following additional Psychochromes.

Prayers 1st one black

Through the long night watches - yellow

Our Father which art in Heaven - red

God bless the poor lepers - green.

Hymns

I to the hills - dark blue

The Lord's my Shepherd - dark blue

Gentle Jesus meek and mild - yellow.

Names /

Names.

- Helen - red (sister)
- Lilian - pink (sister)
- Christian - green (sister)
- Noel - yellow, her own name.
- Elsie - colourless " "
- Kate - brown
- Mother - blue
- Grannie - black
- Mrs Chattwood - brown
- Uncle Dan - Brown
- Miss Chattwood - brown
- Margaret Henderson - red
- William's shop - blue

Months.

- January - light blue
- February - a sort of brown and yellow
- June - dark blue
- July - light blue
- December - red

Days

- Sunday - black
- Monday - white
- Tuesday /

a. green
 b. yellow
 c. blue
 d. red
 e. black
 f. brown
 g. pink
 h. blue
 i. yellow
 j. light blue

The vowels were colourless in her own name
 The names of the three
 colourless in her own name
 by the yellow b.
 when tested as
 colourless

a. green
 b. brown
 c. black
 d. white
 e. blue

as well as the consonants that were colourless at
 5 years - B. pink,
 March /

by the initial
 as B. is
 is coloured
 the vowels had acquired

- Tuesday - dark blue
 Wednesday - green
 Thursday - a sort of red
 Friday - brown
 Saturday - green.

Letters

- | | |
|---------------|----------|
| c. green | r. brown |
| f. yellow | s. green |
| g. blue | t. brown |
| h. red | v. brown |
| j. black | w. brown |
| k. brown | x. black |
| l. pink | y. green |
| m. blue | z. black |
| n. yellow | |
| p. light blue | |

The vowels were colourless and the letters A. B. D. and Q. The names of the three sisters are coloured by the initial

letter; for her own name Elsie she has no psychochrome as E. is colourless in her alphabet. Her second name Noel is coloured by the yellow N.

When tested again at the age of 7 the vowels had acquired colour:-

- | |
|----------|
| a. green |
| e. brown |
| i. black |
| o. white |
| u. blue, |

as well as the consonants and months that were colourless at 6 years - B. pink, D. yellow, Q. sort of bluey;

March /

March - brown

April - green

May - sort of grey

August brown

September - yellow

October - white

November - sort of grey brown.

The child's colour vocabulary was not sufficiently developed to describe the colours exactly as she thought of them.

Singing up high - blue; singing low - black.

Lessons too had acquired colours.

Sums - blue Reading - green brown

writing - brown Poetry brown

Multiplication table - the word table brown.

Drill - yellow.

This child, now 7, has then a very wide range of coloured concepts but little synesthesia - only high and low notes in music, no sounds call up colour. She does not visualise number in any form.

Places also acquired colour between the age of 6 and 7.

Sterling - yellow and brown. Newport - blue

Salford green Manchester - black

Rangoon - white and brown Benleigh - yellow.

All /

All places she had lived or stayed in; a few emotions and virtues were coloured at the same age.

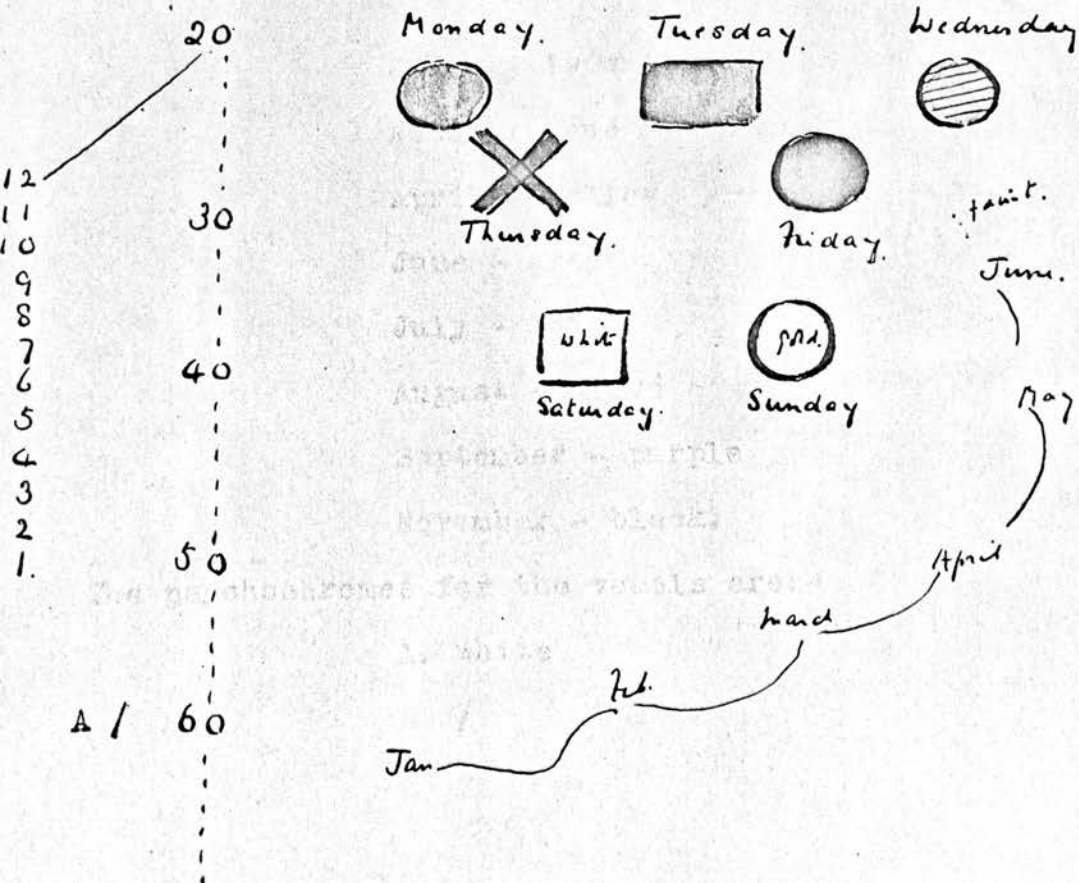
Joy - blue Courage sort of reddy brown

Truth - red Patience she says has no colour in her thoughts.

It is not possible to tell in the case of so young a child how far the colours are visualised, how far only thought. She never learns her lessons, like some of the older children, in colour.

E.P. Scottish - 9 years has colours for the days and for the months but the colours for the latter are too faint to describe.

She visualises the days and numbers as follows



A younger sister thinks in colour and the father had some coloured concepts.

M.C.M. 10^x . This is a gaelic speaking child from the Outer Hebrides. She has colours for the days, nine months, the vowels and some numbers:-

Dea - bright Sunday is yellow
 Fo - green Monday - green
 Doh - pink Tuesday red
 Sall - red Wednesday - white
 Feh - pale yellow Thursday - blue
 Mo - purple Friday brown
 Ray - navy blue Saturday - black.

Dea - grey January is white
 Numbers are given
 February and March grey
 April - yellow
 June - grey
 July - red
 August - brown
 September - purple
 November - black.

The psychochromes for the vowels are:-

A. white

E. /

E. green
 I. blue
 O. black
 U. green.

Jane MacLean's voice is white.

Doh. is bright yellow.

Te - green Saturday - navy blue

Lah - pink

January is white

Soh - red

February - grey

Fah - pale yellow

March - black

Me - purple

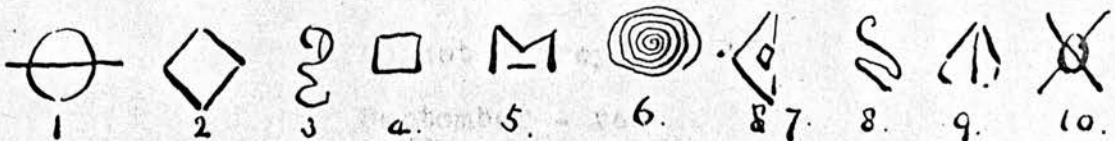
April - green

Ray - navy blue

May - blue

Doh - grey

Numbers are visualised as symbols.



October - blue
 November - green
 December - black

M. A.C. 10 years.

^x
 C. McL. 10. Another Gaelic speaking child from Ness Lewis,
 has the following colour associations - For her too

Sunday /

Sunday is white

Monday - black

Tuesday - brown

Wednesday - red

Thursday - green

Friday - red

Saturday - saxe blue

January is white

February - grey

March - black

April - green

May - blue

June - yellow

July - red

August - grey

September - red

October - blue

November - green

December - black

Some letters have colour

G. is pink

E. blue

F. purple

G. - grey - j. white - k. yellow

H. green

A cat's miou is red, a whisper is yellow, crying is purple, the sound /

sound of cart wheels blue.

These psychochromes for days and months were exactly the same, except those of ^{two} months, when the test was repeated after 3 months but the psychochromes for the letters had many changes.

Numbers are visualised as follows:-

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20. |

A.C. 11. ^x from Lionel Lewis has colour for some days months and sounds and visualises figures in a coloured number form.

^{or}
His colour for

Sunday is white,

Monday - red,

Tuesday - blue

Wednesday - purple

Friday - black

Saturday - green

January is white

February - dark blue

March - yellow

April - white

June - pink

September /

September - grey

Fairies voices are pink,
the wind is saxe blue

Lunan voices grey
the rain white

A. is white

C. black

D. blue
r

G. brown
O.W.

P. green or red

N. grey

- 1 -
- 2 white
- 3 red.
- 4 green.
- 5 white
- 6 brown.
- 7 green.
8. colourless.
- 9 grey.
- 10 red.
- 11 colourless.
12. Saxe blue
- 13 colourless
- 14 "
- 15 green
- 16 blue.
- 17 colourless.
- 18 pink.
19. Colourless.
20. Colourless.

A.C. 11. Lewis.

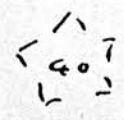


N. G. 11 years. (Boy)

C. H. D. 13 years. (Girl)



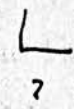
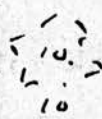
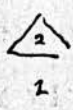
N. A. 12 years. (Boy)



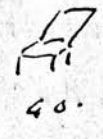
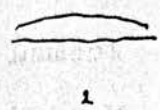
A. H. L. 12. Boy.



J. J. girl. 13.



J. M. 11 years.



M. J. 14 years. girl.

G. fawn H. brown I purple J. white
 M. pink N. green O. fawn
 Q. blacky blue. U. brown yellow z grey.

Sunday is pink

Monday blue

Tuesday grey

Wednesday red

Thursday black

Friday white

Saturday brown

January is yellow

February green

March red

April brown

May white

June white

July blue

August pink

September purple

October fawn

November grey

December navy blue.

Nine figures are coloured - one is orange, two purple, three blue, four green, five white, six grey, seven red, 8 yellow nine navy blue.

London is thought of as yellow - Glasgow as red.

Mary is white, Alice red.

Pity is yellow; Joy is pink; Happiness is red. The taste of butter is blue, sweet things taste white.

K. M. McD.* has also some synaesthesia, voices are coloured white, blue, yellow, orange and brown. The sound of the wind is grey - a whistle red - the noise of the sea white; a cart wheel blue. The moo of a cow is red; a horse neighing green; the lark's song blue and a thrush's red.

C. McN.*, Outer Hebrides 12. has these psychochromes

Monday yellow

Tuesday grey

Wednesday red

Thursday white

Friday blue,

Saturday purple

Saturday pink

January is brown

February black

March mauve

April slate colour

May light blue

June /

June orange

July dark green

August navy

September tartan

October dark brown

November maroon

December tan.

| | | | |
|-------------------|----------|----------------|-----------|
| a is red | b. black | c. light green | d. yellow |
| e crimson & blue | | g. grey | h. mauve |
| i indigo | | j purple | k. green |
| l. pink | | q pink | r. tawny |
| s. heliotrope and | | t tan | u. red |
| v. violet | | w yellow | x orange |
| y. purple | | z black | |

1 is black, 2 green. 3 tawny, 4 indigo, 5 white, 6 yellow
7 red, 8 crimson, 9 green.

Pity is red; Joy is white, sorrow black.

Some tastes have colour, cake is yellow.

