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Who Provides the Best Retrospective Information While Assessing Adult's Premorbid Functioning?	<i>S. Fennig, S. Fennig and E. Bromet</i>	79
Agreement between Spouses and Children in Descriptions of Personality Change in Alzheimer's Disease	<i>J. Heinik, P. Keren, Z. Vainer-Benaiah, D. Lahav and A. Bleich</i>	88
Public Awareness of the Effectiveness of Psychiatric Treatment May Reduce Stigma	<i>Kemal Arikan, Omer Uysal and Gunay Cetin</i>	95
Emotional Reactions to the Mentally Ill Are Positively Influenced By Personal Acquaintance	<i>Kemal Arikan and Omer Uysal</i>	100
Hand Parameter Differences Between Psychiatric Patients and Normal Controls: A Preliminary Evaluation	<i>Talma Brill and Saul Stier</i>	105
Advantages of the Psychiatric Liaison-Attachment Scheme in a Family Medicine Clinic	<i>A. Biderman, A. Yeheskel, H. Tandeter and R. Umansky</i>	115
Withdrawal from Clozapine: The "Rebound Phenomenon"	<i>Rimona Durst, Alexander Teitelbaum, Gregory Katz and Haim Y. Knobler</i>	122
Fenethylin Psychosis: Description of Two Cases	<i>E. Shufman and M. Dickman</i>	129
The 9th Research Day of Y. Abarbanel Mental Health Center Bat Yam and Sackler Faculty of Medicine	<i>Editor: Dr. Pinkhas Sirota</i>	132
Book Reviews		140
Hebrew Section	News and Notes	<i>Haim Y. Knobler</i> 145
	Abstracts	148

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Hand Parameter Differences Between Psychiatric Patients and Normal Controls: A Preliminary Evaluation

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Abstract: The basic assumption of this study was that it is possible to identify unusual hand features in the hands of unusual populations, and that a combination of certain unusual hand features can be associated with mental illness. One hundred and seventeen people were studied in two groups: 63 mental patients (40 males, 23 females) hospitalized in the Abarbanel Hospital, Israel, and a control group of 54 people (27 males, 27 females). Twelve hand parameters were studied, and 11 of them were found to be significantly different. Out of them, 7 show the significant result of $p < 0.001$. The results of this study suggest that the features of the hand may be considered as a part of the phenomenon of minor physical anomalies which are apparently neurodevelopmental markers. It suggests also the desirability of further research in this area.

Introduction

Hand features may be divided into three groups: the most genetic bounded and less liable to change is the level of dermatoglyphics, which are the patterns of the skin on palms and fingertips. There are three basic forms to these patterns: arch, loop and whorl, and two minor forms: tented arch and double loop.

The second group is the morphology of the hand, which includes the structure of the palm, structure, position and length of fingers, and the amount of pads on different palms' areas.

The third group is the linial formation, the lines of the hand, which are more liable to change, and do change, more than the features in the two other groups. In a normal hand there are three main lines: the thenar crease/line, which encircles the thumb "mount," the proximal palmar line, which

cut the palm in the middle, and the distal palmar line, which runs above it, under the fingers. The appearance and the quality of these lines are very important regarding their meaning and interpretation.

Research into the variations of hand features has been carried out in all three groups. The most extensively researched is dermatoglyphics, which has been studied for the purpose of identifying conditions such as congenital heart disease, chromosomal disorders in mental retardation, autism, and tendency to mental illness, especially schizophrenia, in children and adults.

Significant differences have been found between the dermatoglyphic patterns of controls and autistic children (1) and male schizophrenic (2). Penrose (3) studied the distal triradius of mongolian imbeciles and their siblings and parents. Hilbun (4) com-

pared psychotic children and controls and noted a certain form of the proximal line, the single transverse line or crease, and found differences in dermatoglyphics and an increased frequency of the single transverse line in the hands of the psychotic children. The single transverse line is an unusual linial variation, in which the proximal and distal lines are combined, showing one single line crossing the palm from side to side under the fingers. More recently, dermatoglyphics have been studied in affective disorders (5), schizophrenia (6, 7), dyslexia (8) and psychotic twins (9).

