

THE BODY CONCEPT

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THE CONCEPT OF THE BODY

THE need to clarify the “confusion in neurology and allied disciplines between the body image, the body schema, the body concept and the perceived body” was emphasized by Smythies (1953). For the neuropsychiatrist it is perhaps the disorders of the body schema and perceived body which are of the greatest interest and importance, but the confusion which still exists between the body concept and the body percept make it probable that a definition and examination of the body concept would clarify thinking about all Body Image problems.

There has, so far, been no adequate definition of what is meant by the term “body concept”, and I am indebted to Dr. J. P. S. Robertson whose original critical contribution in Reitman’s *Psychotic Art* (1950) stimulated an analysis of the term Body Image, for the following definition. Robertson (1958) suggests as an operational definition of a *concept*, the set of phenomena (a) named by an individual when asked to give the meaning of a word, or (b) listed by him in response to a questionnaire on the meaning of a word, or (c) indicated by his actions in specific choice situations. While concepts vary in complexity and have denotative and connotative aspects, they are given cohesion by the existence of a word as a symbol. We can, therefore, define the *body concept* as the set of phenomena named by an individual when asked to describe the body, reply to a questionnaire, or draw the human figure. This is a *general body concept*. An individual’s concept of his own body would be the set of phenomena named by him when asked to describe his own body, reply to a questionnaire, or draw it.

It can be seen that the concept obtained will depend upon, among other factors, the questions which are asked. The instructions “Describe your own body” and “Describe the human body” would almost certainly yield differing concepts. Previous workers have used this technique; for example, Goodenough (1926) instructed children “to make a picture of a man”, while Wright (1956), using Eaton’s (1940) Semantic Frequency List, asked, in effect, a large group of English, French, German and Spanish literary laymen “How do you describe the body in writing?” A similar method was employed by Tait and Ascher (1955) who asked various groups of people to “Draw the inside of the body including all organs”. The effect on the concept of the nature of the instruction was recognized by Tait and Ascher who wondered whether they might have obtained other results if they had instructed their subjects to “Draw the inside of a *person*”.

EXPERIMENTAL METHOD

It was decided to compare a body concept in subjects totally blind from birth with the concept of normal and schizophrenic subjects, and so a drawing technique could not be used. A method which might be described as "associative listing" was therefore employed. This is very similar to the technique described by Bousfield and Sedgewick (1944). The subjects were presented with a form at the top of which they were instructed to write their occupation, age and sex in appropriate spaces. In order to reassure them of the anonymity of their contribution to the research, the sighted normals were requested not to put their names on the paper and no note was made of the names of the blind. This was not done in the case of the schizophrenic patients who were given the list with other research material.

Below this there were three columns with the headings reading from left to right "Names of Colours", "Parts of the Body" and "Names of Occupations". Just above the columns was printed the instruction "Under each of the following headings please write down a list of 10 names". No further instructions were given. When, very infrequently, subjects asked for further instructions, as little as possible was said to make the matter clear. Only words listed under the heading "Parts of the Body" were used in this study.

THE SUBJECTS

One hundred and ten adult sighted subjects were examined; 55 male and 55 female. The group consisted of workers at an electronics factory and the clerical and artisan staff of a hospital. Nurses were not tested as it was felt that attendance at lectures in medical subjects might influence the results. In addition 83 patients diagnosed as schizophrenic were tested. There were 46 women and 37 men. All were co-operative patients, the majority of whom had spent many years in hospital. Twenty-nine subjects, totally blind from birth, were also examined. In this case the test was administered individually; the instructions were given verbally and the subjects' replies written down by the examiner. There were only 7 blind male subjects, in spite of the co-operation of various blind organizations to secure more. All the blind subjects tested were Braille readers and any considered to be suffering from a serious emotional disturbance were excluded. In all subsequent discussion the words "blind subjects" refer to subjects totally blind from birth.

THE RESULTS

The Frequency of Mention

The frequencies with which the individual body words occur in the lists obtained from the 139 normally sighted and totally blind subjects have been calculated and are shown in Table I. In this calculation singular and plural forms of the same word have been summed, as have synonyms when they appeared to be coterminous; for example *trunk* and *torso* or *breast* and *bust*. Anatomical terms were not summed with popular words except in the case of *thorax* and *chest* where the equivalence seemed close. The frequencies are shown for sighted normal male and female subjects separately, but for the blind no sex differentiation is made because of the small numbers tested. Only parts mentioned by more than 5 per cent. of subjects are included.

TABLE I

Frequency of Occurrence and Ranks of Body Names in Sighted and Blind Subjects

Name of Body Parts	Blind and Sighted Subjects		Sighted Subjects				Blind Subjects	
	Total Frequency of Occurrence	Rank of Total Frequency	Frequency in Males	Frequency in Females	Total Frequency of Occurrence	Rank of Total Frequency	Total Frequency of Occurrence	Rank of Total Frequency
Arm(s)	113	1	47	49	96	1	17	5=
Leg(s)	112	2	43	50	93	2	19	2=
Head	102	3	40	43	83	3	19	2=
Foot, feet	94	4	41	38	79	4	15	8
Hand(s)	84	5	35	33	68	5	16	7
Finger(s)	65	6=	30	25	55	6	10	10
Eye(s)	65	6=	26	20	46	7	19	2=
Nose	63	8	23	18	41	11	22	1
Ear(s)	61	9	24	20	44	9	17	5=
Toe(s)	50	10	25	17	42	10	8	11=
Neck	49	11	16	29	45	8	4	22=
Chest, thorax	45	12	22	16	38	12	7	13=
Mouth	31	13	10	10	20	17=	11	9
Ankle(s)	29	14=	14	13	27	13	2	29=
Shoulder	29	14=	12	12	24	14=	5	18=
Heart	29	14=	7	14	21	16	8	11=
Knee(s)	28	17	17	7	24	14=	4	22=
Stomach	25	18	5	13	18	20	7	13=
Thigh(s)	22	19	7	13	20	17=	2	29=
Trunk, torso	19	20=	9	10	19	19	—	—
Lung(s)	19	20=	6	9	15	21	4	22=
Brain(s)	17	22	6	5	11	23=	6	15=
Hip(s)	15	23	4	8	12	22	3	25=
Elbow(s)	14	24=	5	4	9	27	5	18=
Spine	14	24=	4	4	8	28=	6	15=
Liver	13	26=	4	7	11	23=	2	29=
Tooth, teeth	13	26=	5	2	7	31=	6	15=
Kidney(s)	12	28=	4	7	11	23=	1	35=
Wrist(s)	12	28=	3	7	10	26	2	29=
Rib(s)	11	30=	4	4	8	28=	3	25=
Face	11	30=	1	5	6	33	5	18=
Back	9	32=	2	2	4	35=	5	18=
Chin	9	32=	4	4	8	28=	1	35=
Abdomen	9	32=	4	3	7	31=	2	29=