Voices are orange - the sea gull's cry yellow; a stomchat's
blue. The chanter is yellow - bagpipes red, the flute pink,
wheels of a cart brown, of a gig grey

10. S. Scottish Edinburgh, 11. visualises days and months in

black or white in a coloured ground not actually coloured them-
selves /

themselves. This child's father has coloured concepts and for the days except two they are the same as the child's (~~on p. 93~~). ^{Her} His colours are

Monday black

Tuesday slate blue

Wednesday vandyke brown

Thursday ultramarine in the morning
sky blue in the afternoon - later
black

Friday fire coloured.

^{at} Saturday shell pink. ^{with}

January is white

February grey

May pale green

June pale pink

July rose pink

August cinamon

September light reddish brown

October greyish brown

November nigger brown

December black or white

She has no synaesthesia, but visualises numbers which ~~are~~ appear walking along the road she lives in, till at 100 they/

E.M.C. Scottish 12 has the psychochromes for various concepts and for sensations. She visualises her colours which never change except to become darker or paler. She first thought in colour about the age of 8 or 9, some of her associations she traces to things she has seen or experienced -

Roses in June and July give her the psychochromes for ^{these} other months and the sameness of a school in January and February make the colour of those months grey and black, while the lessons and doings of a day make its colour. Holidays and holiday months are bright colours - Fatigue makes all colours pale, and sometimes grey.

Sounds were first associated with colour, but the letters were learnt from a coloured alphabet and she still thinks of them in those colours. The vowel colours are A. red; e yellow; i green, o yellow; u brown.

Monday is very dark grey or black with a kind of silver

Tuesday grey blue

Wednesday pink brown

Thursday brown or purple

Friday pink fairly dark

Saturday bright red

Sunday green and white, in summer silver or gold.

January is grey with a little white;

February /

February black;

March grey with a very little
pale yellow or pink.

April green with gold

May cream and gold

June pink

July red

August blue

September pale green or gold

October golden brown

November grey

December dark green and red.

Places, names and some books suggest colour also names:-

Faith and Patience very dull dark brown,

Nora purple; Edith dull red; Ada grey; Peggy red;

Meg gold or yellow; Jean grey; Winifred pale grey;

David darker grey; Jack pale brown; Jim rosy red and

May red.

Surnames are generally grey or brown, the names of colours
call up their own colour.

Truth is gold; patience gold; joy red; courage blue.

Smell has colour, yellow or pale brown; agreeable tasks^t are
a golden brown or yellow, disagreeable tasks^t a dirty black

or /

or brown.

Voices have colour; sad voices white, happy voices pink, angry voices black. Music is gold brown or a dreamy silver. Numbers are visualised as shown below. The child's father has a number form. The form has grown in size and is not unchangeable - it becomes indistinct when she tries to draw it and it is very seldom of any use in mathematics - it dates from about her 8th year.

100

golden.

100

100

100

20

17

10 11 12

12 3 4 5 6 7 8 9

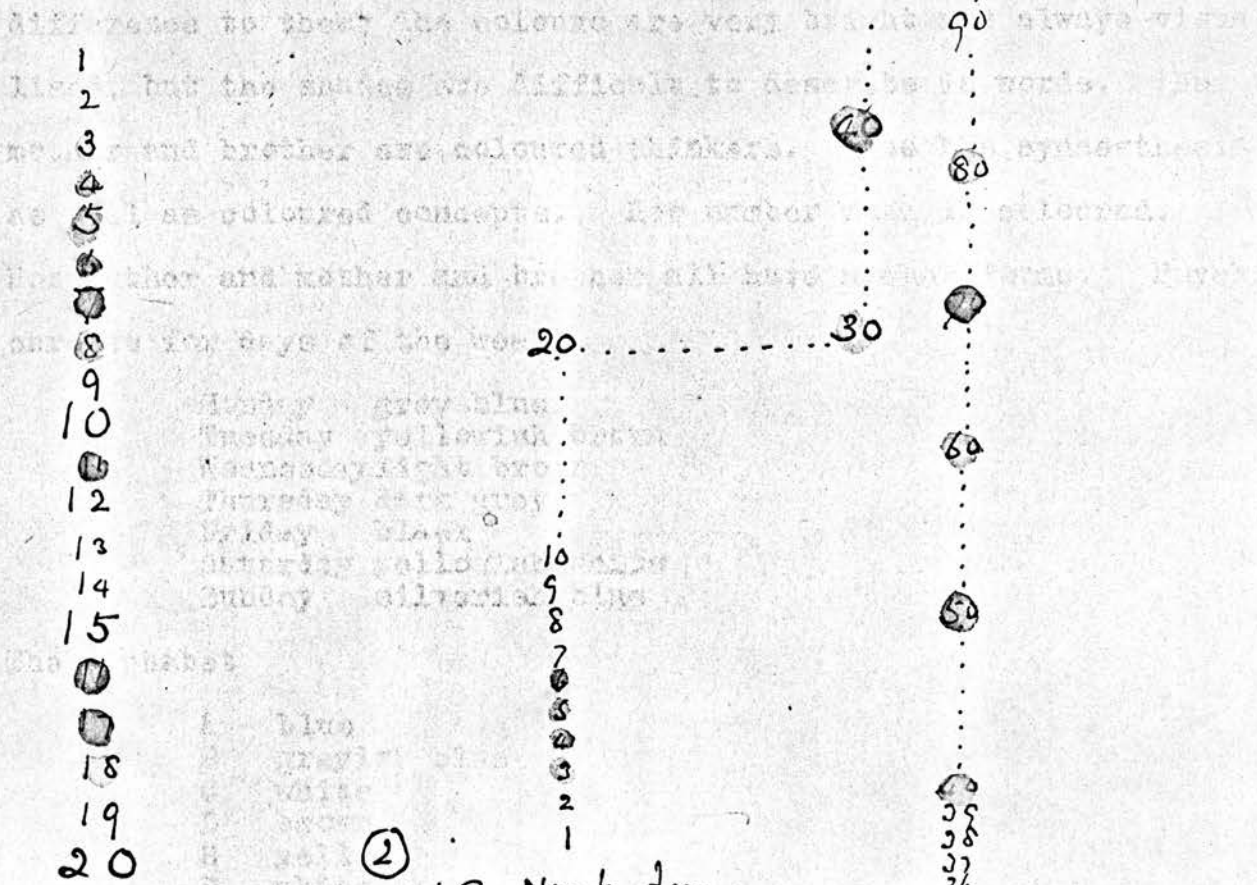
J.P. /

J. P., Scottish, 14, has had colours for the days since childhood - for letters and figures since she learnt them. Her psychochromes for days were almost exactly the same at the age of ten as they are at the age of 14. Monday dark brown, Tuesday black, Wednesday orange, Thursday p. blue mauve, Friday bright purple, Saturday sky blue, Sunday red. Thursday was pale grey and Wednesday yellow.

The colours changed more for months - January is dark blue and February brown, both unchanged. March and April are grey but were white at ten years - May has become blue instead of yellow, ^{June?} July pink instead of green, July pink instead of gold, August now green, was blue. September is gold and was brown. Oct. was colourless and is now golden brown. November brown and December red are the same.

The colours are faint. Another sister has colour associations too. J. P. has no colours for music, but a few for sounds - the wind dark grey, a trumpet golden. She has day, month and number forms, the last coloured, but her number form has changed twice, and her three different forms at age 10, 13, and 14 are given below, the last change is only in the direction taken by the numbers from 1 to 20. ~~at 13.~~ ^{13 but at 14} These ascend at 14,, are arranged horizontally to the figure 12, and then ascend. At 10 the figures descended, a more unusual direction. The first forms date from /

from learning to count, and the form possessed now is used in mathematics, it is seen a little above eye level.



I.P. Number form at 10 years.

② I.P. Number form at 13 years.

20 21 22 23 24 25 26 27 28 29 30

③ I.P. Number form at 14 years.

1 2 3 4 5 6 7 8 9 10 11 12

M. 6
D. O., Scottish, 13 $\frac{1}{2}$, has thought in colour since about her 6th or 7th year - her colours have not changed; fatigue makes no difference to them; the colours are very bright and always visualised, but the shades are difficult to describe in words. Her mother and brother are coloured thinkers. She has synaesthesia as well as coloured concepts. Her number form is coloured. Her father and mother and brother all have number forms. Psychochromes for days of the week.

| | |
|-----------|-----------------|
| Monday | grey blue |
| Tuesday | yellowish brown |
| Wednesday | light brown |
| Thursday | dark grey |
| Friday | black |
| Saturday | yellowish white |
| Sunday | silverish blue |

The alphabet

| | |
|---|--------------|
| A | blue |
| B | greyish blue |
| C | white |
| D | brown |
| E | yellow |
| F | white |
| G | greyish |
| H | grey |
| I | silver |
| J | brown |
| K | browny red |
| L | red |
| M | blue |
| N | brownish |
| O | white |
| P | greyish blue |
| Q | goldy |
| R | brown |
| S | white |
| T | / |

The alphabet contd.

| | |
|---|--------------|
| T | blueish |
| U | goldish |
| V | " |
| W | golden brown |
| X | silvery grey |
| Y | " " |
| Z | " " |

The vowels.

| | |
|---|--------|
| A | blue |
| E | yellow |
| I | silver |
| O | white |
| U | goldy |

Names

| | |
|-----------|-----------------|
| Lucy | golden |
| Molly | darkish red |
| John | brown |
| Gavin | reddish brown |
| Jean | grey green |
| Margaret | dark blue |
| Mary | dark blue |
| George | yellowish white |
| Janet | red |
| Barbara | golden |
| London | whitish |
| Edinburgh | brown |
| Australia | gold |
| Asia | grey white |
| India | red brown |
| Canada | grey white |

Bird and animal calls.

A dog's bark is a brownish sort of colour; ^{in words,} but I can't describe it though I see it quite well in my mind. Birds' songs sound silvery, horse's neigh, grey.

Music /

Music.

Battle music, war songs, or very thrilling music sounds a deep dark colour, dark blue, or brown or purple; deep pathetic music is a sort of dark silver grey; but the colours for music can't be put down in words.

Psychochromes for the months.

Jan. terra cotta, Feb. brownish yellow, March brown, April silver, May golden, June and July golden brown, Aug. deep old gold, Sep. grey, Oct. red or white, Nov. grey, Dec. grey. Some abstract terms are coloured - Love is pinkish white, like apple blossom, Patience grey white, Joy and Courage yellow white, Truth golden brown, Hatred black - Cold is white, Heat red, Life is golden, Death is brown.

Voices are white if soft and low, iron grey if harsh, singing voices are silvery white and golden. Of these concepts the months days and numbers acquired colour about the 6th or 7th year. One or two are less vivid than they were then.

M. O. O. cannot describe the size of the number form given below, but she always visualises it when counting. The form is quite fixed, it dates from first learning the multiplication table.

20 white
19 yellow
18 red
17 grey
16 blue
15 pink
14 white
13 brown
12 brown

10 yellow
9 olive
8 red
7 grey
6 blue
5 pink
4 white
3 brown
2 white
1 olive

M. O. O. 13 1/2

concepts. In childhood things had shapes as well as colours. Sweets and toys were wedge shaped and about three inches high. They were used as being in the drawing room. and necessary were regular charges.

The days of the week are: Sunday is scarlet, Monday dark green, Tuesday dark green, Wednesday dark green, Thursday dark green, Friday dark green, Saturday dark green, Sunday dark green.

J. D., Highland Scottish and English, 13. 11 months, has had psychochromes for the days, months, letters, and figures ever since she knew their names. The colours have never changed, and the lists made of her concepts after an interval of two years gave exactly the same shades in every case.

Abstract ideas, smells, tastes, and sounds have no psychochromes but in music high notes are pale yellow, medium ones yellowish brown and low noted dark brown. Places are sometimes coloured by the initial letter of the word, but only faintly, names are always coloured in the same way.

The colours are visualised, and come without any difficulty, even during fatigue - it requires no effort to recall them as she never thinks without them. Her first coloured concepts were acquired about the age of 12.

J. D. is an only child and has no relations who have coloured concepts /

concepts. In childhood things had shapes as well as colours. Sunday and Monday were wedge shaped and about three inches high. They were always imagined as being in the drawing room. Tuesday and Wednesday were queer irregular shapes.

The days of the week.

Sunday is scarlet, Monday a dull red, Tuesday dark green, Wednesday medium grey, Thursday dark grey or black, Friday pale grey or pale blue, Saturday white.

The months.

January is brown, February pale grey, March green (she thinks) April yellow, May pink, June yellow, July orange, September, Light yellowish brown, October brown (she thinks), November dark grey or black, December medium grey.. August does not seem to have any colour, but she occasionally thinks it is blue.