Although dermatoglyphics is an easier object for scientific research because of its simple quantitative nature and the possibility to translate it to computer language (the ridges of the fingertips are counted by a computer), it nevertheless seems that few have studied the presence of unusual structural and linial feature in the hands of different populations.

Bracha and Torrey et al. (10, 11, 12) studied 30 pairs of monozygotic twins, 23 pairs were discordant for schizophrenia. There were significantly greater interpair differences in the hands of discordant twins. They measured 7 parameters, some of them structural, such as microphalagia or smaller thumbs, others relate to the lines of the hand such as "broken proximal palmar line" and "broken distal palmar line."

Haft-Pomrock and Ginath (13) found differences in the hands of schizophrenics, in the expression of the outer hand and thumb, and flow and quality of the three main lines.

Green (14) found significantly more curved fifth fingers and single transverse palmar creases in the hands of schizophrenics.

Dermatoglyphic and morphological features of the hand are not likely to change over

time as compared with the lines which are more dynamic and liable to change. In addition, certain parameters may be more liable to observer variation, being more difficult to measure, such as the "expression of hands and thumbs" or "arrangement of auxiliary lines" in Haft-Pomrock and Ginath's study. For this reason, for the present study, criteria were selected that were more easily measurable or observable, as can be seen in the appendix. Mostly structural/morphological parameters of the hand were studied, and the number of the parameters was extended to 12, including one linial parameter and one dermatoglyphic parameter, in order to evaluate whether there are additional parameters and functional markers of the hand, which can be associated with mental disorders. The range of hand anomalies examined in our study extends former studies in this field.

Subject and Methods

A. The Subject Population

The subject population consisted of two groups: 63 patients (40 males, 23 females) hospitalized in the Yehuda Abarbanel Hospital, Bat Yam, Israel, and a control group of 54 people (27 males, 27 females). The criteria for inclusion in the control was that they had not received psychiatric or psychological treatment during their lives. The mean age of the patient group was 41 ± 15 years (mean \pm S.D) and the control group 45 ± 17 years. The patient group ranged from 24 to 77 years and the controls from 18 to 80 years. No significant differences were found between the two groups regarding either sex, age, marital status or education. The diagnostic categories of the patient group are presented in Table 1. All the patients were diagnosed according to the DSM-III-R criteria by two senior psychiatrists.

Table 1. *Diagnostic categories of the patient group N=63 (According to DSM-III-R criteria)*

Disease	N
Schizophrenic disorders	35
Schizoaffective disorder	5
Delusional disorder	1
Brief reactive psychosis	1
Atypical psychosis	1
Affective disorder	11
Borderline personality disorder	5
Organic mood disorder	2
Organic delusional disorder with epilepsy	2

B. Materials and Methods

All data pertaining to assessment of hand morphology were read by a single observer (T.B.) with 12 years experience in diagnostic hand reading.

The hand test:

In all subjects a print of both hands was recorded. Additional data regarding the structure of the hand which the print does not clearly provide were obtained by direct

observation. In the process of print taking, the surface of the hand was covered by print ink, and the person was guided to release the hand and open it naturally. In this state the hand was applied to the paper. These two stages took about 10 minutes. The diagnostic data pertaining to the patient's mental state were not available to the observer although the observer in recording the palm prints was aware of the subject's patient status. The appearance of a parameter in one or two hands was considered positive.

C. The Parameters

The parameters that were examined were decided upon before initiation of the study on the basis of previous clinical impressions and their criteria of definition, description and location are contained in the accompanying appendix.

Ten structural parameters were examined (see Table 2 and appendix): 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, and two parameters dealing with ectoderm patterns and lines: 5 and 12 (see Figure 2).