In Table II those parts named by less than 5 per cent. of subjects are arranged according to their individual frequencies. Seventy-five body parts were named in all. Thirty-four parts are mentioned by more than 5 per cent. and 41 parts by less than 5 per cent. of all examined. No part is mentioned by 100 per cent. of subjects, but arm or leg, which are highest in order of frequency, are listed by about 80 per cent. of subjects. Only 12 body parts are listed by more than 25 per cent. of sighted subjects and 14 body parts by more than 25 per cent. of the blind. The parts listed by the sighted are *arm, leg, head, foot, hand, finger, eye, neck, ear, nose, toe,* and *chest*. The blind list the same parts

TABLE II

*Frequency of Occurrence**Parts Listed by Less than 5 Per cent. of Normal Sighted and Blind Subjects*

Parts Listed Once:	Parts Listed Twice:
Back passage	Appendix
Cheek	Bladder
Collar bone	Bones
Diaphragm	Buttocks, seat
Epiglottis	Forehead
Femur	Humerus
Forearm	Shoulder blade
Hip bone	
Jaw	Parts Listed Three Times:
Knee cap	Throat
Lips	Shin
Nerves	Intestine
Patella	Nail(s) or fingernails
Phalanges	Muscle
Private parts (<i>sic</i>)	
Pupil	Parts Listed Four Times:
Sacroiliac	Waist
Skin	Pelvis
Skull	Breast (or bust)
Spleen	
Tibula (<i>sic</i>)	Parts Listed Five Times:
Thumb	Calf
Temple	Tongue
	Hair

except *neck* which is replaced by *mouth*, while *heart* and *stomach* are added. Comparisons of body parts which are listed significantly more frequently or less frequently by the totally blind from birth in comparison with normally sighted subjects are given in Table V.

Tables III and IV show the word frequencies for the schizophrenic subjects;

TABLE III

Frequency of Occurrence and Ranks of Body Names in Schizophrenic Subjects

Name of Body Parts	Total Frequency of Occurrence	Rank of Total Frequency
Leg(s)	70	1
Arm(s)	62	2
Head	61	3
Foot, feet	59	4
Hand(s)	43	5
Eye(s)	34	6
Ear(s)	32	7=
Toe(s)	32	7=
Finger(s)	31	9
Nose	29	10
Neck	28	11
Chest thorax	25	12
Heart	24	13
Stomach	18	14
Mouth	14	15
Lung(s)	13	16
Knee(s)	12	17=
Shoulder	12	17=
Abdomen	11	19
Hair	10	20=
Thigh(s)	10	20=

TABLE III—continued

Name of Body Parts	Total Frequency of Occurrence	Rank of Total Frequency
Tooth, teeth	9	22
Hip(s)	8	23=
Muscle(s)	8	23=
Elbow(s)	7	25=
Back	7	25=
Trunk, torso	6	27=
Spine	6	27=
Nail(s)	6	27=
Liver	6	27=
Rib(s)	6	27=
Lip(s)	5	32=
Kidney(s)	5	32=
Forearm(s)	5	32=

these are not separated according to sex. In Table III parts mentioned by more than 5 per cent. of subjects are included. Eighty-nine different responses were given. Thirty-four body parts are named by more than 5 per cent. of schizophrenics and 41 parts by less than 5 per cent. Eight responses (occurring only once) are unusual while 6 are irrelevant. Unlike the blind and sighted normal subjects several schizophrenics only listed 3 or 4 words.

A comparison of the lists shows considerable similarity between the schizophrenic and normal subjects. There are, however, some differences but

TABLE IV
Frequency of Occurrence
Parts Listed by Less than 5 Per cent. of Schizophrenic Subjects

Parts Listed Once:	Parts Listed Twice:
Membrane	Skin
Digit	Blood
Ligaments	Chin
Vessel	Biceps
Fat	Bladder
Tibia	Breast
Femur	Flesh
Loin	Body
Uterus	Vein
Limb	
Sole	Parts Listed Three Times:
Groin	Pelvis
Intestine	Waist
Gland	Face
Nerve	Wrist
Sinew	
Appendix	Irrelevant Words:
Heel	Lady(ies) mentioned twice
Cheek	Cuckoo
Throat	Leverett
Buttock	Fox
Artery	Claw
Internal organs	Food
Unusual Responses:	
Right arm	Lower part
Pulse	Upper part
Aural	Right side
Figure	Left side

only *ankle* occurs significantly less frequently in schizophrenics (1 per cent. level) than normals (Table V). There are no other significant differences.