Letters and figures.

A is pale blue, B dark red, C yellow, D dark blue, E green, F pale blue or pale grey, G pale yellowish brown, H pale grey, I black, J orange or brown, K dark purplish grey, L blue or grey, M scarlet, N dark red, O brown, P pink, Q pale brownish yellow, R reddish brown, S white, T medium grey, U yellow, V dark grey, sometimes tinged with purple, X and Y medium grey, Z black.

1 is white, 2 dark blue, 3 pale green, 4 scarlet, 5 orange, 6 yellowish brown, 7 black, 8 pale yellow, 9 purple.

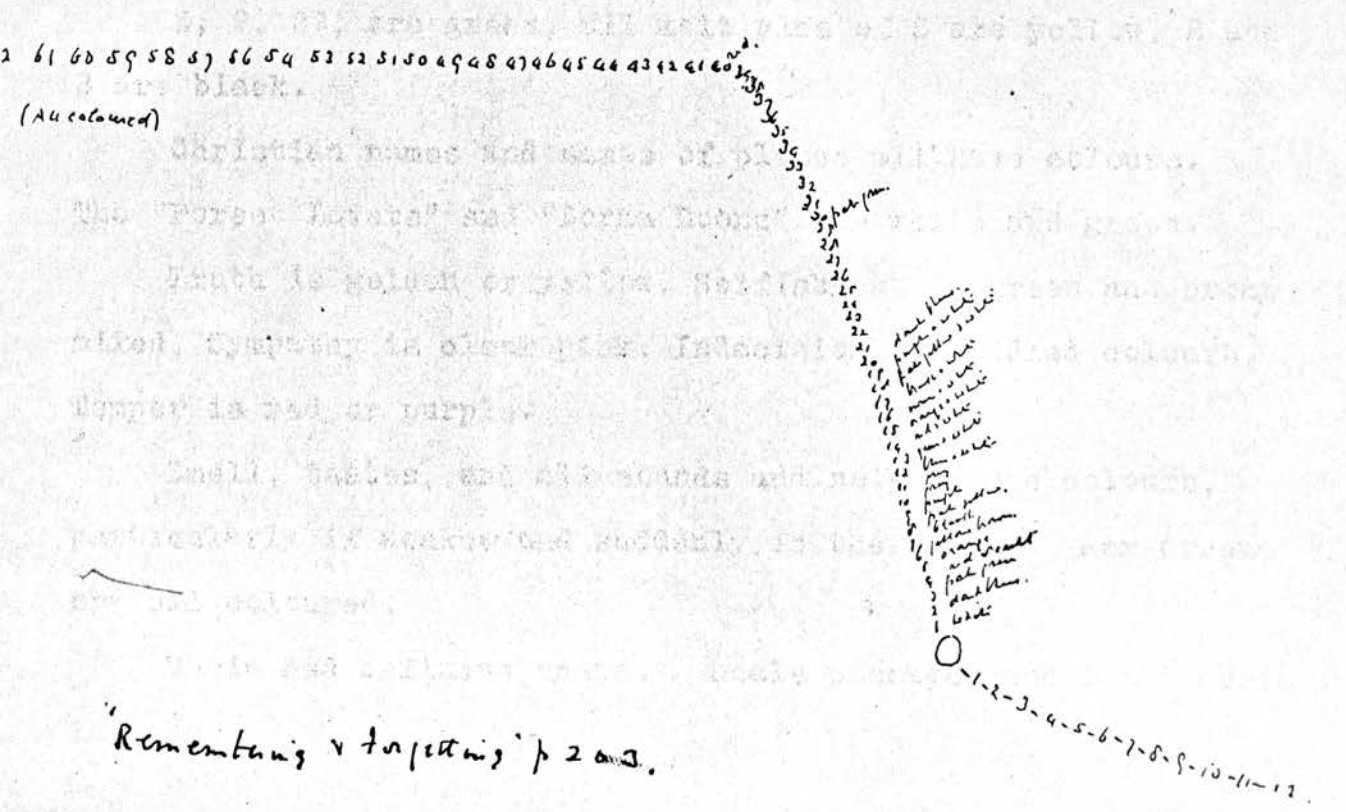
The /

The colours for numbers were associated with early experiences and all numbers are seen coloured in her form.

The form is always clear and is fixed in form, but increases continually as she learns more mathematics.

J. D. always uses her form when she does arithmetic, and it helps her especially to understand negative quantities - which are visualised as well as the units and tens. She is unusually gifted mathematically. Professor Pear points out that the representation of negative values makes Galton's view of the hereditary character of number forms quite untenable.

The figures in the form below are their normal size - the figure nought is seen just in front of the eyes. Positive numbers go to the left and forward, negative numbers go to the right and backward.



Remembering & forgetting p 2 and 3.

H. P., 15, English, first associated colour with music. The months, alphabet, and numbers have only recently had any psychochromes at all. The colours constantly change, she has given the most usual. H. P. always thinks and remembers in colour. Periods of history are coloured, and character is very definitely coloured; the shades become bright or dull according to her feelings at the time.

Days of the week.

Monday light green, Tuesday morning grey, Tuesday evening black, Wednesday varies, Thursday dark green, Friday and Saturday pink, Sunday yellow or flame coloured.

May is pink, August brown.

The alphabet is mainly green.

The vowels are red, but e is black.

3, 9, 27, are green, all multiples of 5 are yellow, 2 and 8 are black.

Christian names and names of places all have colours.

The "Forest Lovers" and "Lorna Doone" are white and green.

Truth is golden or yellow, Selfishness is green and brown mixed, Sympathy is clear pink, Indecision is muddled colours, Temper is red or purple.

Smell, tastes, and all sounds and noises have colours, particularly if awoken and suddenly in the night. Her dreams are all coloured.

Music had definite shape. Scale passages and light music is like /

oo yellow, oi orange, ow white.

Numbers.

1 white, 2 blue grey, 3 cream colour, 4 brown, 5 pale green, 6 bright brown, 7 golden brown, 8 blue grey and white, 9 grey, 10 brown and white, 11 dirty yellow, 12 blue grey, 13 pink, 14 dark brown, 15 green, 16 same as 6, 17 same as 7, etc., 20 same as 2, 30 same as 3, etc., 100 white, 200 same as 2, etc.

v Ivanhoe green, The Talisman white, King Lear yellow. She thinks every book has a colour to her, and it is usually not the same as the colour of the binding.

Truth pale flame, Joy bright flame, Patience white, Courage gold, Envy green, Jealousy dark green, Hope white, shining, Despair brownish black, Faith pink, Charity pink, Love colour of sunlight, Fear greenish grey, a lie, white slippery, The Future light with colours floating in it. The Past (in history) dark, with lights and colours where important things happened.

The colours of smells and tastes are not solid, they are rather like reflections in water and are difficult to describe. The colours of flower scents are usually pale yellow or white and those of food are usually darker. Sharp tastes are points or streaks of light. Short sounds are usually short streaks of colour, long ones are large and have no decided outline.

Bass notes, dark brown, growing darker as they get lower.

Treble /

Treble notes - light blue, getting lighter as they get higher.

^{sh}
I see all songs and music as light and shade against a dark background.

A high voice - light. A low voice - dark. A whisper - bluish white. Some voices ~~A~~ know well have different colours. A dog's bark - brown. A cat's mew - blue. Most bird songs - streaks of light.

January is brown. February speckled with brown.

April white. May light blue

June gold July yellow

August yellow and green. September blue between ultramarine and prussian blue.

October dark prussian blue. November and December the same but lighter.

London is blue grey: Edinburgh blue grey

Manchester brown: Dumfries warm brownish orange -

every place has a colour.

L.C. thinks of every name as coloured but the names she has known longer are brighter. Anna is blue; Mary white;

Kathleen blue; Dorothy blue; Molly green; Eileen green;

Edith red; Edward brown; George white.

Some of these psychochromes change if the subject has a very strong new association with a thing. A great many words that had always been coloured changed when she learned to read and letters /

A.M.C.S. Scottish 17, has the following psychochromes. The days of the week have been coloured as long as she can remember; her sister, one brother and both parents think in colour. The colours are visualised and name colours change sometimes; they are more difficult to recall during fatigue. Some of the colours are soft and thick, others are bright and spiky.

Monday is dark grey
 Tuesday - crimson
 Wednesday blue
 Thursday - very thick red.
 Friday - yellow
 Saturday - red and white
 Sunday - white and yellow.

January is grey
 February - grey
 March - blue
 April - yellow and green
 May - green
 June - red
 July - red and green
 August - red and yellow
 September - blue and white
 October - white and grey
 November /

November - grey and yellow

December - white.

D. and M. are vermillion; A. blue, E. yellow, O. white, U. pink,
I. grey

All numbers are grey except multiples of 10 which are red.

Books as a whole are red.

Places are green.

Truth - white.

Joy - yellow and white.

Patience - white and

Courage - red.

Names are coloured:-

May - pink

Helen - pale blue

Margaret - red

Catherine - yellow

Kathleen - purple

Nora - yellow

Elizabeth - white

Marjorie - white

David - white

Frederick - red and white

William - pink

John - blue

Jack - red

Richard - white

Dick - red

Jenny - red.

Smells are yellowy green.

Music is Pale blue, pink and white, with a deep rich blue in
very fine church music.

Shaky voices are the colour of heat waves, other voices a
clear and pure as water.

Birds /

Birds calls are blue and animal calls are red.

Number form given below is never used and it only dates from about the age of 15.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 to infinity
 A. 2 P. 3 17.

C.M.G. Scottish Irish, 17 has the psychochromes for the days months and alphabet. All sensations, sounds, and music call up colour and some abstract terms - truth is white; courage bluey grey; Patience green grey.

Monday is whitish and pearly

Tuesday bluey grey

Wednesday golden green

Thursday dark grey or black

Friday reddish brown

Saturday red

Sunday golden.

January /

- January is bluey grey
- February grey
- March reddish brown
- April gold and green
- May pink
- June pale golden green blue
- July dark gold
- August corn colour
- September deep golden brown
- October dark reddish brown
- November glacier colour
- December snow and red

Some of these colours are those of the associations she had with the months when younger. January was associated with cold clear dark pines; August with deep golden corn fields; November with grey mornings; May with pink ^{morning} ~~morning~~ and brown; April with birds' song and pale green

Some letters have colours;

- C. is golden
- D. bluey grey
- E. J. & G. brown
- F. reddish brown
- K. brownish grey
- L. water colour
- M. greeny
- N. greeny
- O. black
- P. grey
- Q. /

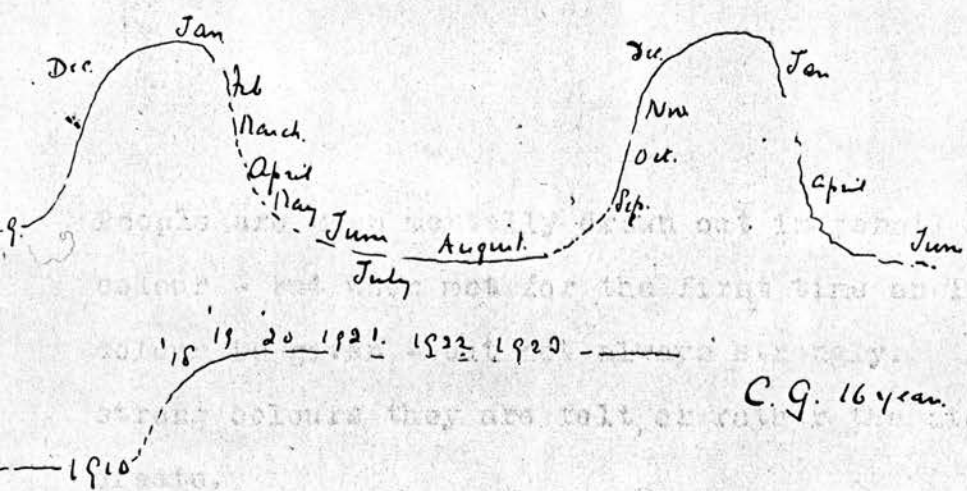
- Q. colour of early morning light.
- R. reddish brownish black
- T. blackish
- H. & U. fawn
- X. reddish-fawn
- Z. fawn.
- S. & I. white
- U. like Q
- W. blackish grey with blue
- Y. yellowish

The numbers 1 - 100 are seen in colour. The form becomes misty and blurred if the subject attempts to recall all the numbers. She uses it in addition and subtraction - the form is described as not very big but completely filling the mind when visualised, only one part is seen at a time. It has always contained the same number of figures but the higher numbers are used more now. C.M.G. can't remember thinking of numbers in this way before learning to count. She was taught on a bead counting frame. Her mother has a form but none of her brothers or her sister, and only one brother besides herself thinks in colour.