Table 2. *Number-percentage of positive findings of hand parameters in psychiatric in-patients and controls groups, and their level of significance*

Hand Parameter	Psychiatric in-patients number (%) [N=63]	Controls Number (%) [N=54]	χ^2	Significance
1 Closed fingers	34 (54)	10 (18.5)	14.10	p<0.001
2 Long and narrow hand	31 (49.2)	14 (25.9)	5.71	p<0.02
3 Flexibility	45 (71.4)	10 (18.5)	30.59	p<0.001
4 Excessive lower ulnar	27 (42.9)	6 (11.1)	12.95	P<0.001
5 Irregular ulnar pattern	23 (36.5)	7 (13)	7.26	p<0.01
6 Underdeveloped upper ulnar	34 (54)	6 (11.1)	21.87	p<0.001
7 Excessive pad under middle finger	45 (71.4)	13 (24.1)	24.22	p<0.001
8 Long middle finger	22 (34.9)	8 (14.8)	5.16	p<0.02
9 Short index finger	41 (65.1)	25 (46.3)	3.44	N.S.
10 Short fifth finger	30 (47.6)	14 (25.9)	4.94	p<0.02
11 Low fifth finger	43 (68.3)	15 (27.8)	17.47	p<0.001
12 Anomalies in proximal palmar line	60 (95.2)	20 (37)	42.90	p<0.001

Despite its potential importance we did not rate whether the appearance of positive parameters was in the right or left hand or in both hands. The parameter was considered to be present or positive if it fulfilled the criteria as described in the appendix at least in one of the hands.

Results

The findings in the two groups, the results of the Chi square test, and the level of significance are shown in Table 2.

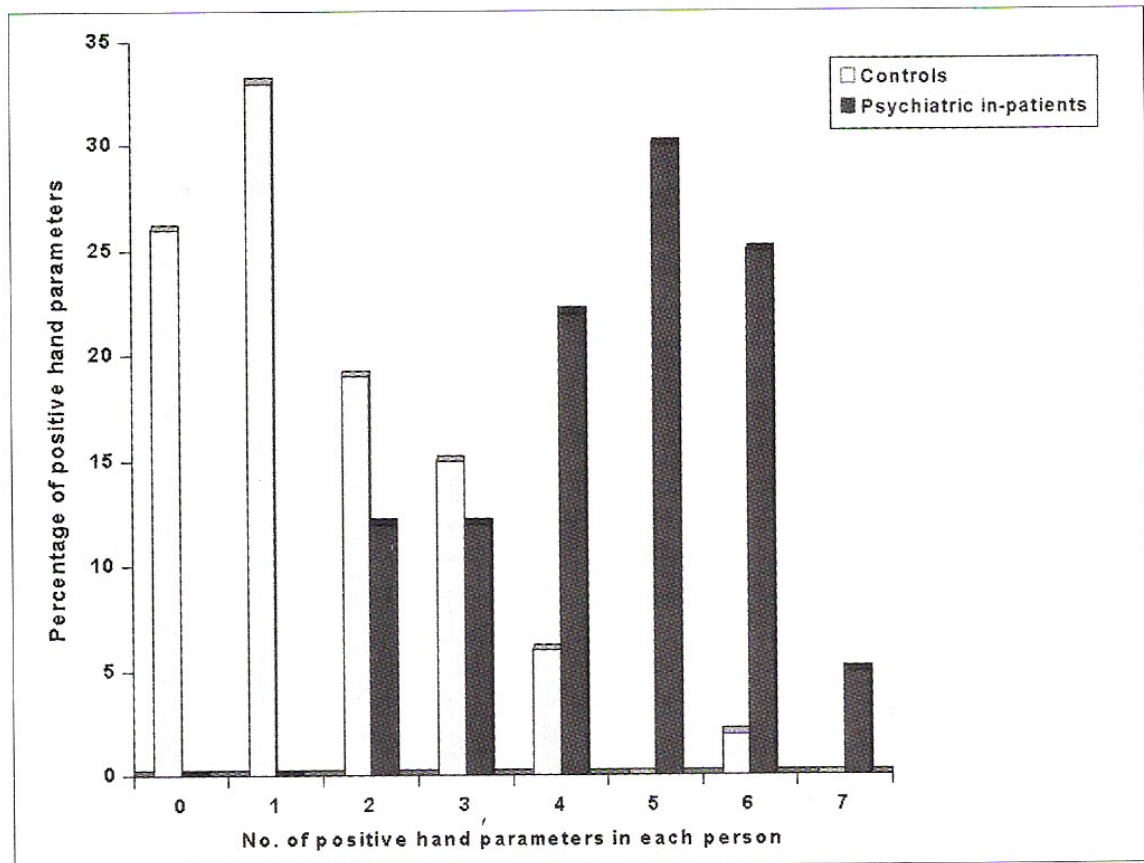
A comparison between the data of the two groups shows that 11 out of 12 parameters were found to be significantly different. Out of them, 7 show the significant result of $P < 0.001$. Figure 1 shows the distribution of the 7 most significant parameters in the in-patient and control groups. Here

it can be seen that most of the controls have no or a low number of positive parameters, while most of the patients have at least 4-6 positive parameters.