TABLE V
Comparison of Significant Differences in Total Frequency of Occurrence Between Sighted Normals and Blind Subjects and Schizophrenic Subjects

Body Parts more Frequent in Blind Subjects			
Part	Significance Level (Per cent.)	Rank in Blind	Rank in Sighted Normals
Nose	1	1	11
Eye	5	2=	7
Mouth	5	9	17=
Tooth	5	15=	31=
Back	5	18=	35=
Body Parts less Frequent in Blind Subjects			
Leg	5	2=	2
Arm	1	5=	1
Neck	1	22=	8
Trunk	5	Not named	19
Body Parts less Frequent in Schizophrenic Subjects			
Part	Significance Level (Per cent.)	Rank in Schizophrenics	Rank in Sighted Normals
Ankle	1	35=	13

No part occurred significantly more frequently in schizophrenic subjects.

Thirteen parts are listed by more than 25 per cent. of schizophrenics. These are the same as for normals with the addition of *heart*.

Order of Mention

The mean relative positions of individual words in the word lists have been calculated for all words occurring more than 5 times in either of the three lists. In Table VI (page 62) these mean ranks together with the rank of the mean ranks are shown.

Frequency of First Mention

Those parts mentioned first in the word lists by both sighted and blind subjects are shown in Table VII (page 63). Significantly more blind subjects mentioned *ear* first and significantly fewer mentioned *head* first. In sighted subjects *head*, *arm*, *leg* and *hand* accounted for 82 per cent. of the cases; in the blind these accounted for 57 per cent. of first mentions, and in schizophrenics for 71 per cent.

Sex Differences

These have only been studied in the sighted normal subjects. Two statistically significant differences were found in the sighted group; *knee* was more commonly listed by men and *neck* by women. One cannot attach much weight to this finding as it was not reproduced with the blind, where proportionately more males mentioned *neck*.

TABLE VI
Order of Mention

Part	Sighted		Blind		Schizophrenic	
	Mean Rank	Rank of Mean Rank	Mean Rank	Rank of Mean Rank	Mean Rank	Rank of Mean Rank
Head	3.0	1	4.3	4=	2.7	1
Arm(s)	3.4	2	2.3	1	3.2	3
Leg(s)	4.0	3=	3.0	2	4.3	5
Trunk	4.0	3=			3.0	2
Hand(s)	5.0	5=	5.0	8	5.6	11=
Knee(s)	5.0	5=			7.1	30=
Neck	5.1	7			5.3	8
Mouth	5.2	8	6.2	12=	6.4	23=
Ear(s)	5.4	9	4.4	6	5.5	10
Eye(s)	5.5	10	4.3	4=	5.9	15=
Nose	5.6	11=	5.4	11	5.8	13=
Calf(ves)	5.6	11=				
Brain(s)	5.8	13=	4.2	3		
Foot, feet	5.8	13=	6.3	14	5.9	15=
Shoulder(s)	5.8	13=	6.2	12=	5.9	15=
Rib(s)	5.9	16			4.0	4
Elbow(s)	6.0	17	8.0	19	5.9	15=
Heart	6.3	18	4.6	7	5.2	6=
Wrist(s)	6.4	19				
Ankle(s)	6.5	20				
Abdomen	6.6	21			6.2	21
Lung(s)	6.7	22=			5.2	6=
Chest (thorax)	6.7	22=	6.7	17	5.8	13=
Thigh(s)	6.8	24			7.1	30=
Finger(s)	6.9	25=	6.6	16	6.9	28
Toe(s)	6.9	25=	6.5	15	6.8	27
Tooth, teeth	6.9	25=	8.3	20	6.0	19=
Chin	7.0	28=				
Spine	7.0	28=	8.5	21	8.0	33
Face	7.2	30	7.4	18		
Hip(s)	7.3	31			5.6	11=
Stomach	7.4	32	5.3	10	6.4	23=
Back			5.2	9	7.3	32
Kidney(s)					5.4	9
Forearm(s)					6.0	19=
Muscle(s)					6.3	22
Hair					6.4	23=
Lip(s)					6.6	26
Nail(s)					7.0	29
Liver					9.2	34

There is also a sex difference in regard to the listing of plurals for body parts, e.g. *eyes* instead of *eye*. Singular words are more common in males, plurals in females and this difference is statistically significant in some items. This may be an idiosyncrasy of the present sample or a definite sex trait, and will require testing in further samples.

DISCUSSION

Just as, in our everyday thinking, we fail to distinguish between bodily experience and description, so in all writings of the Body Image, there is little distinction made between the body percept and the body concept.

TABLE VII
Frequency of First Mention in List of Body Parts

Body Part	Sighted		Blind		Schizophrenic	
	Rank	Frequency	Rank	Frequency	Rank	Frequency
Head	1	46	2=	4	1	39
Arm(s)	2	23	1	8	2	15
Leg(s)	3	12	4	3	4	4
Hand(s)	4	9	5=	2	7=	1
Eye(s)	5	6	5=	2	7=	1
Ear(s)	6=	2	2=	4		
Brain(s)	6=	2	5=	2	7=	1
Finger(s)	6=	2	8=	1		
Mouth	6=	2				
Nose	10=	1			5	2
Toe(s)	10=	1			5	2
Trunk	10=	1			7=	1
Waist	10=	1				
Shoulder blade	10=	1				
Diaphragm			8=	1		
Hip bone			8=	1		
Heart					3=	7
Thigh(s)					7=	1
Forearm(s)					7=	1
Knee(s)					7=	1
Lung(s)					7=	1
Bladder					7=	1
Brain(s)					7=	1
Artery(ies)					7=	1
Nail(s)					7=	1
Face					7=	1

Paper after paper on the Body Image confuses concept with percept and many investigators have tried to demonstrate that changes in human figure drawing parallel changes in bodily perception.

Recent papers by Shontz (1956) and Silverstein and Klee (1958) typify the confusion existing between these two quite different aspects of the Body Image.