To 100
30 21 22.....

- 19
- 18
- 17
- 16
- 15
- 14 dark blue grey.
- 13 very golden brown
- 12 dark brown.

- 1 white
- 2 bluey grey
- 3 golden brown.
- 4 dark bluey grey.
- 5 pink. and brown.
- 6 green gold.
- 7 purple blue grey.
- 8 gold brown
- 9 gold.
- 10
- 11 fleecy white.



E.M.P. English (Devon) 22, has the following coloured concepts.

- January Light grey
- February Brownish red
- March Slate grey
- April Light green
- May white and pink
- June red
- July pink
- August sand coloured
- September grey
- October orange
- November royal blue
- December dark grey.

Ah, rose coloured O - blue Ee. too piercing for
 a colour

Ou - deep blue.

People /

People are seen mentally drawn out in pencil and outlined in a colour - ~~but~~ when met for the first time an impression of a colour is given - but not always strongly. If they have strong colours they are felt, or rather the atmosphere they create.

Hot or warm music is visualised as red, or orange, or pinky. Sounds are hot and cold, metallic etc. visualised in hot and cold colours.

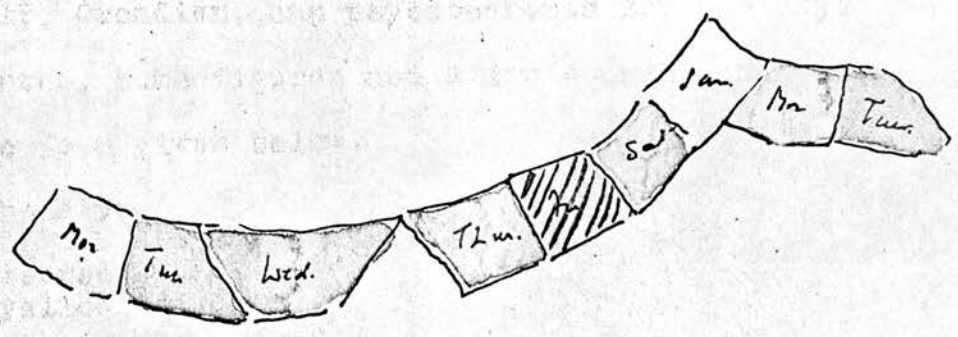
The colours are visualised. People were first associated with colour, but all the psychochrome dates to such early years that she can never remember thinking in any other way. The colours are clear and vivid and always used even in written things. They are easier to recall during a state of fatigue.

E.M.P. is the only member of her family who thinks in colour, and has always disliked mentioning it, fearing it was something rather abnormal. She has certain psychic powers. Her number form is always used and dates from the time she learnt to count. The form is fixed in shape but the number of figures has increased. It begins clear and small but as it gets up to 100 and turns to the left it gets almost liquid and quite unmanageable. It can just be controlled with an effort but it means writes the E.M.P. "putting oneself into the last block i.e. 90 - 100 and getting well above the numbers to be controlled."

100 very irregular
at May to 1900

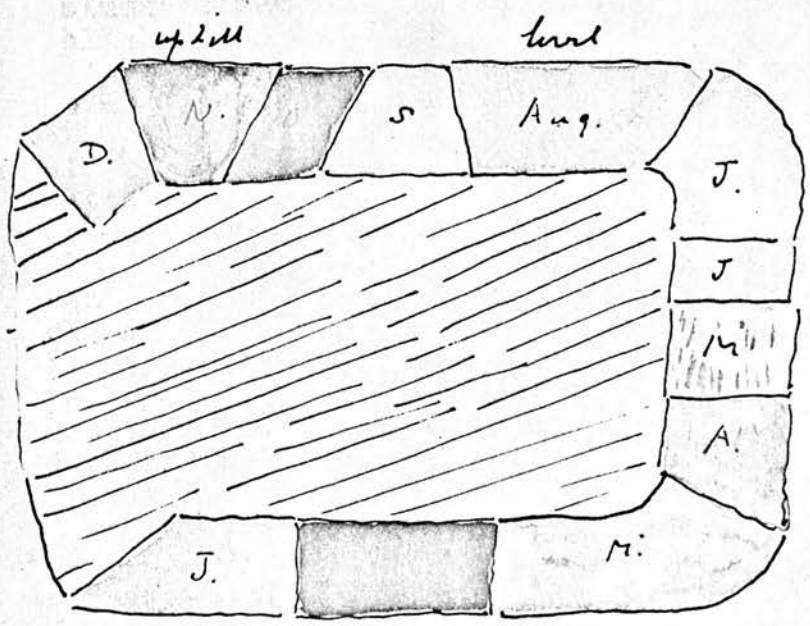
clear up to 100 →

40
 35 39 40.
 37 36 35 34
 30 71 32 33
 28 29 30
 27 26 25 24
 20 31 22 23



The Week.

20
 19 18 17 16 15 14 13 12 11 10
 9
 8
 7
 6
 5
 4
 3
 2
 1



The Year.

S.M.P. 22.

George W. M., 19, Orcadian, has psychochromes for the days of the week, the months, some figures and a few sounds, and visualises numbers in the form given below.

Psychochromes for the days.

| | |
|-------|---------------|
| Sun.x | dull coloured |
| Mon. | bright yellow |
| Tue. | green |
| Wed. | grey |
| Thur. | red |
| Fri. | golden |
| Sat. | red |

Psychochromes for the months.

| | |
|--------|----------------------|
| Jan. | dark coloured |
| Feb. | grey |
| Mar. | whitish grey |
| April | light green |
| May | olive green |
| June | bright yellow |
| July | yellow with red tint |
| August | golden |
| Sep. | orange |
| Oct. | dark brown |
| Nov. | almost black |
| Dec. | black |

Psychochromes for figures.

| | |
|----|-------------|
| 1 | black |
| 2 | white |
| 3 | green |
| 4 | " |
| 5 | red |
| 6 | olive |
| 7 | light green |
| 8 | yellow |
| 9 | green |
| 10 | dark brown |

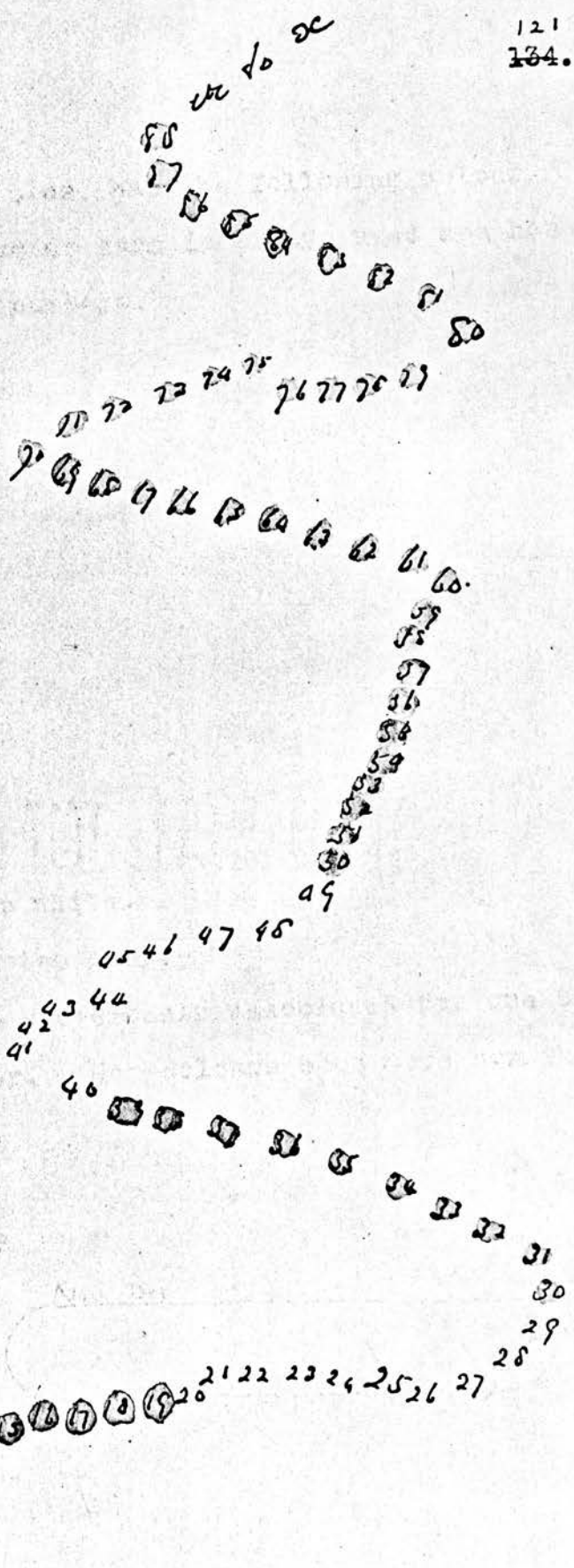
W
Margaret H., 17, ...
associations and forms. The ...
increased with her knowledge of ...
Psychometrics for ...

Jan. green
Feb. black
Mar. red
Apr. red

Psychometrics for ...

Dec. white
Jan. black
Apr. green
May. blue
June. red
July. red
Aug. red
Sep. green
Oct. green

is golden, is black, is ...
less notes are brown, ...
to M. E. words and colour ...
be thought of with ...
when she was younger.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Blond. W. hair
ad. skin light blue hair. dark brown.

G. W. M. 19. Ureadian.

Margaret H., 17, Shetland Isles, has the following colour associations and forms. The number form is always used and has increased with her knowledge of numbers.

Psychochromes for days.

| | |
|------|-------|
| Sun. | green |
| Mon. | black |
| Fri. | red |
| Sat. | red |

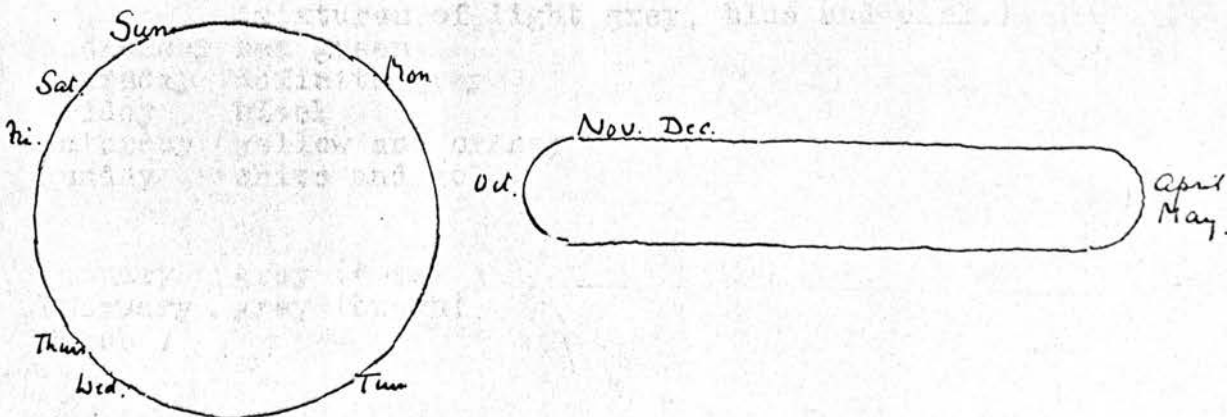
Psychochromes for months.

