Cummins' Summational MLI (1936) as an Expression of Significance of D and A Lines: An Alternative Approach

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RÉSUMÉ

L'auteur démontre la valeur scientifique de la méthode préconisée par Cummins malgré certaines déficiences du point de vue de la statistique.

Introduction

As was mentioned by Leche (1933:15) that "...D line is by far the most important, line A next in importance, while lines B and C are of less significance", it is clear that line D either singly (e.g. in MLF 11.9.7.5") or in combination with line A (e.g. in MLF 7.5".5".3, 9.7.5".1, and so on) in a way "controls the movements" (strictly morphologically speaking) both of B and C as is clear from the examples given with parantheses. Attention was recently drawn by this writer to "somewhat topsyturvy arrangements" of the gradation orders indicated by C_5, B_5, and B_7 as compared to those shown by A and D lines. Further it has also been suggested that the "control" of the two latter lines (D and A) over B and C (in the morphological sense) is perhaps represented by the topsyturvy arrangements of their gradation orders (C_5, B_5, B_7) in the descending order of transversality and this seems to me "the most plausible explanation" (Sharma 1962a:112-127).

* The present paper is a shorter version of Art. VI of the unpublished Doctoral Thesis (Sharma 1962:150-159).

Problem

The central theme of the present paper is to attempt to show that besides the geometrical approach (Sharma 1957, 1959, 1961b, 1962a, 1962b, 1963a, 1963b) there is yet another way that both lines D and A are by far the most important (Cummins and Midlo 1943, 1961) and Cummins' MLI is simply instrumental in expressing this significant relationship between the two lines. In spite of a positive correlation (r = + 0.93) shown by Valsik and Pospisil (1960:369) between MLI and Valsik's Papillary Number (VPN), the latter is "an unscientific device" (Cummins, personal communication). This has been shown in several other papers by this writer (Sharma 1961a, 1962c, 1963c).

Material

Bilateral palmar prints (inked) of Burman males (400) and females (71) collected in 1953-1955 in Burma while I was on a teaching assignment at Rangoon University without any bias (Sharma 1962a:5-12) using the T-pad method of obtaining inked impressions (Sharma 1962a:29-37; 1962d).

Discussion

Table 1 shows the incidence of MLI-values (first vertical column) falling under different heads of D line terminations like D_{13}, D_{11}, D_{10}, D_9, D_8, D_7, and or D_x (first horizontal column).

The objective is to assess as to which different MLI-values are included when line D terminates in one particular termination. Is it that we find all MLI-values under all the different line D terminations, or only some? Some interesting facts come to light. For example, under D_{11} are included the MLI-values ranging from 7 to 12 (Table 1) but under D_9 the range of MLI-values is from 5 to 10, and so on as shown below for the entire Burman males under investigation (see Table 1):

D_{13} includes MLI-value of 16 only.
D_{11} includes MLI-values from 7 to 12.
D_{10} includes MLI-values of 7, 8, and 10.

D_9 includes MLI-values from 5 to 10.
D_8 includes MLI-values of 4 and 6 only.
D_7 includes MLI-values from 3 to 8.
(Value of r between MLI-values and line D terminations = 0.96 ± 0.003)

For D_x and D_0, MLI-values cannot be given since under the existing methods it is not possible to determine MLI for conditions D_x & D_0.

In Table 1, line D has been kept as a constant under different heads like D_{13}, D_{11}, D_{10}, D_9, D_8, D_7 and yet the values of MLI under each head of D line terminations show a wide range. It is only because of the uncommon factor of A line involved in the calculation of MLI of Cummins. The same can be stated in slightly different words: *for each fixed category of D line terminations A line shows a variety of combinations (with that fixed category of D) so as to give us a wide range of MLI-values.* This is what is observed in all the vertical columns of Table 1. Note that mean values of MLI go on progressively decreasing as we shift from D_{11} to D_9 to D_7.