Human Figure Drawing and the Body Concept

While the operational definition of the body concept makes it desirable for one to consider the many studies of human figure drawing it should be recognized quite clearly that there is a definite difference between the body concepts obtained by drawing and by "associative listing". It is worthwhile to see what relationship, if any, exists between these concepts. We must consider the three stages in the development of children's drawings described by Lowenfeld (1939); the *pre-schematic*, the *schematic* and the *representational*. In the *pre-schematic* stage the child is searching for a method of presenting form. This is a stage dominated by exploration and experiment with forms and symbols rather than with the developed expression of a concept. In the *schematic* stage the child is expressing in his drawings a concept rather than what he sees, and it is this stage which is of importance for us and which Goodenough (1926) has analysed. The child's schematic drawing is bound to a symbol (Lowenfeld, 1939) and resembles the enumeration of objects (Buehler, 1930); two important features of the body concept, as defined by Robertson (1958). Luquet (1913) and Paget (1932) give illustrations of this and show in this stage how various parts of the body may be put down without any synthesis

into a recognizable whole; "an eye will be placed next to the head, an arm next to a leg" (Fig. 1). It is to this stage that the results of our word listing study could, perhaps, be related. After the mental age of 10 children progress to the *representational* stage in their drawing of the human figure. This is the "realistic" stage of artistic production and may be influenced in certain cases by visual and in others by haptic experiences.

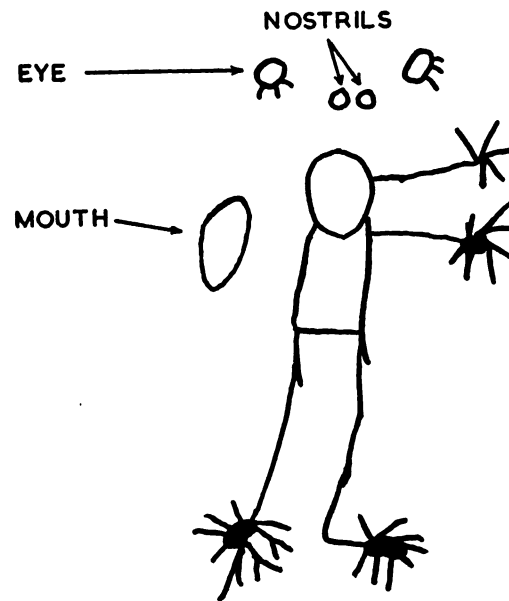


FIG. 1.—Drawing of a man by an East African native girl aged 6 years 6 months.

Representational artistic productions are not related to the body concept in our sense, for the artist does more than list phenomena; he draws on his visual and haptic experience to create form. "The nude is the body re-formed" says Clark (1956) paraphrasing Aristotle's definition of art as that which completes what nature cannot finish. Woëlfllin (1932) says this in another way when he states that "all pictures owe more to other pictures than they do to nature".

The "Integral" and "Non-Integral" Parts of the Body Concept

Goodenough pointed out that in its development the child's schematic drawing of the human figure consists of two parts; the first consisting of items which are an integral part of his concept of the object drawn, while the second includes items not yet integrated. "The frequency with which any given characteristic tends to appear is a function of the extent to which it has become integrated into the developing concept." In view of the similarities pointed out between the body concept here described and schematic human figure drawing it is worth considering how frequently a word must occur in the lists before it can be considered to be an "integral" part of the body concept. If from the frequency tables (Tables I and III) one takes those parts listed by at least 25 per cent. of the subjects it is found that the sighted subjects list 12 parts, the blind 14 parts and the schizophrenics 13 parts. These could be considered to represent the "integral" part of the body concept just as the parts which occur

in less than 5 per cent. of subjects can be considered a "non-integral" part of the concept. What of the parts with a frequency of more than 5 per cent. and less than 25 per cent.? There are 21 such parts in the "sighted" list, 20 in the "blind" list and 26 in the "schizophrenic" list, of which 17 parts are common to all lists occurring in roughly the same proportion and order of frequency.

It seems that those parts with a frequency of more than 5 per cent. can be considered to form an "integral" part of the concept, for without them, the concept would be extremely circumscribed and would in any case not include parts considered by Tait and Ascher (Table VIII) to form the "inside-of-the-body" concept nor would it include 5 parts included in the drawings of 25 per cent. of Goodenough's 10-year-old subjects (Table IX, page 66).

TABLE VIII
Rank Order of Internal Body Parts in Different Investigations

Present Investigation		
Sighted	Blind	Schizophrenic
Heart	Heart	Heart
Stomach	Stomach	Stomach
Lung	Brain	Lung
Brain	Spine	Spine
Liver	Lung	Liver
Kidney	Rib	Rib
Rib	Liver	Kidney
Spine	Kidney	Brain
Intestine	Appendix	Bone
Appendix	Bladder	
Bladder		
Spleen		
Tait and Ascher (1955)		
Neuropsychiatric Patients	Naval Academy Candidates	Medical and Surgical Patients
Heart	Heart	Lung
Lung	Lung	Heart
Stomach	Intestine	Stomach
Intestine	Stomach	Intestine
Kidney	Kidney	Kidney
Brain	Liver	Brain
Rib	Brain	Liver
Liver	Oesophagus	Rib
Bladder	Pancreas	Trachea
Vein/blood vessel	Appendix	Bladder
Penis	Trachea	Oesophagus
Testes		Appendix
Trachea		
Oesophagus		
Wright (1956)		
Eaton	<i>Oxford English Dictionary</i> Columns	
Heart	Heart	Heart
Brain	Brain	Stomach
Stomach	Stomach	Spine
Womb	Womb	Rib
Rib	Rib	Liver
Lung	Lung	Brain
Liver	Liver	Lung
Bowel	Bowel	Kidney
Kidney	Kidney	Intestine

TABLE IX

Percentage of Frequency of Occurrence of Body Parts in Children's Drawings of a Man (after Goodenough)

	7 Year Old Normals	10 Year Old Normals
Head	100	100
Legs	100	100
Trunk	99	100
Eyes	98	100
Nose	95	100
Arms	88	98
Mouth	91	96
Fingers	77	93
Chin and forehead	56	90
Neck	44	83
Feet	53	76
Heel	18	66
Arm joint (elbow or shoulder)	18	64
Hair	22	58
Leg joint (knee)	13	53
Hand	14	48
Shoulders	7	46
Ears	27	36
Nostrils	8	27

This attempt to limit the concept is arbitrary and artificial but is justifiable for the purpose of discussion.