Seven of the parameters which were found to be significant in this study are structural /morphological (parameters 2, 4, 6, 7, 8, 10, 11, Table 2) two of them are functional (1 and 3, Table 2), one is palmar dermatoglyphics (5) and one is linial formation (12).

We did not identify any significant differences in the hand abnormalities related to the psychiatric diagnosis in the patient group, although this may be because of the small sample of each diagnostic category. A larger number of patients in each diagnostic entity is needed in order to draw more definitive conclusions on this subject.

Figure 1. *Distribution of the 7 most significant parameters*



Discussion

In this study, 12 hand parameters were examined in order to evaluate and compare two groups: 63 psychiatric in-patients and 54 control subjects.

The study was an open one, the chirolgist-examiner being aware who was a patient and who was not. Fifty-five percent of the patients were schizophrenics. The measures were evaluated solely as to their presence or absence. The statistical results were found highly significant in 7 of the parameters and significant in 4 more parameters. It now seems reasonable to use these 7 parameters for further research.

In the hospitalized sample, all the measures were present in 35 – 71% (one measure 95%), while they were present in 11 – 46% in the controls.

These results suggest that the hands of psychiatric in-patients differ from a control group. In addition, the fact that the patient sample in our study was heterogeneous, raises the possibility that the differences may be a result of a more general factor, such as severe mental and emotional disturbances.

There are several limitations to this preliminary study: In spite of the effort to define the parameters in an exact and measurable way, there are some parameters in which it is quite impossible to do so, e.g., parameters 4, 6, and 7, which describe the extent of development of certain areas in the hand. Here, measuring is a matter of greater subjective evaluation. The chirolgist, although being aware of this problem, chose to keep these parameters because of their importance to the profile of the patient sample.

Further, the open nature of the study raises the possibility of bias. In deciding between the presence or absence of a measure, the difference between yes and no

may have been influenced by the measurer's expected outcome.

One of the most prominent parameters in this study was parameter number 12 in Table 2, the proximal palmar line, which crosses the palm laterally from the thenar side of the hand (thumb or radial side) to the hypothenar area (ulnar side) and terminates more or less under the little finger.

The single transverse crease, which was mentioned above, is one of the variations of this proximal line. This form of the line is also known as one of the characteristic signs of Downs Syndrome (15). Our findings confirm the association of anomalies (single crease and others) in the proximal line with mental disorders, and strengthen those of Green (14), Hilbun (4), Bracha (10) (who found it in 88% of the schizophrenics twins), Haft-Pomrock and Ginath (13), and Aisen (16). We found anomalies in this line in almost all the in-patients' hands, although caution is necessary in assuming too much importance in one measure as 37% of the controls were also positive.

Regarding the two functional parameters (tightly closed fingers in the print and flexibility changes) one could take into consideration the possibility of the influence of neuroleptic medications. However, Walker (17) noted that studies of unmedicated schizophrenia patients still found common abnormalities of limb posture and movement.

The flexibility of the hand (parameter 3) was considered to be positive in two possible ways: hyper-flexibility or a complete lack of flexibility. Although the more common and more problematic phenomenon among the mentally ill patients was lack of flexibility (rigidity), the presence in some patients of hyper-flexibility of the hand indicates that these unexpected findings merit further study.

An important point of difficulty concerning this type of test is that each of the

parameters have varying degrees of prominence. The all or none score of 1 or 0 records only the *existence* of a positive parameter, but not its *prominence*. It may be that the mentally disordered can be differentiated from the normal not only by the percentage of parameters present, but also by the degree of prominence of certain parameters, which was often marked. It could be seen quite clearly in the prints, but it was not expressed in the statistical data (especially regarding parameters 9 and 10). Also, the appearance of a particular parameter in both hands apparently strengthen its significance, but this fact too was not reflected in the score data, and deserves attention in further research.

