HOW TO KNOW IN WHICH LINE ONE CHILD CAN SHOW MAXIMUM ABILITY

SUNIRMAL ROY

ABSTRACT : Mainly nineteen cellular entities take place in mainly thirty chemical reactions in a cell. The cell is divided into two when the cellular entities are doubled at a time. In this way growth process takes place in a living body.

From the solution space of this cell generation it is possible to explain mathematically why the shapes of different species are different and why the shapes in the same species are same.

Relative growth rate of different parts of a body remains the same constant for the same species and these constants are different for different species. This is the cause of the same shape of all living things of the same species. This is verified for some castes of India. Similarities are also found in the ratios among the same type of experts (specially of sports). Observing these similarities in a child it can be predicted in which line the child will show his or her maximum ability.

INTRODUCTION, FORMULATION AND SOLUTION OF THE PROBLEM

Growth is a basic property of biological species, and growth coupled with cell-divisions leads to an increase in population. In F. Heinmets1 we see that the rate constants K_1, K_2, K_n are taken to be constants throughout the whole generation time of cell. When the value of one rate constant is decreased then other equations will balance it and obviously the value of other rate constants will be changed. Therefore we cannot use the conception of rate constants. Hence the author has modified the model of F. Heinmets1 in a different way. The author has rearranged the Table as follows :-

Terminology and Symbols

Pools :-

P_e extra-cellular nutrient pool

P_i General intra cellular metabolic pool.

P_a Amino acid pool for protein synthesis.

P_n Nucleotide pool for RNA synthesis.

Enzymes :-

E Total protein.

E_n Enzymes which convert internal pool (P_i) into RNA precursors.

E_a Enzymes which convert internal pool (P_i) into amino acid.

E_p RNA polymerase for messenger RNA (M) synthesis.

E_t Enzymes which convert external pool (P_e) into internal pool (P_i).

Rate constant Kn, Ka and Kt determine what fraction of total protein represents respective enzymes.

Genes :-

G_e Genes for messenger RNA (M) synthesis.

G_p Gene for messenger RNA (MP) synthesis.

G_b Gene for the synthesis of RNA fraction ribosome.

G_c Gene for transport RNA (C) synthesis.

Messengers :-

M Messenger (RNA) for protein (E) synthesis.

Mp Messenger (RNA) for Ep synthesis.

B' RNA fraction of ribosome.

B Ribosome.

C Transport RNA

N Ribosome & messenger complex for protein (E) synthesis.

Np Ribosome and messenger complex for Ep synthesis (template).

N Inactive state of N.

N'p Inactive state of NP.

Si Metabolite which converts templates N and Np into inactive state.

Si' Metabolite which converts inactive template N and NP into active state.

K_1...Kn various rate constants.