The Determinants of the Conceptual Content

We come now to a consideration of the arrangement of the words in our lists, and the principles according to which they are ordered. We shall consider the effects of perception, motivation, language behaviour and the body schema.

In the schematic drawings of the human figure the child exaggerates the size of items which seem interesting or important; other parts are minimized or omitted. What determines the importance of certain items? The importance of perceptual experience has been stressed by most writers and this view is perhaps best stated by Hobbes when he says, "There is no conception in a man's mind which hath not at first, or by parts, been begotten upon the organs of sense". While direct bodily perceptions can explain much of the conceptual content, it cannot explain the inclusion of parts such as the internal body parts, which cannot be so experienced. Knowledge of these parts depends on less direct or secondary perception; from information in books or pictures or other sources. In the reproduction of these perceptions there is a process of selection. In their drawings children "do not show all the facts which they know about the body but only those which are so essential or characteristic that they occur . . . spontaneously" (Goodenough, 1926). In this selection the individual's mental and bodily constitution, especially such factors as intelligence, sex and social taboos, will operate. Many factors are at work shaping the concept. McKellar (1957) proposes a theory of thinking which summarizes these views. He believes that thought products in general are the result of the organization of previous perceptual impressions. These impressions are provided either by original perceptual content (*the primary perception*) or, by relationships extracted from other perceptual contents (*the secondary perception*), and they are moulded by *motivational factors* which gather together those experiences which are relevant.

The Influence of Primary Perceptions on the Body Concept

The study of the relationship of primary perceptions to the body concept as obtained by associative word listing does not, except in respect of vision, which will be discussed later, yield profitable results. All the parts mentioned except the internal body parts can be perceived by touch or are visible in the individual's own body or in the bodies of others, and it must be assumed, at least for the time being, that their inclusion in the concept could be determined by primary perception. Of the primary perceptions touch, movement, pain and vision could be determinants of the body concept and their possible influence will be considered in more detail.

Since all the parts mentioned (apart from the internal parts) can be touched, it cannot be said that "touchable" parts are more frequently mentioned than "untouchable" parts. On the other hand, some parts frequently touched, for example, *skin, back, chin, hair, forehead* and *lips*, receive scant mention. Closely allied to the manual analysis is the importance of the mobility of body parts. Earl (1933) has stressed that mental defectives draw the head and trunk larger than the limbs since the limbs have less interest for the defective who has "less activity and less interest in activity". Lauretta Bender (1940) studying the body concept of post-encephalitic children by Goodenough's method, found that their concept of their bodies was disrupted by the disturbance of mobility. "It is the most important fact that motor impulses give the final shape to the body image." Schilder (1935) too, feels that the "obedience" of a body organ plays an important part in the creation of the Body Image. Sina Mott (1936) showed that the degree of activity shown in children's drawings of the human figure correlated highly with the child's behavioural activity as rated on the Marston Scale.

All the 5 body parts mentioned by more than half the subjects in the present investigation can be moved voluntarily, as can more than half the parts included in the body concept. The trunk on the other hand is only mentioned by 13 per cent. of subjects, although it comes third in order of mention (Table VI). These findings seem to offer some support for considering the perception of movement a determinant of the body concept.

While Schilder (1935) and Lhermitte (1939) have stressed the influence of pain in the development of the Body Image, consideration of the present list of body parts does not support an influence on the body concept. Those associated linguistically with the suffix "ache" such as *head, ear, stomach, tooth* and *back* are scattered in a random fashion throughout the lists. It is possible that pain may have a more direct influence on the development of the body percept and indirectly influence the body concept, but there is no evidence for this view in this experiment.

Vision and the Body Concept

While some of the controversy which has centred on the importance of vision in the body concept can be explained by the failure to distinguish adequately between body percept and body concept, there is, nevertheless, a definite divergence of view on this subject which is not of semantic origin.

Critchley (1953), in a stimulating article on tactile thought in the blind, supports the view of Schilder (1935) and Lhermitte (1939) when he maintains that of the various factors which combine to determine the conception of the body "vision is by far the most important, for it both affords knowledge as to the appearance of one's own body and permits comparison with that of

others. The body image of those *born without sight* must, therefore, be quite unusual". Lowenfeld (1939) studying the drawings of *weak sighted* children found that these were similar to those of normal children and contended that the drawn human schema is not dependent on sight. Riddoch (1941) also denied that the visual image of the body should be given first place and pointed to the expert use of the body by the congenitally blind, while Flugel (1930) points out that civilized man has, apart from the face and hand, little opportunity of observing the bodies of his companions.

From the present investigation, testing as it does the sighted and the totally blind from birth, it is possible to make some suggestions about the part that visual perception plays in the body concept. The internal body parts, depending as they probably do on secondary perception, are almost the same in blind and sighted subjects.