One further point of note is that these are not the only hand features which may be relevant in the field of mental health. Also, it is important to point out that it should not be understood from this study that each of the parameters alone may be a useful aid in diagnosing mental disorders. Only the cluster of several parameters points to this possibility, and especially when their prominence is taken into consideration.

The overall conclusion of this study is that the features of the hand may be considered as a part of the phenomenon of minor physical anomalies (14, 18-26) which are apparently neurodevelopmental markers. They were found associated with behavioral and mental disorders as well as with psychiatric disorders. The outcome of this study suggests the possibility to expand the hand part of this phenomenon and the desirability of further research in this area, with blind replication in other populations, separating and comparing diagnostic groups.

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References

1. Walker MA. A dermatoglyphic study of autistic patients. *J Autism Child Schizophrenia* 1977;7:11-20.
2. Polednak AP. Dermatoglyphics of Negro schizophrenic males. *Br J Psychiatry* 1972; 120:397-398.
3. Penrose LS. The distal triradius on hands of parents and sibs of mongolian imbeciles. *Ann Human Genetics* 1954;19.
4. Hilbun WB. Dermatoglyphics findings on a group of psychotic children. *J Nervous and Mental Disease* 1970;151:352-358.
5. Balgir RS. Dermatoglyphic studies in affective disorders, an appraisal. *Biol Psychiatry* 1982;17:69-82.
6. Fananas L, Moral P, Bertranpetit J. Quantitative dermatoglyphics in schizophrenia: Study of family history of subgroups. *Human Biology* 1990;62:421-427.
7. Turek S. Dermatoglyphics and schizophrenia, analysis of quantitative traits. *Collegium Antropologicum* 1990;14:137-150.
8. Jamison CS. Palmar dermatoglyphics of dislexia. *Am J Physical Anthropology* 1988; 76:505-513.
9. Marcow TA, Gottesman II. Fluctuating dermatoglyphic asymmetry in psychotic twins. *Psychiatry Res* 1989;29:37-43.
10. Bracha HS, Torrey EF. Subtle signs of prenatal maldevelopment of the hand ectoderm in schizophrenia: A preliminary homozygotic twin study. *Biol Psychiatry* 1991; 30:719-725.
11. Bracha HS, Torrey EF, Gottesman II, Bigelow LB, Cunniff C. Second-trimester markers of fetal size in schizophrenia: A study of monozygotic twins. *Am J Psychiatry* 1992; 149:1355-1361.
12. Torrey EF, Taylor EH, Bracha HS, et al. Prenatal origin of schizophrenia in a subgroup of discordant monozygotic twins. *Schizophr Bull* 1994;20:423-432.
13. Haft-Pomrock Y, Ginath Y. Differences between schizophrenics and normal controls using chirological (hand) testing. *Isr J Psychiatry Relat Sci* 1982;19:5-22.