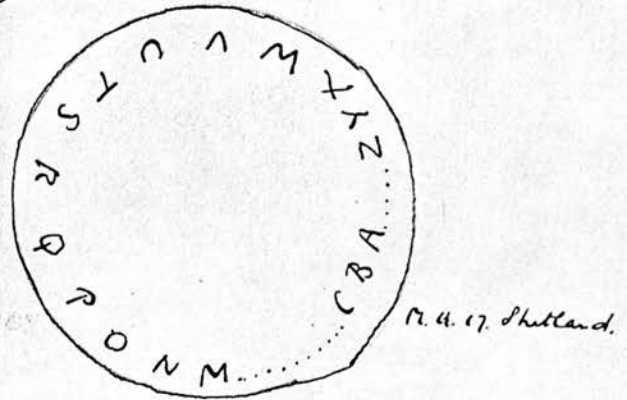
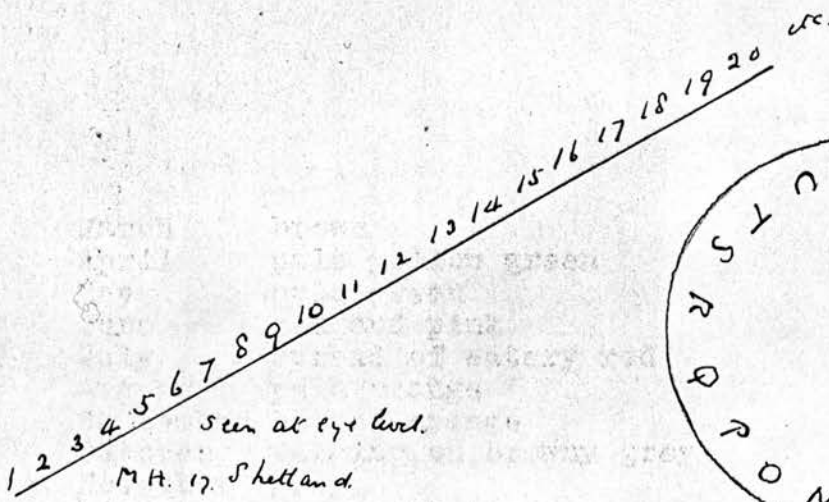
| | |
|-------|-------|
| Dec. | white |
| Jan. | black |
| April | green |
| May | pink |
| June | red |
| July | red |
| Aug. | red |
| Sep. | brown |
| Oct. | brown |

35 is golden, 47 is black, 1 is white.

Bass notes are brown, treble notes grey.

To M. H. words and colours are too closely associated for one to be thought of without the other. Her colours come more now than when she was younger.





M. P. Deneven, 19, Irish, has the following psychochromes; the four other members of her family are also coloured thinkers. Her colours never change, only intensify in shade, but some are much brighter than others; the colours for the days and letters date back to very early childhood, as she thinks of the word of each day the colour comes naturally with it. The months were coloured at the age of 6, but figures not till about 14. M.P.D. explains her colour associations as due to the sound of words, events, and the influence of the weather. She thinks more in colour than when she was younger.

Psychochromes for the days and months.

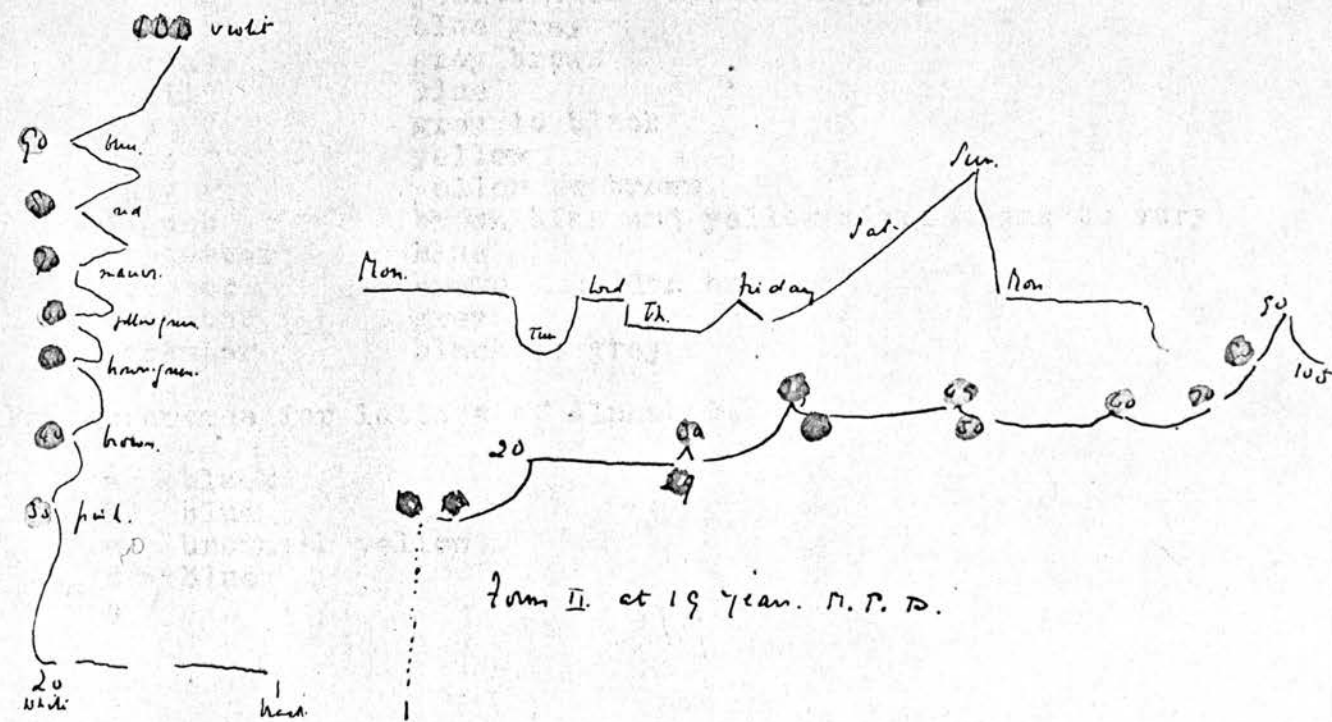
- Monday greyish brown
- Tuesday rather airy and light
(mixtures of light grey, blue and pink.)
- Wednesday sea green
- Thursday definite grey
- Friday black
- Saturday yellow and orange
- Sunday white and gold.

- January grey (dove)
- February grey (brown)
- March /

March brown
 April pale yellow green
 May pale green
 June red and pink
 July spread of watery red
 August pale orange
 September bright orange
 October verging on brownish grey
 November grey
 December white and black.

Sounds are grey. Music is indefinite filmy colours. Pain is silver (bright). Feelings are a mixture of very warm colours. Figures are different colours for different figures, e.g. 40 - brown, 50 - green.

M. P. D. has forms for the days and for numbers. The number form is used whenever she thinks of numbers collectively, but it is always subconscious; ^{the first form} it dates from the time of learning to count; and though the size changes, the ^{second} form ~~itself~~ ^{now} is fixed.



m 1. 16 years.

H. G. L., 22, Scottish, has the following colour associations; the colours are visualised, and do not change radically, only slightly in shade. H. G. L's colours date from early childhood, and she explains for letters by the fact that she learnt the alphabet in colour. The colours are bright and easily recalled, but in listening to music they do not force themselves into consciousness and are only seen by an effort of concentration.

Psychochromes for days.

| | |
|-----------|---|
| Monday | grey |
| Tuesday | blue (royal to saxe) |
| Wednesday | paler with more grey |
| Thursday | yellow |
| Friday | white |
| Saturday | red |
| Sunday | red - paler (S in the letters is seen as red) |

Psychochromes for months

| | |
|-----------|---|
| January | yellow with streaks of grey |
| February | blue grey |
| March | grey brown |
| April | blue |
| May | grey to black |
| June | yellow |
| July | yellow to brown |
| August | brown blue and yellow mixed (seems to vary) |
| September | blue |
| October | brown - golden brown |
| November | grey |
| December | black to grey |

Psychochromes for letters of Alphabet.

| | |
|---|-----------------|
| a | black |
| b | blue |
| c | brownish yellow |
| d | blue |
| e | / |

- e white
- f yellow
- g green
- h yellow white
- i white
- j yellow
- k black
- l yellow
- m grey
- n grey
- o steel colour
- p blue
- q blue green
- r brown
- s red
- t steel colour
- u yellow
- v blue
- w purplish blue
- x yellow
- y yellow
- z orange

Psychochromes for numbers

- 0 black and white
- 1 white
- 2 yellow
- 3 blue
- 4 golden brown
- 5 black
- 6 steel colour
- 7 pink
- 8 red - brownish
- 9 silver.

Number Forms.

An investigation of coloured conception in childhood shows that a strong tendency to associate colours and concepts is frequently accompanied by the visualisation of numbers in some form or outline; the origin and nature of such forms is too large a question /

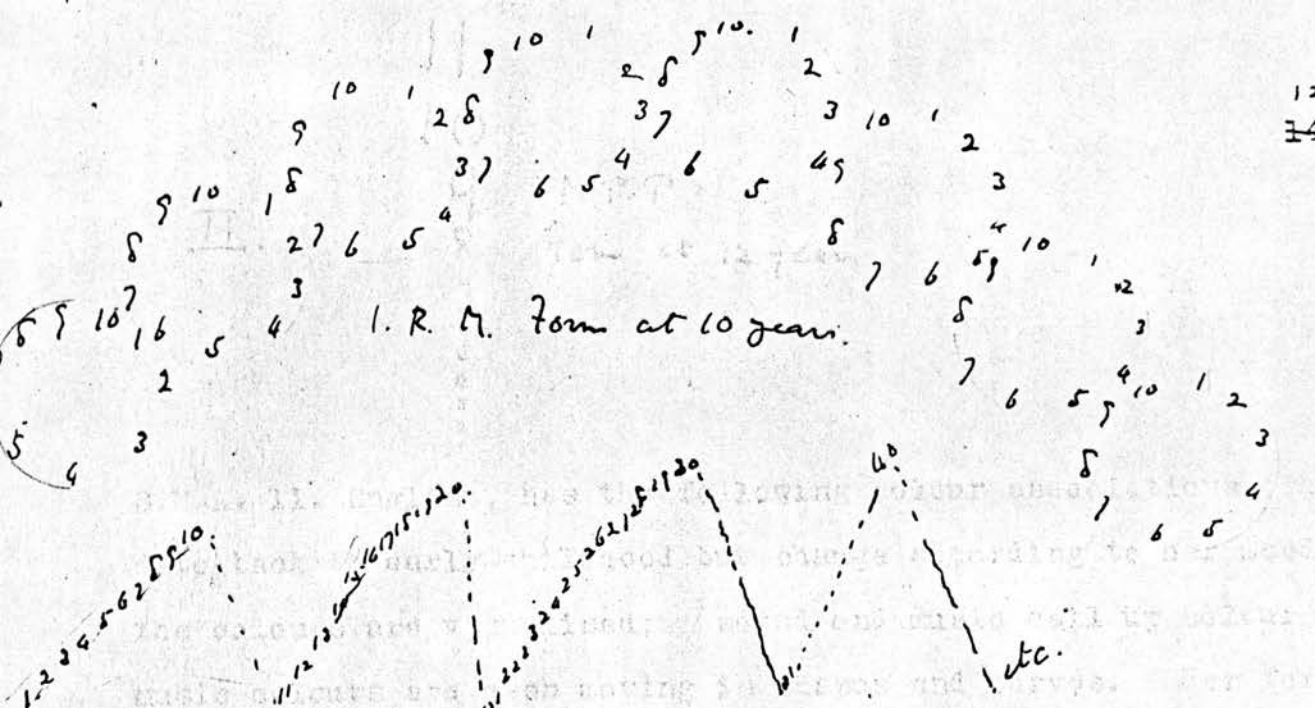
question to discuss here, but one characteristic attributed to number forms by Galton is not universally true when applied to those of children.

"Number forms," wrote Galton, "are in each case absolutely unchangeable except through a gradual development in complexity. Their diversity is endless, and the number forms of different persons are mutually unintelligible."

Many examples of identical forms were obtained in this investigation from subjects living in very different parts of the British Isles, and of widely different ages; while the following subjects, whose ages range from 11 to 17, had all quite definite changes in their visualisation of numbers in the course of a few years, and the change is more than a change in complexity; the whole shape of the form and the direction taken by the numbers is different; a circle becomes a slanting line, ^{strips} strips become a vertical line, and so on.