TABLE -- I

1. r_1x_1 of E_p+r_2x_1 of P_n = r_3x_1 of E_pP_n
2. r_4x_2 of B+r_5x_2 of E = r6x2 of B
3. r_7x_8 of GB+r_8x_3 of Pn = r_9x_3 of GB+$r_{10}x_3$ of B
4. $f_{11}x_4$ of GC+$r_{12}x_4$ of P = $r_{13}x_4$ of GC+$r_{14}x_4$ of C
5. $r_{15}x_5$ of GP+$r_{16}x_5$ of P = $r_{17}x_5$ of GP+$r_{18}x_5$ of M p
6. $r_{19}x_6$ of Ge+$r_{20}x_6$ of Ep P = $r_{21}x_6$ of Ge+$r_{22}x_6$ of Ep+$r_{23}x_6$ of M.
7. $r_{24}x_7$ of B+$r_{25}x_7$ of M = $r_{26}x_7$ of N.
8. $r_{27}x_8$ of B+$r_{28}x_8$ of M p = $r_{29}x_8$ of Np.
9. $r_{30}x_9$ of C+$r_{31}x_9$ of P = $r_{32}x_9$ of C Pa.
10. $r_{33}x_{10}$ of N+$r_{34}x_{10}$ of CPa = $r_{35}x_{10}$ of B+$r_{36}x_{10}$ of C+$r_{37}x_{10}$ of M +$r_{38}x_{10}$ of B
11. $r_{39}x_{11}$ of NP = $r_{40}x_{11}$ of CPa = $r_{41}x_{11}$ of B+$r_{42}x_{11}$ of M p+$r_{43}x_{11}$ of C+$r_{44}x_{11}$ of Ep
12. $r_{45}x_{12}$ of M =$r_{46}x_{12}$ of Pn.
13. $r_{47}x_{13}$ of M p = $r_{48}x_{13}$ of Pa
14. $r_{49}x_{14}$ of B = $r_{50}x_{14}$ of Pi
15. $r_{51}x_{15}$ of C = $r_{52}x_{15}$ of Pi.
16. $r_{53}x_{16}$ of E = $r_{54}x_{16}$ of Pi.
17. $r_{55}x_{17}$ of Ep = $r_{56}x_{17}$ of Pi.
18. $r_{57}x_{18}$ of Pe+$r_{58}x_{18}$ of Ei = $r_{59}x_{18}$ of Pi+$r_{60}x_{18}$ of Et.
19. $r_{61}x_{19}$ of Pi+$r_{62}x_{19}$ of En = $r_{63}x_{19}$ of Pn+$r_{64}x_{19}$ of En.
20. $r_{65}x_{20}$ of Pi+$r_{66}x_{20}$ of Ea = $r_{67}x_{20}$ of Pa+$r_{68}x_{20}$ of Ea.
21. $r_{69}x_{21}$ of Ep+$r_{70}x_{21}$ of C = $r_{71}x_{21}$ of EpC.
22. $r_{72}x_{22}$ of E+$r_{73}x_{22}$ of Pi = $r_{74}x_{22}$ of Epi.
23. $r_{75}x_{23}$ of Ep+$r_{76}x_{23}$ of B = $r_{77}x_{23}$ of EpB.
24. $r_{78}x_{24}$ of Np+$r_{79}x_{24}$ of Si = $r_{80}x_{24}$ of N'p.
25. $r_{81}x_{25}$ of N'p+$r_{82}x_{25}$ of Si = $r_{83}x_{25}$ of Np.
26. $r_{84}x_{26}$ of N+$r_{85}x_{26}$ of Si = $r_{86}x_{26}$ of N.
27. $r_{87}x_{27}$ of N'+$r_{88}x_{27}$ of Si = $r_{89}x_{27}$ of N.
28. $r_{90}x_{28}$ of N = $r_{91}x_{28}$ of Pi.
29. $r_{92}x_{29}$ of Np = $r_{93}x_{29}$ of Pi.
30. $r_{94}x_{30}$ of Pi = $r_{95}x_{30}$ of X.

Where r_1, r_2.....r_{95} are constants. The equations of Table 1 are written on the understanding that the quantitative measure of the entities in a reaction are one to another in constant ratios. These constants are r1, r2.....etc. which can be calculated. These are independent of the rate constants which are not fixed. Therefore the defect of F Heinmets[1] is eliminated in this model.

Let the measure of the functional entities.

Ep, Pn, Ep, B', B, C, M, M p, N, N'p, Pa, CPa, E, Pi, EpC, EpB, Epi, respectively initially be

$X_{31}, X_{32}, X_{33}, X_{34}, X_{35}, X_{36}, X_{37}, X_{38}, X_{39}, X_{40}, X_{41}, X_{42}, X_{43}, X_{44}, X_{45}, X_{46}, X_{47}, X_{48}, X_{49}$.

Since it is assumed that all functional entities are approximately doubled after one generation time of the cell, therefore we get the equations of Table 2.