Considering the other parts we find (Table V) that *nose, eye, mouth, tooth* and *back* have a significantly greater frequency of occurrence in the blind. This is represented graphically in Figure 2, where the length of the horizontal

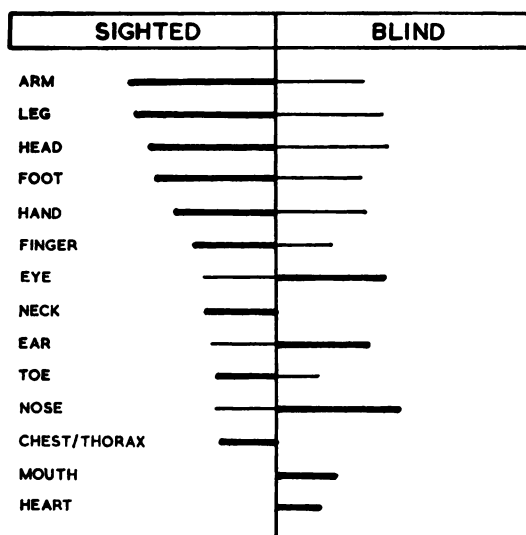


FIG. 2.—Comparison of the frequency of mention of body parts by blind and sighted subjects.

lines denotes the frequency of mention of the first twelve body parts listed by sighted and blind subjects. *Nose* is the most frequently mentioned part in the blind, being mentioned by 75 per cent. of those tested. This finding was unexpected, although a plasticine model of the head by a blind boy discussed by von Stockert (1952) and illustrated in Figure 3 shows a marked exaggeration of the nose. The only other significant difference occurs in the order of the first mention (Table VII) where it can be seen that significantly more blind subjects mentioned *ear* first and significantly fewer mentioned *head* first. There is thus a definite emphasis in blind subjects, with the sole exception of *back*, on facial parts or organs of special sense. The emphasis on the face was not entirely expected as Révész (1950) and Critchley (1953) have stressed the emphasis which the blind place on hands and fingers. Helen Keller's (1908) experiences reinforce this view, for she says, "If I had made a man I should

certainly have put the brain and soul in his finger tips." It is important to remember that Helen Keller was deprived, not only of sight, but of hearing as well.

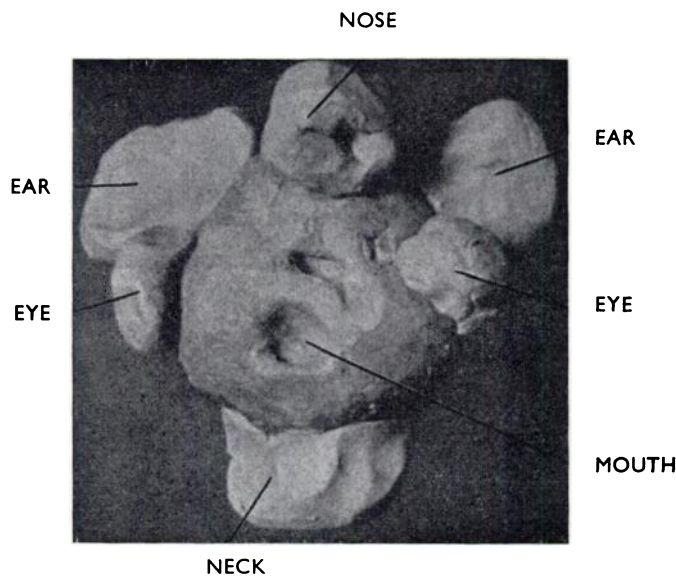


FIG. 3.—A head modelled in Plasticine by an intelligent boy of 12, totally blind from birth. (After Von Stockert.)

For the totally blind who are not deaf, the face and not the hands is of primary sensory importance. The process by which the blind are able to sense obstacles at some distance has been known for some years and has been called "facial vision" by James (1890). One of James's subjects described it thus, "I seem to perceive objects through the skin of my face and to have the impression immediately transmitted to the brain". It has always been suspected that hearing played a great part in this perception and this seems to have been confirmed by the work of Worchel and Dallenbach (1947) since they found that "facial vision" was absent in the deaf blind. For the blind auditory perceptions are apparently referred to the face in the perceived body, and it is of considerable interest to find that the face, presumably as a result of this alteration in the primary bodily perceptions of the blind, assumes a significantly greater importance in their body concept. Similar study of the "deaf-blind" would be of great interest.

The Influence of Secondary Perceptions on the Body Concept

The eight "internal" parts of the body named in Eaton's word frequency lists seemed to Wright (1956) "to differ from all the other named parts in respect of sensory analysis". These parts cannot be perceived directly and our knowledge of them must come from reading, from pictures and from hearsay. They form, nevertheless, an integral part of our body concept resulting from associative listing. They do not appear in the concept delineated by Goodenough's children but they have been shown graphically by the test of Tait and Ascher (1955) where the subjects were instructed to "draw the inside of the body including all the organs". In Table VIII one can compare the rankings of

internal body parts in lists based on the "Inside of the Body Test", drawings of neuropsychiatric patients, naval academy candidates and medical and surgical patients, with the lists of the blind, sighted normal and schizophrenic subjects in the present experiment. The frequency of these words in Eaton's lists and the ranking of the number of columns devoted to these words in the *Oxford English Dictionary* (Wright, 1956) are also given.

If we consider the first eight parts obtained in these eight lists from such widely different sources the similarities are very marked. Five parts are mentioned in all the lists and two in seven of the eight lists. Only five other parts occur. The unanimity not only in content but in ranking and frequency is striking and appears to confirm the assumption that this part of the body concept (about a quarter of the whole concept) is dependent on secondary perception.

Language Behaviour

At this point it is necessary to consider other possible determinants of the "associative listing" body concept which can be described under the heading of language behaviour.