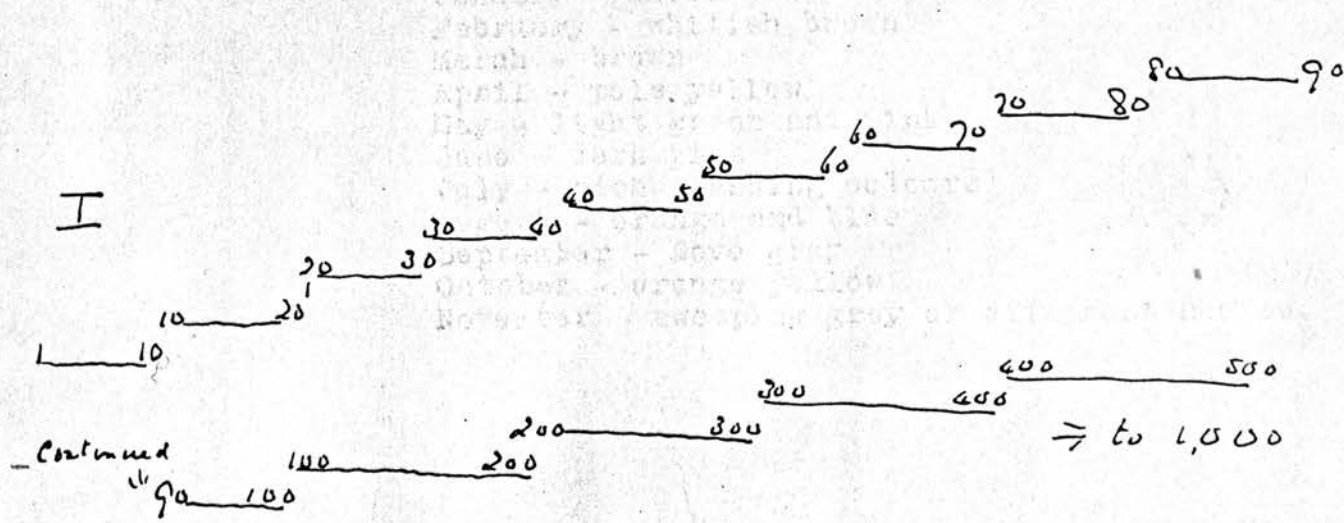
I. M., 11, Highland, had colour associations for 7 days, 9 months and some synaesthesia at the age of 10. Her psychochromes at that age are given below, and her number form; - at 12 years the former were the same, but the latter was no longer a series of circles but a series of slanting lines. I.M. always uses her form.

* *Journals into Human Faculty. p. 125.*



I.R.M. form at 11 years.

M.P.P. 12, Scottish, Lowland, has colour associations for only 4 days and 8 months. Her number formed at 11 years and at 13 are given below. The second form begins very small and gets larger till it is too big to think about; it is sometimes used. She is extremely mathematical.



M.P.P. form at 11 years.

II.11
10
9
8
7
6
5
4
3
2
1M.P.P.
Form at 13 years

S.M.A. 11. English, has the following colour associations. They date back to early childhood but change according to her mood; the colours are visualised; sound and music call up colour and music colours are seen moving in shapes and curves. Her form dates from learning to count in tens. The form is less vague than when she was younger and becomes clearer when recalled but it is not used.

Psychochromes for days and months:-

Sunday - clear blue
 Monday - yellowish grey; Tuesday colourless.
 Wednesday - Brown
 Thursday - greenish yellow
 Friday - rich brown red
 Saturday - blue.

January - white
 February - whitish brown
 March - brown
 April - pale yellow
 May - light green and pink
 June - dark pink
 July - rich flashing colours
 August - orange and blue
 September - Dove grey
 October - orange yellow
 November - sweeping grey or different shades.

1. ----- 100 I
 200
 300 S.M.A. 15.

130
~~145~~

II
 S.M.A. 16.

1 2 3 4 5 6 7 8 9 (10) 11 12 13 14 15 16 17 18 19 (20) etc.

1. ----- (10) ----- (20) ----- (30) etc.

III
 S.M.A. 16.

A.L.F. 17. English has only colour association for the days and for 2 months. She sees her number form very clearly and it is quite often used.

Psychochromes for days and months:-

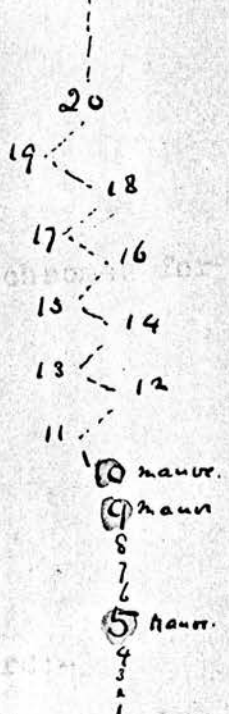
- Monday - black
- Tuesday - Orange
- Wednesday - mauve
- Thursday - yellow
- Friday - blue
- Saturday - light grey
- Sunday - dark grey

- March - mauve
- April - pink

1000

1921. 17. 1911-1912 has the following colour associations -
 those for the days were acquired in the year of 10. 1911. 1912
 and Saturday were obtained first; the other figures for 1913
 other figures. She has no psychomotoric work for the day,
 which holds in a bright dazzling white. The colours are vis-
 ualised as except for certain numbers the day change. The
 numbers are also visualised in individual shapes.

100



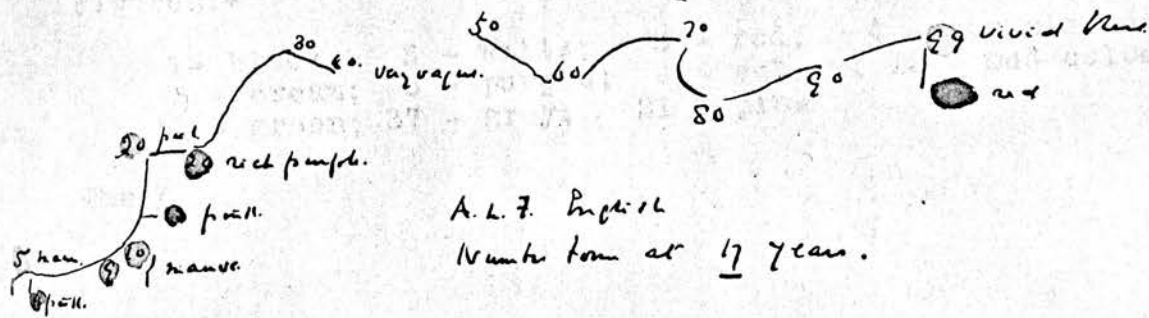
I

Monday - red
 Tuesday - blue
 Wednesday - purple
 Friday - white
 Saturday - black
 Sunday - green

January - grey
 February - cream
 March - silver
 May - pink
 July - sky blue
 August - russet green
 September - gold stone colour
 November - brown
 December - white

AL7 English.
 N-form at 16 years.

II



A.L.7. English
 Number form at 17 years.

J.F.H. 17, Scots-Irish has the following colour associations - those for the days were acquired about the age of 10. Wednesday and Saturday were coloured first; and the number '5' before other figures. She has no synaesthesia except for the wind, which calls up a bright dazzling white. The colours are visualised and except for certain numbers do not change. The numbers are also visualised in individual shapes.

Psychochrome for days:-

Monday - red
 Wednesday - flame
 Thursday - purple
 Friday - white
 Saturday - black
 Sunday - green.

Psychochromes for months:-

Jan. at 15 years
Not coloured

January - grey
 February - cream
 March - silver
 May - pink
 July - sky blue
 August - russet green
 September - cold stone colour
 November - brown
 December - white

Letters:-

B - purple; D - nigger brown; I - green; L - yellow

Figures:-

1 - black; 2 - white; 3 - red; 4 - raw sienna;
 5 - cream; 6 - purple; 9 - yellow; 13 - mud colour;
 15 - green; 37 - grey; 21 - pink

The /

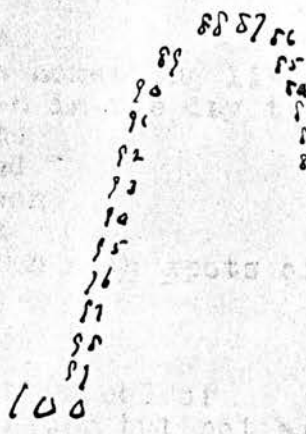
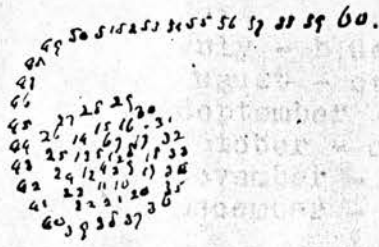
The number form of J.F.W. at 15 is given below; after 80 all the numbers seem to disappear till 100, which stands out alone. The form does not extend beyond 100. She is not at all mathematical, and never uses her form.

100

80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60

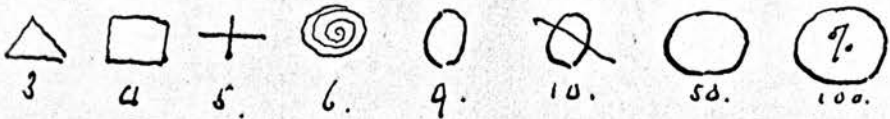
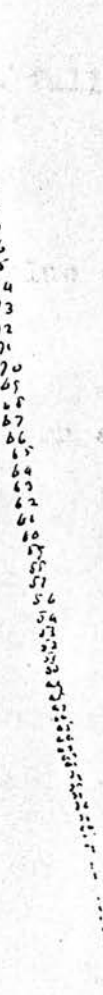
I

Form at 15 years
Not Coloured.



II

Form at 16 years.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

K.B.S. 17. English has colour associations for days and months and a few colours for sounds. Her number form at 16 was a horizontal line from 1 to 20 then it turned and ascended vertically, but at 17 the numbers are vertical from 1 to 20, then horizontal. The form is not used.

Psychochromes for days:-

- Sunday - white
- Monday - white something like a full moon seen in the day time.
- Tuesday - white
- Wednesday - red
- Thursday - green
- Friday - brown
- Saturday - brown with spots of blue and red.

Psychochromes for months:-

- January is a dark brown colour
- February also dark brown but not so rich as January.
- March - light brown
- April - blue and green
- May - pink and white
- June - blue
- July - blue
- August - orange
- September - light brown
- October - orange
- November - dark purple
- December - red

9-16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Form I. K.B.S. 16 years.

20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 etc.

19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1.

Form II. K. B. S. English.

17 years.

1. black; 2. dark blue; 3. dark crimson; 4. white
5. green; 6. dark grey; 7. brown; 8. black
9. black; 10. grey

11. The number forms are given below, the second given at 15 years

12. The more elaborate, it becomes more when required for the

13. purpose of drawing, but otherwise is visualised very clearly

14. Both forms were used

15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40.

M.B. Form II at 17 years.

M.B. 17, English, has the following colour associations.

Sunday - orange
Monday - white
Tuesday - grey
Wednesday - pink
Thursday - purple
Friday - blue
Saturday - black

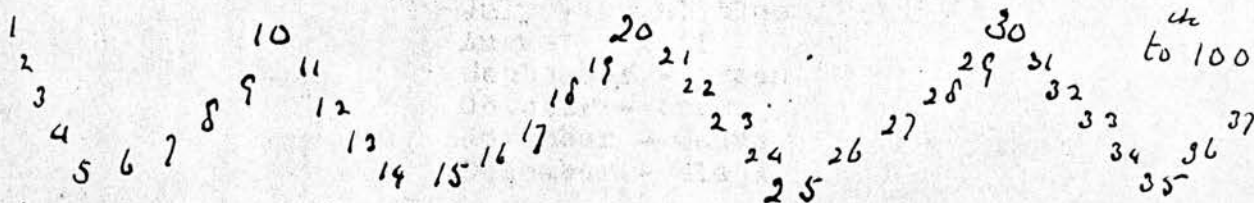
January - black
February - dark green
March - grey
April - pale blue
May - pink
June /

- June - mauve
- July - lemon yellow
- August - orange
- September - cream
- October - brown
- November - nigger
- December - red

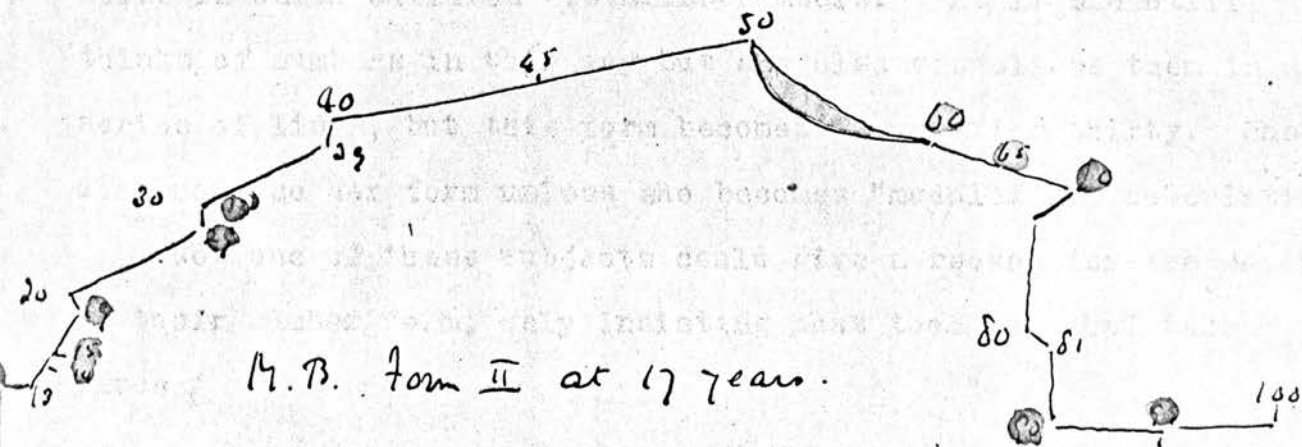
psuchochromes for Figures:-

- 1, black; 2, dark blue; 3, dark crimson; 4 black
- 5, green; 6, dark grey; 7, brown; 8, black
- 9, black; 10, grey

The number forms are given below, the second drawn at 16 years is far more elaborate; it becomes vague when recalled for the purpose of drawing, but otherwise is visualised very clearly; - both forms were used



M.B. Form I at 16 years.