14. Green MF, Satz P, Gaier DJ, Ganzell S, Kharabi F. Minor physical anomalies in schizophrenia. *Schizophr Bull* 1989;15:91-99.
15. Davis P. The single transverse palmar crease in infants and children. *Develop Med Child Neurol* 1963;5:491-496.
16. Aisen S. Diagnosis of children with learning disorders from normal ones by chiological characteristics. MA Thesis, University of Haifa, Israel, 1982 [Hebrew].
17. Walker EF. Developmentally moderate expressions of the neuropathology underlying schizophrenia. *Schizophr Bull* 1994;20:453-480.
18. Gualtieri CT, Adams A, Shen CD, Loisell D. Minor physical anomalies in alcoholic and schizophrenic adults and hyperactive and autistic children. *Am J Psychiatry* 1982;139:640-643.
19. Green MF, Satz P, Soper HU, Kharabi F. Relationship between physical anomalies and age at onset of schizophrenia. *Am J Psychiatry* 1987;144:666-667.
20. Green MF, Satz P, Christenson C. Minor physical anomalies in schizophrenia patients, bipolar patients and their siblings. *Schizophr Bull* 1994;20:433-440.
21. Waldrop MF, Pederson FA, Bell RQ. Minor physical anomalies and behavior in pre-school children. *Child Development* 1968;39:391-400.
22. Campbell M, Geller B, Small AM. Minor physical anomalies in young psychotic children. *Am J Psychiatry* 1978;135:573-575.
23. Guy JD, Majorski LV, Wallace CJ, Guy MP. The incidence of minor physical anomalies in adult male schizophrenics. *Schizophr Bull* 1983;9:571-582.
24. Robinson GC, et al. Broad thumbs and toes and mental retardation. *Am J Dis Child* 1966;111:287-290.
25. Van Tiggeien CJM. The Bracha reflexes, neurological indicators of localisation of brain damage: Implication for diagnosis and therapy of organic mental disorders. *Aktuelle Gerontologie* 1983;13:195-200.
26. Kazuhike A, Genro I. The pollicomental reflex (Bracha's modification of the palmo-mental reflex). A useful sign in cerebral lesions. *Folia Psychiatrica et Neurologica Japonica* 1962;16.

Appendix: Description of Hand Parameters (Table 2)

Parameter No. 1:

Closed fingers

This relates to the space between the fingers as seen in the print. Generally, there will be some space between the fingers in the print. For the purposes of this study, when three fingers or more in one hand remained closed together it was considered to be a positive score.

Parameter No. 2:

Long and narrow hand

This refers to the structure of the palm without the fingers. A narrow hand has a rectangular shape, whereas a non-narrow hand is more similar to a square. The relation between the length of the palm and its width

was found to be $AB/CD \geq 1.25$ in order to consider this parameter as positive (Figure 3).

Parameter No. 3: Flexibility

This refers to the flexibility of the fingers in their relation to the palm. This parameter is divided into two possible extremes and was seen to be positive when:

- a. the hand was hyper-flexible (the fingers fold backwards easily to almost 90°);
- b. the hand was rigid and unable to open freely to a straight position. By holding the raised hand, the fingers will be seen to flex slightly inwards, and folding the fingers backwards is impossible or minimal.