A similar Table can be compiled by keeping the A line terminations separately in the horizontal columns so as to assess the "fluctuation" (in the morphological sense alone) of line D which would then combine differently with a fixed category like A_7, A_5'', A_5', A_4, A_3, A_2, A_1. It could be demonstrated, similarly to D line treatment, that MLI mean values show a progressive decrease as we shift from A_7 to A_6... to A_1 implying that more longitudinally alignments of line A are associated with lower MLI values as is indicated by the means. This is the crux of the present study. But these need not be compiled since the same can be deducted from the Table showing distribution of total number of different formulae as is shown below for D and A lines separately:

Line D:

D_{13} combines with A_7 only.
D_{11} combines with A_5'', A_5', A_4, A_3, A_2, A_1.
D_{10} combines with A_5', A_3, A_2.
D_9 combines with A_5'', A_5', A_4, A_3, A_1.
D_8 combines with A_3, A_1.
D_7 combines with A_5'', A_5', A_4, A_3, A_2, A_1.
D_x combines with A_3.

Line A:

A_7 combines with D_{13}.
A_5'' combines with D_{11}, D_9, D_7.
A_5' combines with D_{11}, D_{10}, D_9, D_7.
A_4 combines with D_{11}, D_9, D_7.
A_3 combines with D_{11}, D_{10}, D_9, D_8, D_7, D_x.
A_2 combines with D_{11}, D_{10}, D_9, D_7.
A_1 combines with D_{11}, D_9, D_8, D_7.

This is what has been referred to by M.T. Newman (1960: 49) in connection with the courses of line D and A as "...the association between their courses is not a rigid one". In spite of Gordon Gibson's statistical objections against MLI for two population samples being subjected to "comparative statistical treatment" referred to as "a statistical manipulation" of "unguarded means" by M.T. Newman (ibid), Gordon Gibson's suggestion (aimed at following statistical procedures) in favour of MT-11:7 Ratio being a "statistically unobjectionable device" is rejected by M.T. Newman (1960:49) since this ratio shows little or no distributional regularities in American aboriginal samples but "the regional weighted means for the main-line index (Newman 1960: 52, Table 4) partly corroborate the division between the North and South Highlands so clearly seen in finger pattern intensities" (Newman 1960:54).

It is only apt to quote Newman (1960) in relevant parts from the same paper as follows:

"For these reasons any attempt to devise a statistically acceptable measure of palmar main-line direction from *one main line alone* is not likely to produce as meaningful a measure as the main-line index" (p. 49).

"This distributional pattern [...] is only mentioned here as evidence that the main-line indices are meaningful in a biological sense, although their differences cannot be statistically validated" (p. 51).

"There is no question that Gibson is right in withholding statistical approval from so composite a measure as the main-line index. Future research for the purpose of developing more sensitive dermatoglyphic tools should more closely adhere to the tenets of good statistical procedures than they have in the past.

[...] it seems best to use the main-line index even though this tends to violate statistical usage" (pp. 49-50).

"The present paper, then shows what can be accomplished by established dermatoglyphic methods in discerning the biological distances between Maya populations" (p. 45).

"In short, use of the main-line index is statistically suspect, yet it does have definite meaning. A high average main-line index bespeaks a strong trend toward transverse (across the palm) courses of the two outside main-lines, while a low mean index signifies their generally longitudinal (proximo-distal) direction" (p. 50).

In spite of Gordon Gibson's opinion (see Newman 1960:49), "Statistical procedures in this instance would be better satisfied [...] if the values for one and not two main-lines were summated into an index or a proportion", it is found by Newman (1960:49) that this ratio shows little or no distributional regularities in American aboriginal samples [...]", whereas the regional weighted means for the MLI do succeed in partly corroborating "the division between the North and South Highlands so clearly seen in finger pattern intensities" (*ibid.*: 54). To my mind, this certainly settles the issue in favour of MLI being a superior technique or measure as an expression of extent of transversality (or longitudinality) as shown by the average mean ridge-directioning taken between D and A lines for a population. Of course, this is to be followed till "more sensitive dermatoglyphic tools" following "the tenets of good statistical procedures" are found out as Newman points out (*ibid.*: 49-50). He further recommends the usage of MLI "even though this tends to violate statistical usage" as has just previously been mentioned.