TABLE - 2

1. $x_{31} = -r_1x_1+r_{22}x_6+r_{44}x_{11}-r_{55}x_{17}-r_{69}x_{21}-r_{75}x_{22}$
2. $x_{32} = -r_2x_1-r_8x_3-r_{12}x_4+r_{16}x_5+r_{46}x_{12}+r_{48}x_{13}+r_{66}x_{19}$
3. $x_{33} = r_3x_1-r_{20}x_6$
4. $x_{34} = -r_4x_2+r_{10}x_3$
5. $x_{35} = r_6x_2-r_{24}x_7-r_{27}x_8+r_{35}x_{10}+r_{41}x_{11}+r_{49}x_{14}-r_{76}x_{23}$
6. $x_{36} = r14x4-r30x9+r36x1+r43x11-r51x15-r70x21$
7. $x_{37} = r_{23}x_6-r_{25}x_7-r_{45}x_{12}+r_{37}x_{10}$
8. $x_{38} = r_{18}x_5-r_{28}x_8+r_{42}x_{11}-r_{47}x_{13}$
9. $x_{39} = r_{26}x_7-r_{33}x_{10}-r_{84}x_{26}+r_{89}x_{27}-r_{90}x_{28}$
10. $x_{40} = r_{29}x_8-r_{39}x_{11}-r_{78}x_{24}+r_{83}x_{25}-r_{92}x_{29}$
11. $x_{41} = r_{86}x_{26}-r_{87}x_{27}$
12. $x_{42} = r_{80}x_{24}-r_{81}x_{25}$
13. $x_{43} = r_{31}x_9+r_{67}x_{20}$
14. $x_{44} = r_{32}x_9-r_{34}x_{10}-r_{40}x_{11}$
15. $x_{45} = -r_5x_2+r_{38}x_{10}-r_{53}x_{10}-r_{72}x_{22}$
16. $x_{46} = r_{50}x_{14}+r\ 2x_{15}+r_{54}x_{16}+r_{56}x_{17}+r_{59}x_{13}-r_{61}x_{19}+r_{91}x_{28}-r_{65}x_{20}+r_{93}x_{29}-r_{73}x_{22}-r_{94}x_{30}$
17. $x_{47} = r_{71}x_{21}$
18. $x_{48} = r_{77}x_{23}$
19. $x_{49} = r_{74}x_{22}$

Since $x_{31}, x_{32}, \ldots. x_{49}$ are fixed in an individual body and the ratios $r_1, r_2 \ldots\ldots r_{94}$ can be calculated therefore there are 30 variables $x_1, x_2 \ldots\ldots x_{30}$, and 19 equations.

There are 30 variables and 19 equations and hence 11 variables can be given arbitrary values satisfying the corresponding equations. Let the solutions make V vector space. Let the solutions of $x_1, x_2 \ldots\ldots x_{30}$ during the whole life of an individual body make a vector space S. Then S is a subspace of V. Let the solutions of $x_1, x_2 \ldots\ldots x_{30}$ (during the whole life) of different organs, tissues, different parts of the body make solution vector spaces S_1, S_2.....etc. Then S_1, S_2.....etc. are subspaces of S and hence subspaces of V. Considering $X_{31}, X_{32} \ldots\ldots X_{49}$ these subspaces $S_1, S_2 \ldots\ldots S_n$ and hence S can be studied and the relations of different organs, tissues with each other and with the whole body can be known.

The relative growth of different organs, tissues can be shown as constant for an individual body. For this reason, the individual body remains it's shape unchanged. For another individual body of the same species similarly the solution vector-spaces can be studied which is a subspace of V and similarity of growth and shape of the two individuals of the same species can be explained.

The solution spaces of other individual bodies of other species are also subspaces of V and hence similarities and dissimilarities of different individuals of different species can be studied in this respect.

Growth process remains unstopped throughout the whole life through the cellular division. But when different organs, different parts of the body gets stable size then and when the time of cell division is too much greater than the remaining life time then also the growth of that organ is continued, but the growth of the body is not marked and it seems that growth of that part is stopped.

The equations can be discussed in different way also. The activities of different genes in different organs, different parts of a body are not the same. In one organ one gene can be inactive and in another organ the same can be active. Thus we will get different set of equations for different parts of body and obviously we will get different solution spaces, different nature of different parts. But the cell generation time for all cells of all organs are same though solutions may be different. For this, growth rate of one organ is same as the growth rate of another organ and relative growth rate of another organs remains the same. This is understood from the experimental results also.