Figure 2. Representation of hand parameters as described in text of appendix

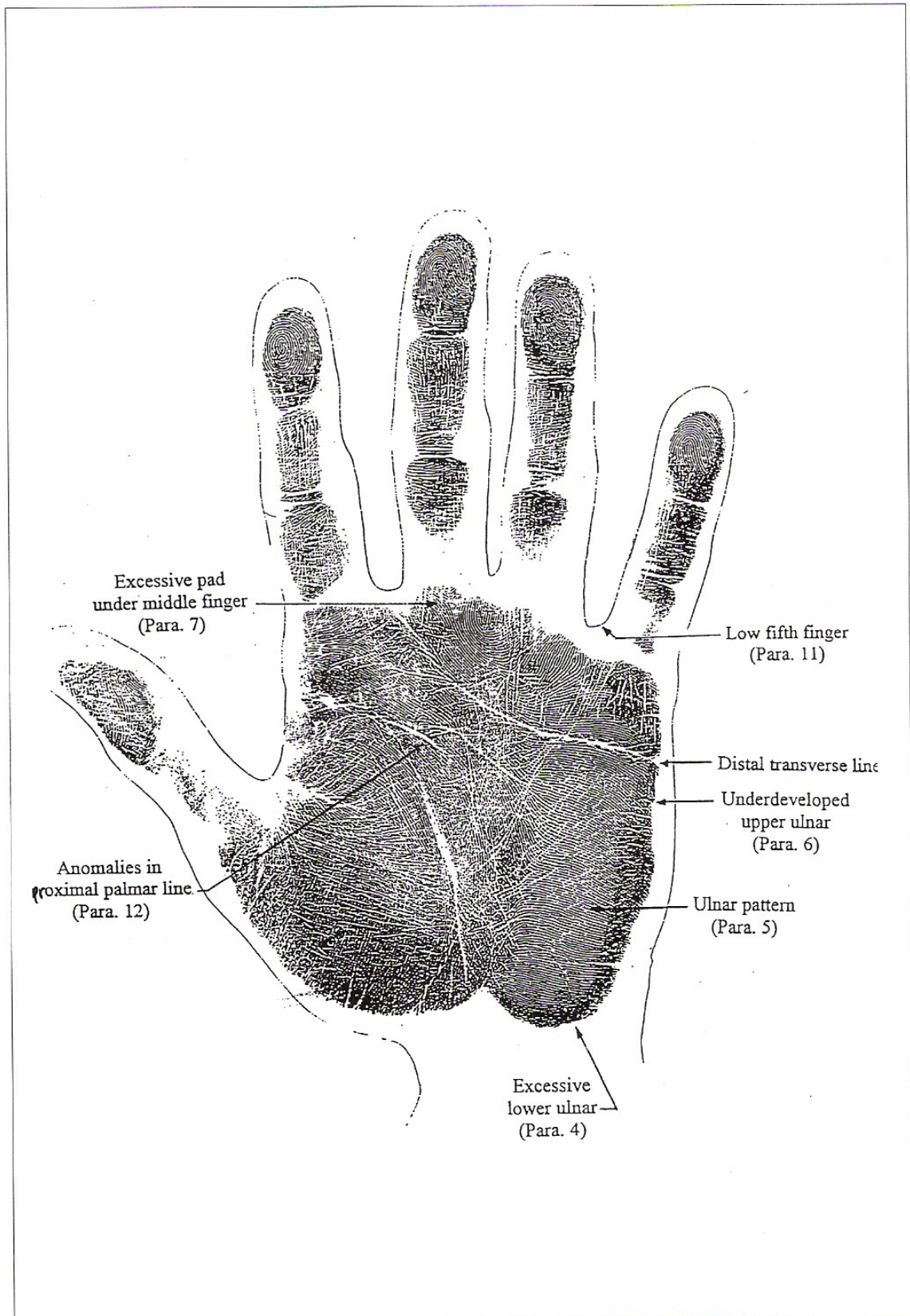
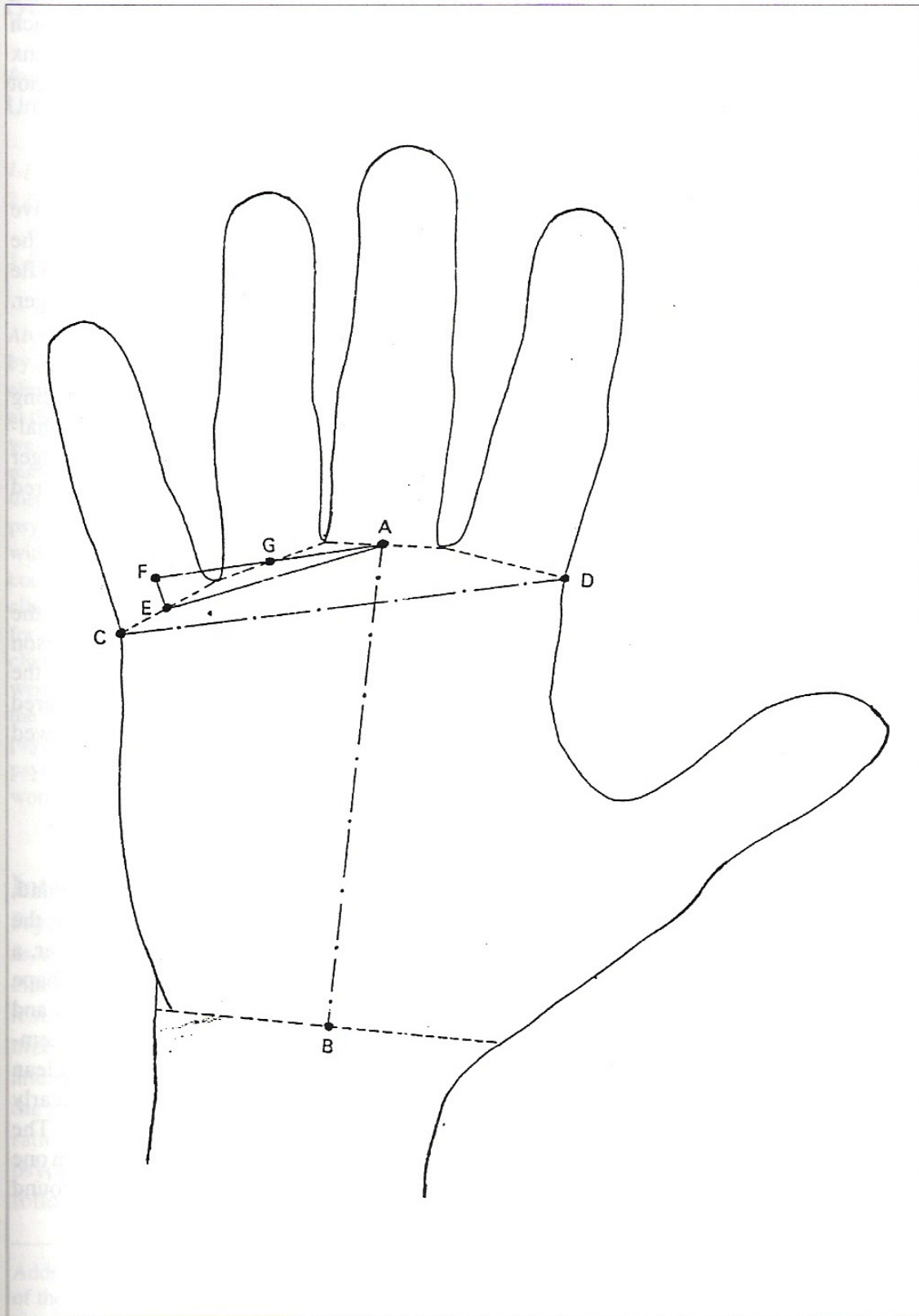