The expression *"one main line alone"* as used by Newman *(ibid.: 49)* in this context is significant since he writes, *"...one main line alone* is not likely to produce as meaningful a measure as the main-line index". Though this has been written in the context of Modal Types 11, 9, 7 as based on D line terminations, it is equally valid for line D or A separately, whatever form is given to these lines in adjudging the transverse or longitudinal alignments. This is further true because I hold the opinion that both

TABLE 1

Frequency Distribution of MLI Values Included Under Separate Terminations of D Line (D_{13}, D_{11}, D_{10}, D_9, D_8, D_7, D_x) in the Burman Males (400) Showing Association of Ridge Courses Between D and A.

	Classes of Line D Terminations (males only)																	
MLI	13		11		10		9		8		7		X		Total	
	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
16	2	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–
12	–	–	18	5	–	–	–	–	–	–	–	–	–	–	18	5
11	–	–	76	22	–	–	–	–	–	–	–	–	–	–	76	22
10	–	–	2	1	3	–	1	–	–	–	–	–	–	–	6	1
9	–	–	47	31	–	–	57	14	–	–	–	–	–	–	104	45
8	–	–	–	4	2	3	8	2	–	–	1	–	–	–	11	9
7	–	–	2	1	–	2	84	115	–	–	18	2	–	–	104	120
6	–	–	–	–	–	–	–	6	2	3	2	1	–	–	4	10
5	–	–	–	–	–	–	1	24	–	–	72	118	–	–	73	142
4	–	–	–	–	–	–	–	–	–	1	1	16	–	–	1	17
3	–	–	–	–	–	–	–	–	–	–	1	28	–	–	1	28
N	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	(IN)
Total	2	–	145	64	5	5	151	161	2	4	95	165		1	400	399 (IN)

Result

Line D beginning with		Mean	S.D.	C.V.
D_{11} (MLI : 7 to 12)	R	10.41 ± 0.09	1.10 ± 0.07	10.58 ± 0.62
	L	9.84 ± 0.15	1.20 ± 0.11	12.17 ± 1.08
D_9 (MLI : 5 to 10)	R	8.19 ± 0.08	1.00 ± 0.06	12.69 ± 0.73
	L	6.91 ± 0.08	1.00 ± 0.06	14.41 ± 0.80
D_7 (MLI : 3 to 8)	R	5.40 ± 0.09	0.88 ± 0.06	16.30 ± 1.18
	L	4.66 ± 0.07	0.92 ± 0.05	19.66 ± 1.08
D_7 to $_{13}$ (MLI : 3 to 16)	R	8.23 ± 0.11	2.25 ± 0.08	27.38 ± 0.97
	L	6.39 ± 0.11	2.07 ± 0.07	32.34 ± 1.15

Value of r between MLI values and line D termination = + 0.96 ± 0.003

D and A lines (including their variations) morphologically define the two "outside most" limits of palmar main lines since D and A are the farthest removed from each other among the four digital triradii.

Summary and Conclusion

Both D and A lines — and their variations — on the palmar surface morphologically define the palmar ridge-coursing in any human population under investigation while Cummins' summational main-line Index (MLI) is by far the most vivid expression of this basic fact in spite of Gordon Gibson "withholding statistical approval". Newman (1960) is justified in observing that MLI has *"definite meaning"* irrespective of it being *"statistically suspect"*. Besides the geometrical approach, this is an alternative approach to understand the significance of MLI as an expression of significance of lines D and A.

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