M.B. Form II at 17 years.

M.W.P. 17, English, has colour associations with the days and months. She thinks the sound of the word influences the colour; words being cold or warm and the colours are cold or warm to correspond.

Monday - white
Tuesday - pale blue
Wednesday - Cerise
Thursday - navy blue
Friday - brown
Saturday - black

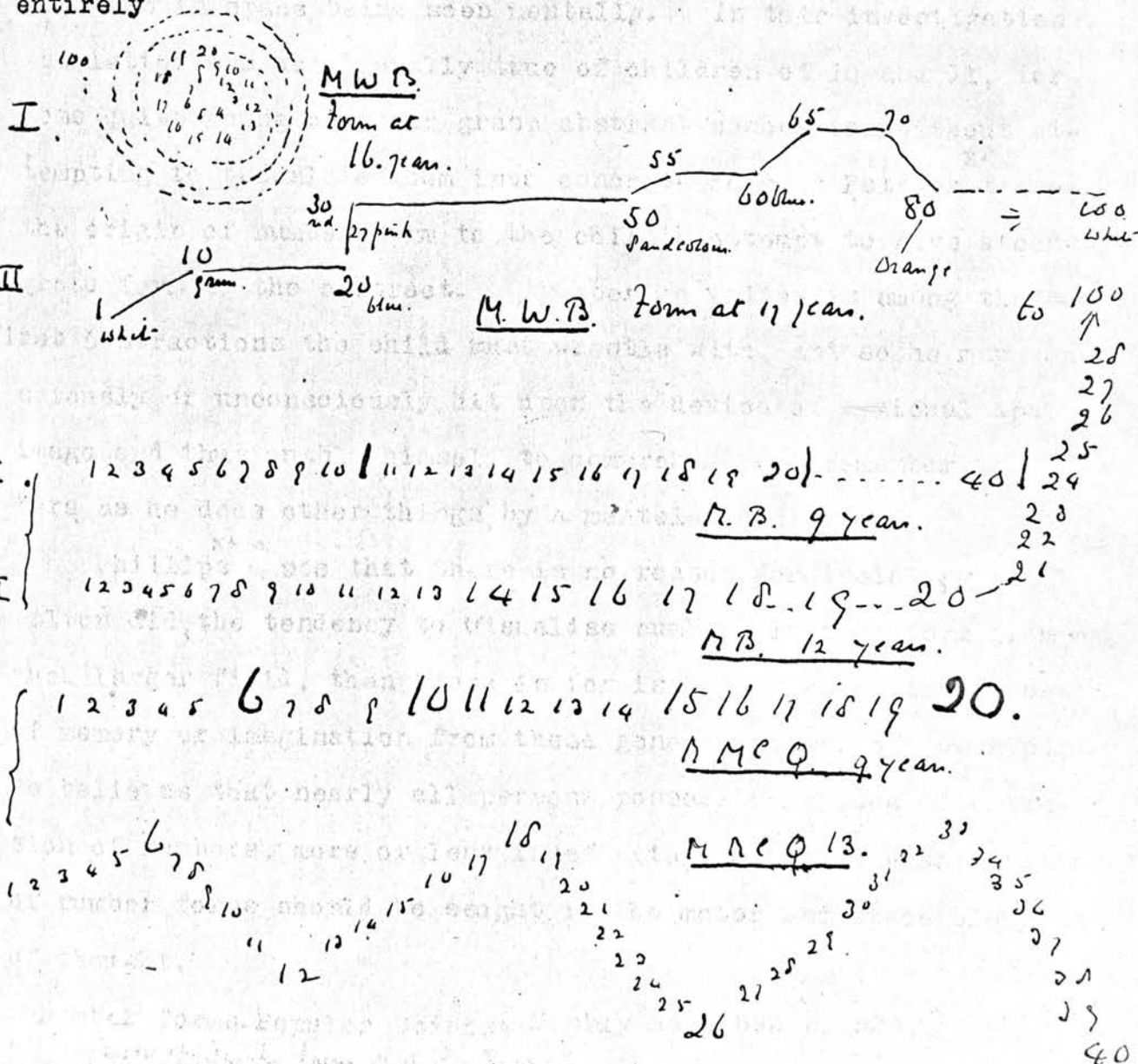
January - grey
February - white
March - green
April - yellow
May - pink
June - pale blue
July - royal blue
August - Buff
September - green
October - brown
November - mauve
December - black.

At 16 years M.W.P. thought of the numbers in a circle which gradually increased in size; this is one of the most frequent forms in which children visualise numbers. At 17 she still thinks of numbers in this way but she also visualises them in a series of lines, but this form becomes vague after thirty. She does not use her form unless she becomes "muddled" in calculating.

Not one of these subjects could give a reason for the change in their number form, only insisting that the change had taken place /

place and that they now always visualised numbers in that way.

A smaller number of subjects who had forms lost them completely before the age of about 14 - 17. The majority of them ^{their forms} were simply composed of vertical or horizontal lines; young children frequently visualise numbers in this way, a few figures standing out larger than the rest; such simple forms sometime develop as in the examples given below and sometimes are lost entirely



Some children think of the direction taken by numbers without visualising the actual figures though they know at which number the direction turns. Professor Pear points out that the simplest representation of quantities by the number-form occurs when the actual numbers are seen arranged in fixed spatial relation. "Rather more complex," he writes, "is the representation when the numbers are not visualised but only thought of, their position in space being seen mentally." In this investigation the latter was occasionally true of children of 10 and 11, for some quite young children grasp abstract conceptions without attempting to translate them into concrete form. Patrick traces the origin of number-form to the child's attempt to give a concrete form to the abstract. 'Number' he writes is among the first abstractions the child must wrestle with, and so he may consciously or unconsciously hit upon the device of a visual spatial image and thus enable himself to comprehend and remember the numbers as he does other things, by a mental picture.

Phillips^{x² n} agrees that there is no reason for isolating, as Galton did, the tendency to visualise numbers in some form from a much larger field, than there is for isolating exceptional cases of memory or imagination from these general powers of the mind; He believes that nearly all persons possess some idea of extension of numbers, more or less indefinite, and that the explanation of number forms should be sought in the motor and space elements of thought.

x¹ Number forms. Popular Science Monthly No. 1893 p. 504.

x² The Genesis of Number Forms. A. J. P. 8. 1896.

CONCLUSION.

140
143.

Two main theories are held of the nature of chromaesthesia, one physiological, the other that of psychological association. Perroud in 1863 was the first to attempt a physiological explanation, and to show that the condition was not pathological.

A physiological explanation is found in the continuity of the sensorial centres in the cerebral cortex, so that sensory stimuli from one sense organ may radiate to different centres; ^{more particularly} in an exceptional anastomosis of nerve-fibres leading to an abnormally close connection between the auditory and visual centres.

^{xl}
Krohn too believed that, though some chromaesthesia might be due to the association of ideas, much of it arises from cerebral work. ^{activity?} Although colour and form may be lost independently, his hypothesis of a chromatic centre is a doubtful one, for ^{x2} Dr. Head has shown that there is no reason to suppose that any groups of cerebral functions correspond to the forms assumed by psychological activity. ^{? too unconvincing}

^{x3}
Professor Calkins points out that an assumed cerebral peculiarity is little more than a confession of ignorance, and therefore, ^{that} the psychological theory of the origin of chromaesthesia is to be preferred if it can be substantiated, but that it is difficult to draw ^{we} position conclusions from the evidences of adult subjects.

- x1. Pseudo-Chromesthesia, or the Association of Colours with words, Letters, and Sounds A.J.P. 1892 p.20
- x2. Disorders of Symbolic thinking. B.J. Psy. Jan.1921 p.181
- x3. A statistical study of Pseudo-Chromaesthesia A.J. Psy. 1892 p.439

In 1905 a further explanation was attempted by Mon. Peillaube, who suggested that the apparently arbitrary connections between colours and concepts could be traced to some long forgotten impression made on the individual, the experience or emotions which had united colour and concept having become sub-conscious but the association remaining. Such experiences or emotional links between colours and concepts can often be traced in the psychochromes of children. A.W. at nine years had no colours for the months but with each month she had a definite association - January snow, February snowdrops, March wind, and so on, at 12 she had lost her associations but had colours for her months, the majority of her psychochromes corresponding to the earlier associations; January was white, February white and green, March purple, a common psychochrome for wind. These seasonal associations, which sometimes later become coloured concepts, are not rare in childhood. M.B. at 10 years had the following associations: January ice and snow, February wet and dreary, June mild sun, July hot sun, but three years later she had instead the following psychochrome for her months: January white, February grey, June pale yellow, July gold. Seasonal associations occur in ~~many~~ older subjects; K.G. a Scottish girl of 14 had no colours, but these associations for five of the months: August deep golden corn fields, November grey mornings, January cold clear dark /

dark pine trees, May pink blossom in a bower, February a weak dark month; at the age of 17 she had colours not associations, but each colour is that of the corresponding seasonal association. August yellow, the yellow of corn, November whitish blue, January a blue grey, May pink, while February previously thought of as a weak dark month has become grey.

Some of the links between colour and concept are the trivial happenings of childhood, others the fanciful associations so characteristic of an imaginative child. The Psychochrome for Sunday of a Scottish girl of 12 is blue - it used to be a blue sash with frayed ends, it is now just a patch of blue. To another child the psychochrome Saturday blue used to be a blue overall, to another the association of white is traced to the association between a white table cloth and dinner at one o'clock. A girl of 15 with colours for all the days and months associated shapes with them when she was younger, her psychochromes being derived from their colours. January now brown was once thought of as a brown cylinder seven feet high, wider at the base than at the top and covered with bits of snow that she always imagined as being in a certain part of the garden. Friday, now bronze red and white, used to be a bronze crumb scoop and a brush with white bristles and so on for each day and month.

A favourite colour is often a clue to the origin of psychochrome /

In children, ^{in the early} ~~the~~ ^{earliest} associations of colour with concepts had been subconscious

psychochromes. The colours of the days to one adult subject followed the colour of the initial letter except Saturday which was pink. She has ^{no} no favourite colour, but as a child pink was her favourite colour so Saturday became pink. Friday was the favourite day in the week to another coloured thinker, and about the age of five it was associated with a warm red, the other days were not coloured till long afterwards, but now at the age of 17 Friday still stands out among the rest. The favourite colour ~~is~~ is often the explanation of the psychochromes for Saturday and Sunday, both days apart in the child's life. Some children give their favourite colour to the date of their birthdays, to their own names, though no other figures or names are coloured. One small girl has no colour for voices except her Father's which has the association blue - she is a Motherless child and blue her favourite colour.

The majority of child coloured thinkers in this investigation had colour associations with sensations as well as concepts, and though coloured conception can be clearly distinguished from synaesthesia (coloured sensation) yet sensations and sounds which actually call up colour to some children, may only be mentally associated with colour to others; just as to one child it is the thought of a letter that calls up colour and to another the sound of a letter, so to some children bird songs and other sounds are /

are always ^{mentally} associated with colours, and to others it is only when actually hearing the sound that the colour comes; and even in the same group of concepts the two coloured conception and coloured hearing, may be alternative; 'some words are coloured by association of ideas' writes one girl in explaining her psychochromes for months, 'and some by the sound.'

It is rare to find a child whose colour associations are not influenced by some group of sensations:- headache and tooth-ache, dull and sharp pains are frequently coloured, but smells have colour associations for very few children. Chloroform smells pink to one girl, and acetylene gas yellow; a bicycle lamp smoking smells brown to another child, escaping gas purple.