Figure 3. Representation of hand parameters as described in text of appendix



Parameter No. 4: Excessive lower ulnar

This eminence is located at the lower ulnar side of the hand. This parameter was taken to be positive when the eminence was noted in the direct test to be excessively high, or when it was high and the other parts of the ulnar eminence were undeveloped, thus heightening its appearance. In the print, excessive lower ulnar is often identified as a distinct descent of the print in this area (Figure 2).

Parameter No. 5: Irregular ulnar pattern

This refers to the pattern of the dermatoglyphics on the ulnar side of the hand, which usually show more or less straight lines. This parameter was considered positive when a pattern of a whorl or a loop, or any other unusual variation is present in the hand print (Figure 2 shows the regular straight form of skin pattern.)

Parameter No. 6: Underdeveloped upper ulnar

This area is located in the ulnar side of the hand, just below the distal transverse line. When this area was noted in the direct test to be depressed and not developed, it was scored as a positive finding (Figure 2).

Parameter No. 7: Excessive pad under middle finger

This is the area on the palm at the base of the middle finger. Usually, it is not high, and often appears flat or even sunken to a certain degree. When the eminence was high it was considered as a positive parameter.

Parameter No. 8: Long middle finger

The middle finger was defined as long when the two fingers closest to it did not reach beyond half the height of the distal phalanx of that finger, or when one of them did not go beyond a third of that phalanx.

Parameter No. 9: Short index finger

This parameter was regarded to be positive when the index finger did not reach half the height of the distal phalanx of the middle finger and was shorter than the fourth finger.

Parameter No. 10: Short fifth finger

A normal little finger reaches the dividing line between the distal and middle phalanges of the finger next to it. A little finger which did not reach this line was considered to be short.

Parameter No. 11: Low fifth finger

This refers to the point of emergence of the finger being lower than usual, in comparison to the other fingers. This was evaluated in the print, and the parameter was considered positive when one of the hands showed $EF/EA \geq 0.195$ (Figure 3).

Parameter No. 12: Anomalies in the proximal palmar line

This line begins at the radial end of the hand, and usually ends in the middle third of the hypothenar eminence. There is, however, a great deal of variation both in its shape (straight, curved, etc.) and in its length and the quality of formation. Yet, an unproblematic proximal line should be unbroken, clean of interruptions along its length, clearly defined and of a reasonable length. The parameter was considered positive when one or more of those conditions was not found (Figure 2).