According to the views of the language behaviourists, an individual in the present test situation responds to the stimulus to name 10 body parts by tapping a mental pool of potentially associated words. The selection of words from this pool could be a random matter, or it could be determined by the relative habit strengths of the words. Bousfield and Barclay (1950) support the latter view when they say that "as habits these associates have been subjected to various degrees and types of reinforcement and hence differ in strength". Those responses most extensively reinforced, therefore, are those most likely to occur, i.e. have the greatest frequency. Similarly, habit strength will also determine the order in which the subject draws on the pool of associative responses. In subjects whose verbal habits have been formed in a common culture there should be a positive correlation between frequency and order of mention. Bousfield and Barclay found this positive correlation for their subjects.

In the present study, taking words occurring at least five times in the "sighted normal" lists, a Spearman rank-order correlation of 0.57 between total frequency and mean rank-order of mention, was obtained. Whether it would have been higher in a group whose cultural background was as homogeneous as Barclay and Bousfield's undergraduates is impossible to say.

Zipf (1945, 1949) suggests determinants other than habit strength and by an analysis of samples of written English, Latin and Chinese has shown that the frequency of occurrence of words is inversely related to their length; that the lower the rank-order in frequency the more different words are found at that rank, and that the average number of different meanings for a word is proportionate to its frequency of occurrence.

If these findings are considered in relation to the lists of words in Tables I and II, one can see that of the 34 most frequently occurring only 7 are polysyllabic whereas of the 41 words having frequencies of less than five, 23 are polysyllabic. A consideration of these two tables also supports his second finding.

The number of different meanings per word has been calculated from the *Thorndike's English Dictionary* (1948). Zipf had used the *Thorndike Century Senior Dictionary* but this was unobtainable. In Figure 4 the number of meanings is plotted graphically against the rank-order of frequency. Zipf's proposition

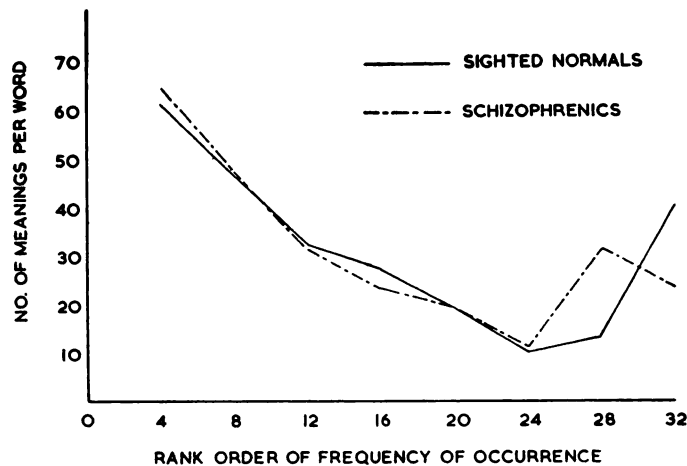


FIG. 4.

is confirmed for the first part of the curve but *face* and *back*, words of low frequency, have many meanings.

It seems quite clear that language behaviour plays a large part in determining the body concept obtained by the present method.

Schizophrenia and the Body Concept

In the symptomatology of schizophrenia there is often in Reitman's (1950) view a disturbance of the individual's concept of his own body and of the human body in general. This disorder of the body concept is depicted, he believes, in the schizophrenic's pictures of the body by "amputated limbs, mutilated bodies, detached heads, fusion of parts and the like."

Not all the studies of drawings of the human figure by schizophrenics have shown the changes noted by Reitman. Stonesifer (1949) using the Goodenough Scale found no significant differences between the drawings of male schizophrenics with an illness of less than 3 years' duration and normals. Smith (1953) found no difference in the time sequence of the parts drawn; while Chase (1941) found when scoring drawings by schizophrenics and normals on the Goodenough Scale that "scatter" of the items drawn was the prominent feature in the schizophrenic drawings.

Szasz (1957) and other authors with an interest in psycho-analysis believe that there is an increase in "libido tonus" either of the whole body or some organs, but offer no objective evidence. Presumably changes of this type would alter the body percept but if they do, there is no comparable change in the body concept. One wonders how much Reitman and other authors have been influenced by "special cases" where such changes do occur in the body concept.

Returning to a consideration of the word lists of body parts, it might be expected that schizophrenic disturbances in thinking, for example "over-inclusion", as described by Cameron (1944) or, the "loss of continuity in associations" (Bleuler, 1950), would be reflected in the lists.

While the list of irrelevant words in Table IV shows that there is "over-inclusion" by some schizophrenic subjects, the rank-order of frequency for the parts used by more than 25 per cent. of subjects is essentially the same as for normals (Tables I and III). In the 34 parts mentioned by more than 5 per cent.

of subjects only *ankle* is mentioned significantly less frequently than in normals. Sequences in associative listing which were calculated for normals and schizophrenics showed few differences and are not reported in detail.

From the point of view of language behaviour (Zipf, 1949), it is clear that as in normals the frequency of the occurrence of words is inversely related to their length and that the lower the rank-order in frequency, the more different words are found at that rank (Tables IV and V). The number of different meanings in relation to rank-order in frequency are plotted in Figure 4 as for normals, and it will be seen that the curve is almost identical.

In a further study of the relationship between the rank frequency distribution of words in schizophrenic language, Whitehorn and Zipf (1943) interpret their limited data in terms of opposing tendencies to "repetitiousness and diversification" in speech. The tendency to repetitiousness tends to increase frequency and diminishes the number of different words, whereas the tendency to diversification tends to increase the number of different words and diminish the relative frequency of their use. They equate the tendency to repetitiousness with autism. While their work is not entirely relevant to this study, since it involved the analysis of large quantities of written material, it does recognize that the correlation between word frequency and rank may, in schizophrenia, have other explanations than those suggested by Bousfield and Barclay (1950).

A Spearman rank-order correlation for the "schizophrenic" list of body parts of 0.38 was found between total frequency and mean rank order of mention. As stated previously, a figure of 0.57 was found in "normal sighted" lists. The correlation for schizophrenics is significantly less (at the 5 per cent. level) than that found for normal sighted subjects.