A few have colours for tastes, roast beef, "dark yellow to one child of 10 and smells blue - but colour associations with music are the most frequent type of synaesthesia in childhood. In the secondary schools some environmental influence may be the cause of this, for colour is frequently used as an illustration in the musical appreciation classes, as well as in teaching instrumental music; in one school the idea of colour music was a most familiar one owing to such teaching.

x

Myers believed synaesthesia to be commoner among children than among adults and to be due to a sympathy (whatever be its physiological and psychological basis) existing between auditory and /

x A case of Synaesthesia B.J. of Psych. 4 1911 p. 228.

and visual experience.

Flournoy also showed that we may ~~not~~ be affected in exactly the same way by a certain sound or by a certain colour, and attempted to reconcile the two theories of the origin of colour associations by the principle of psychophysical parallelism; showing that owing to the unity of the nervous system associations might be formed between two sensations received at the same time, no matter how heterogeneous, through the mediation of the feeling tone.

This similarity (not of content, for there is no common element in sensation,) Bullough discusses in connection with characters and colour associations. He found, in his investigation on the aesthetic appreciation of colours, that in some of his subjects the essentially critical attitude towards colours was replaced by one of intense sympathy. Colours were described as cheerful, frank, energetic, thoughtful, difficult to know, and so on, and the character attributed to the same colour by being different observers often showed an astonishing agreement; thus while blue was reserved, thoughtful, and distant, red was usually open, fresh, very energetic and strong. Yellow had a temperament quite unlike blue or red; being essentially cheerful and light of heart.

The temperamental features some observers attributed to colours was explained by Lipps, and accepted by Volkelt, as due to the /

the fact that a sound and a colour may affect a subject in the same way, ^{though} the contents are incomparable, colours have no auditive qualities, sounds no visible qualities. The similarity exists between two experiences, e.g. a high sound and the colour yellow, not because of their sensational context, but because of the agreement between the manner or form of the experience. 'Thus' Bullo^ugh writes; 'It would be possible to receive a character impression from a colour without any intermediate links of either an association or physiological nature, exclusively on the basis of the similarity which we may feel to exist between the manner in which we are affected by a colour, and the manner in which we are affected by some particular emotional state.' The same explanation can be extended to the association of colours with concepts;- and these colour characters are the more interesting because ^{in the investigation} the same colour is frequently associated with the same abstract quality by different seers. The psychochrome for courage is red, for cheerful sounds such as whistling, yellow, while laughter is golden. Now Bullo^ugh's subjects described red as strong, self sufficient, proud, dashing active and splendid, yellow as essentially cheerful, frivolous, light of heart.

Galton believed that colour associations were little influenced by the environment, that they result from nature not nurture, and Professor Fraser Harris writes 'Just as their origination is not /

Psychology of the senses, the sense of sight, the sense of hearing, the sense of touch, the sense of taste, the sense of smell.

not due to the influence of the environment, so the environment exercises no modifying influence on them as life proceeds." +

B.C. a Highland girl of 16 with colour associations for days, months, vowels, people, abstract terms, tastes and music had the idea of colour for music suggested to her at a concert when she was very small, and her psychochromes for concepts gradually developed as she grew older - her Mother also has Synaesthesia. Another subject who visualises every word in colour and to whom thinking and coloured thinking are indistinguishable, traces all her colour associations to a coloured alphabet from which she learnt her letters, she did not, like some seers, have colours for the sounds of words before learning to read; her Mother has also some colour associations though much vaguer. Many similar cases could be quoted in evidence of the environmental ^{origin} nature of some ~~and~~ of psychochromaesthesia, in children, and also in some adults. J. McQ.²¹ who has a wide range of colours^{es} and concepts and ^{also} colour associations for vowel sounds, traces all her coloured thinking to her schooldays when ~~she~~ about the age of 15th heard her friends discussing their colour associations for the days of the week. She does not visualise her colours though she has elaborate day, month and number forms.

Professor Harris explains the tendency to think in colour by some inherited disposition in the central nervous system by the theory /

theory of Protoplasmic functional inertia, or inaccessibility to environmental stimuli. By virtue of this inherited disposition^{h. v. s.} 'these unalterable and arbitrary associations early unfold themselves to the consciousness of the percipient.'

Galton held the unchangeable nature of psychochromes to be one of their chief characteristics. Professor Harris writes:-
"It is almost universal confession that they appear to the percipient now as they have always appeared, that they have undergone no change during a life time full of changes."

Both Galton and Professor Harris base their conclusions on the evidence of adult subjects. When we examine the psychochromes of children, and compare these of the same individual in early and late childhood we find striking evidence of change as the years pass; for the environment is anything but ^{a negligible} negligible factor in the colour concepts ^{formed} found in childhood. However stable psychochromes may become in later life, they change in childhood, and are still changing in some individuals up to the age of 20 or even 30; more than half, 54% report some change. Especially variable are the colour associations with the days of the week. Monday always changes^{for?} to one child, Thursday is a fickle day to another. 'Lessons and the ^{doings} of the day make its colours' writes a Highland child of 11 with an amazing wealth of colour associations, and the colours change every week.

'I have had colours for all the days since I was seven' writes a girl of 17 but I can't remember them; I have different ones now'. This was a subject with very marked synaesthesia as well as chromaesthesia. To a Highland child of 12 the colours change except Saturday which is red and Sunday which is yellow, these date from very early childhood; the other days were not coloured ~~will~~ she went to school at the age of seven, and have never acquired stable colours but are always influenced by school routine - the child's Mother is also a coloured thinker and has some identical psychochromes.

New impressions may ~~also~~ affect the colours. 'A strong new association will change a colour' writes H.S. 18 who ^{at} has had colours for a wide range of concepts since early childhood 'but when I was 15 they changed.' 'I have always thought of letters and figures coloured as I do now, but every new impression makes a slight change I think' writes L.H. a Highland girl of 18; her Mother has similar colour associations but much vaguer. Learning to read was given by several subjects as a reason for changes in colour of words, 'my colours sometimes change if I get a strong new association with a thing' writes E.C. 'A great many words that had always been coloured changed when I learnt to read and letters began to get mixed with the colour and form of words'. The influence of new experiences in the origination of /

of colour associations is clearly illustrated in the case of E.B. who had colours for letters days of the week, and other concepts from early childhood, but none for figures till the age of 24, when she worked in a Government office during the war and for the first time, for she had disliked arithmetic as a child, became interested in numbers, since then all figures have assumed quite distinct colours;

The accuracy of children's accounts of the change, or of the stability, of their psychochrome is proved by a comparison of lists made by the same subjects at different ages. School girls who were sure that their colours had never changed wrote out long lists of identical psychochromes, with the same chromatic precision in describing the colours, after an interval of several years; being tested under conditions which excluded the possibility of any reference to earlier records, should such have existed. Sometimes the change in psychochromes is only temporary; one Shetland girl explained that though her psychochromes change for a few days they always returned to the original colours.

Krohn argues that the alleged unchangeable nature of psychochromes supports the physiological theory of the origin^{of} chromaesthesia, "These secondary colour impressions", he writes, "remain constant in their relation to the primary sensation. That is, the same colours are always called up by the same excitant or stimulus." Krohn also quotes the evidence of adult subjects as to the vivid nature /

nature of the impression of colour during fatigue, But we saw that here there are wide individual differences, fatigue sometimes making the colours blurred or dull. Emotion has often the same effect as fatigue, pointing to the strength of emotional influences in coloured thinking. If a day is dull the colours of some seers become grey, or the colours may not change only lose their brightness, and always are more vivid on happy days. Saturday in children's psychochromes is nearly always bright, just as Monday is often grey; an emotional reason for Monday's psychochromes is very common; Monday is blackish grey to one coloured thinker because an unpleasant day after the weekend - Black to a Highland boy because he "sees a long week of stiff lessons stretching before him;" Red to a less despondent coloured thinker, a girl, because red is such an invigorating colour and Monday is the beginning of a new week. Monday for some coloured thinkers becomes a brighter colour, towards evening.

'My colours change according to my mental atmosphere' writes a Scottish girl of 18. 'They vary according to my mood, more so /

so if I am happy or sad' writes another girl of 17.

Some subjects have colour associations only for people, places books or music that make a special appeal to them, things that do not appeal are colourless. To others, especially to young children, a dislike is often given as the very reason for a psychochrome. 'I dislike 4 and 7 so I colour them' writes one child. Another child has colours only for unlucky numbers. Emotions also affect the psychochrome of older subjects; to one seer days are never coloured unless they have an emotional atmosphere; the sameness of school in January and February make the colours of the month grey to a school girl of 16. One subject could make no lists of her psychochromes as they so constantly changed, depending entirely on her mood.

No theory of the origin of psychochromaesthesia can explain the genesis of every psychochrome, but the evidence accumulated in this investigation is sufficient on which to base a working hypothesis.

It has been shown that not every concept is coloured, but only those that make an imaginative appeal; so the Highland child's colour associations may range from his favourite day in the week to the pipes playing MacCrimmon's Lament, and an older subject's from an abstract quality to a sonata of Beethoven. The most significant of all the explanations given by seers of their colour associations is that of an emotional link that binds a colour and a concept. Some strong impressions, in childhood, ^{or} ^{at} sometimes later, some like or even dislike, accounts for the origin of hundreds of such associations; while the stimulus that starts the train of thought that unites concept and colour is the tendency of the child to personify, to give form to his abstract conceptions, to clothe his ideas with individuality even with colour.

In the other phantasies of childhood the boundary line between the real and the imaginary cannot long remain ill-defined; but the coloured thinker may escape reality owing to the personal nature of his psychochromes, and not realise that his way of thinking is not shared by all. The different concepts which a child may associate with colour is astonishing to those who look upon /

upon such a tendency as something abnormal and rare.

The wide extent of the tendency to form psychochromes in childhood, the variety and wealth of these colour associations, and the large number of cases in which they can be traced to psychical associations and to environmental influences, render the hypothesis of an obscure physiological origin unnecessary; while from heredity comes, if not a specific tendency to form coloured concepts, at least a more general inheritance; a mind sensitive to every kind of visual and auditory impression; together with an imagination that clothes ^{these impressions} them with qualities they do not in reality possess, and which to the more logically-minded seem as absurd and fantastical as to the other they are natural and inevitable.

COLOURED THINKING

Note on Questionnaires.

The following questionnaires were drawn up for use in this investigation, with a simpler form for the Highland Schools. Whenever possible the children were questioned individually before being asked to fill in the paper. Children under 10 were always tested in this way, and, some Edinburgh Schools the first record of Colour Associations were obtained by an investigation of the nature of Children's imagery at different ages: it was thus possible to find out which children had coloured concepts without introducing any suggestion of coloured thinking.

1. Coloured thinking.
2. Note on colour Associations.
3. Number Forms.

COLOURED THINKING.

You associate Colour with any of the following, give with as much detail as possible, the colour for separate day, month, letter, number, etc. Use the back of the paper if more space is required.

the Week.

alphabet.

levels.

s.

places, Names, &c.

joy, Patience, Courage, Hope, etc.

tastes.

Noises.

Animal Calls.

Which of the above did you first associate Colour ?
When did the Colours change ?

Do you mentally see the Colours, or only think of them ?

Name :

Nationality :

Give age if under 25 :

NOTE ON COLOUR ASSOCIATIONS.

Do you mentally see your colours when you hear sounds or music, or only think of them ?

Do you ever use your colours? Do they help you to think or to remember things ?

Are your colours faint or bright? Are they more difficult to recall if you are tired ?

How old were you when you first thought in colour ?

Had you more colour associations when you were younger than you have now ?

Can you give a reason for any of your colour associations? Have you a favourite colour ?

Which other members of your family think in colour ?

Name :

Nationality :

Give age if under 25 :

NUMBER FORMS.

When you think of the numbers 1—100, do you mentally *see* them in any form or outline? If so, make a drawing of the way in which you think of them, on the back of this paper.

Does your number form become clearer when you try to recall it?

Do you ever use your form?

If any of the figures are coloured, give the colours on your diagram.

Can you describe the size of your form and its position in space?

Is the form fixed or changeable? Does it contain more figures than when you were younger?

Does your number form date from the time you learnt to count or later?

Can you remember anything which explains the particular shape of your form?

Which other members of your family have number forms?

Name :

Give age if under 25 :

Nationality :