Apart from the tendency to a greater scatter in the results of the schizophrenics and the significantly lower correlation between frequency and rank-order of mention, the results are perhaps surprisingly similar to those obtained in normals. As far as the method of association listing goes, it does not seem to show a gross distortion of the body concept in chronic schizophrenic patients. It is hoped to present a study of the concepts of individual patients at a later date.

The Influence of Motivational Factors on the Body Concept

The present study was not designed to investigate the influence of motivational factors on the body concept but certain observations are relevant. Nothing can be said of the effects of intelligence although these have been studied extensively by Goodenough (1926). Sex appears to have less effect than might have been expected from the work of other authors. The small differences noted are of doubtful significance. In Goodenough's study sex differences depend more on clothing characteristics and differences in the proportions of various parts than on their presence or absence. Such differences in the male and female concepts would not, therefore, be demonstrated in the present investigation. The influence of other motivational factors is even more obscure and the present study does little to clarify the problem although the associative listing method of investigating the body concept might be a useful research tool in the investigation of the claims of such workers as Machover (1949). Machover believes that in the "draw a person" test the individual draws consciously or unconsciously on the whole system of psychic values and she attempts to assess personality structure from the drawings obtained. Her work has been examined critically by Copeland (1952), who points out the lack of

statistical data, the arbitrary nature of the interpretations and the theoretical confusions, particularly in relation to the Body Image concept, and concludes, as we must do, that much work remains to be done before the study of body concept can lead to a study of personality and motivation. Swensen (1957) has reviewed research on the "draw a person" test over the past eight years and concludes that Machover's hypotheses have seldom been supported. Motivational factors certainly operate as censors and there is only one mention of sexual parts in our investigation, while the erogenic zones stressed by Schilder do not receive particular mention.

Two other motivational factors must be mentioned. The first is the subject's attitude to the word "body". Foley and MacMillan (1943) investigated the associations of law, medical and non-professional students to 40 stimulus words. They found professional groups gave "professional interpretations" significantly more often. For this reason we excluded doctors and nurses from the "sighted normal" group. The second factor is called by Osgood (1953) "the internal non-verbal context" by which he means the ways in which a man's moods, emotions and motives influenced his verbalization. Secord (1953) used a list of homonyms which had "bodily" and common "non-bodily" meanings in a word association test. He believed that subjects with the greater number of "bodily" associations were those most concerned about their bodies.

The Body Schema and the Body Concept

The body schema as defined by Head and Holmes (1911) is a purely physiological mechanism operating outside consciousness and related to the sensory cortex. It is to this body schema, rather than to the body percept, that Wright (1956) has attempted to relate word frequency lists of body parts when he compares them with the areas of sensorimotor cortical representation as determined by the experiments of Penfield and Rasmussen (1950). He concluded that there was a strong possibility that the linguistic importance of the name of a part of the body was a function of the sensorimotor importance of that part. It is impossible to argue the matter in detail, but his views are not supported by our findings and two points which seem to contradict his views will be mentioned. It is impossible to explain the differences which occur between the sighted and totally blind subjects, for example the occurrence of the *nose* and *eye* as two of the parts first mentioned by the blind, when they are much less frequently mentioned by the sighted subjects. All the other differences which occur between the totally blind and sighted subjects argue against a relationship between linguistic frequency and sensorimotor representation. Wright found too, a remarkable correspondence between the ratio of the number of columns devoted to the upper and lower limbs in the *Oxford English Dictionary* (O.E.D.) and the ratio of the respective areas of cortical representation as determined by Penfield and Rasmussen. Wright's "linguistic" (O.E.D. columns) ratio upper limb/lower limb was 1.49/1 and the "neurological" (sensorimotor cortical representation) ratio was also 1.49/1. In the present study 6 upper limb parts are mentioned compared with 7 lower limb parts and if their frequencies are totalled this gives an upper limb/lower limb ratio of 317/350 or 0.9/1 which does not compare as favourably with the "neurological" ratio of 1.49/1. There may well be a relationship between body schema and body concept, but it seems that to attempt to relate a body concept obtained solely from Semantic Frequency lists with the areas of sensorimotor cortical representation overlooks some of the complexities of the body concept.

Bender, Green and Fink (1954) applying simultaneous tactile stimulation involving different body combinations to patients with organic mental syndrome, normal children, normal adults and schizophrenic adults, demonstrated a pattern in cutaneous perception not previously recognized. In this pattern the face as well as the genital region was the most perceptive and dominant body area, whereas the hand showed the least dominance. The remainder of the body regions fell between these two extremes in the form of a mild gradient. Bender and his colleagues attempted without success to explain this pattern which has no relationship to the body schema. It is clear from the present findings that it has no reference to the body concept as determined by this test.

Cohn (1953) proposed on the basis of similar findings from simultaneous tactile stimulation the principle of rostral dominance. By this he meant that the face was the most dominant part while the remaining body areas showed a descending gradient along the longitudinal axis of the body. He thought that for children under 5 years the patterns of their drawings of a boy and girl supported this view. As can be seen there is no evidence of any rostral dominance principle in our word tests.

SUMMARY

1. An attempt is made to define the term "body concept" and to describe one such concept elicited by a method of associative listing.
2. The differences between the concepts obtained from sighted individuals, those totally blind from birth and schizophrenics are described and analysed.
3. Relationships between the body concept and the schematic stage of children's drawings of the human figure are discussed.
4. The influence on the concept of primary and secondary perception together with other factors is discussed with special reference to visual perception and "facial vision" in the blind.
5. The effect of language behaviour on a body concept obtained by the method of associative listing is demonstrated.
6. Similarities and differences between the body concept of schizophrenics and normals are emphasized and the effect of motivation considered.
7. Reference is made to the lack of a clearly demonstrable relationship between the body schema and the body concept.

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