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Verification of the constants of relative growth of different parts of 400 human body of different castes and experts of different field, where the parts are shown in Fig 1 (Denote first part by X and second part by Y, lengths are in cm.)

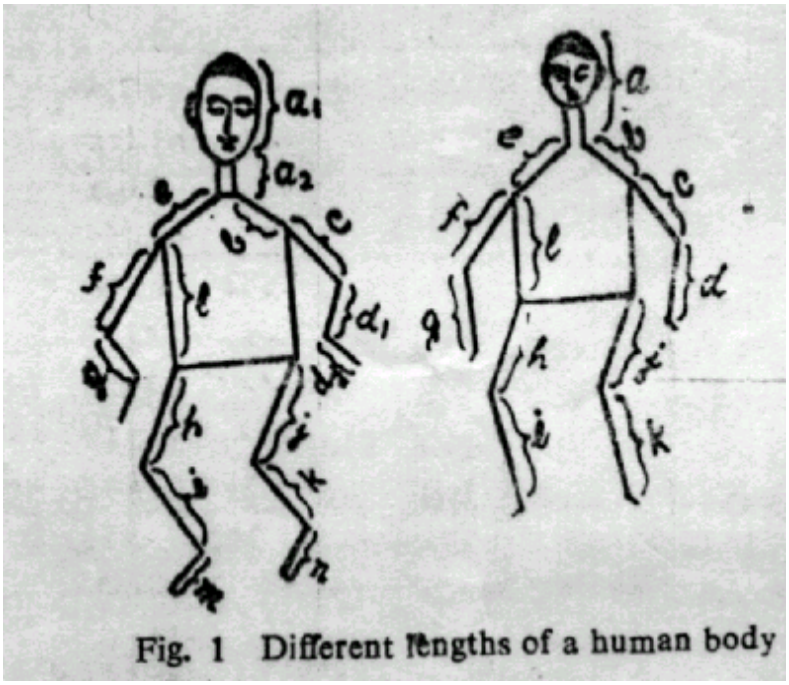

Fig. 1 Different lengths of a human body

VERIFICATION FOR SOME CASTES

Kayastha-1

Mean of X	Mean of Y	Std. dev. X	Std. dev. Y	Correlation co-efficient	Regression equation
b--c 13.3	34	9.89	8.16	.6185	Y =27.214+5.102x
c--d 34	44.2	8.16	1.26	0.63	=78.2+(-1)x
d--e 44.13	13.3	1.37	9.89	.188	=7.28+1.36x
e--f 13.3	34	9.89	8.16	.618	=27.21+5.10x
f--g 34	44.13	8.16	1.37	.645	=81.53-1.10x
h--i 47.2	44.43	1.55	9.46	.976	=16.42+5.93x
i--j 44.43	47.2	9.46	1.55	.976	=-24.24+1.60x
j--k 47.2	44.43	1.55	9.46	.976	=16.42+5.93x
k—l 44.43	53.6	9.46	1.23	.491	=82.04-6.40x

4.2

Kayastha - 2

b--c	11.8	27.15	2.05	8.12	.9428 -16.848 +3.728x
c--d	27.15	37.5	8.12	9.37	.990 6.26 +1.15x
d--e	37.5	11.5	9.37	2.05	.924 4.20 +2.02x
f--g	27.15	37.5	8.12	9.27	.936 6.26 +1.15x
h--i	40.32	43.25	10.47	6.10	.93 21.41 +5.41x
i--j	43.25	40.32	6.10	10.47	.93 -28.75 +1.59x

j--k 40.32 43.25 10.47 6.10 .93 21.41 +5.41x

k--l 43.25 44.72 6.10 10.94 .859 -21.99 +1.54x

4.3

Brahmin - 1

a--b 33 12.47 1.58 1.42 0.95 -15.90+0.86x

c--d 31.5 41.77 4.12 8.07 . 803 -7.79+1.57x

e--f 12.47 31.5 1.42 4.12 .964 28.02+2.78x

g--h 41.77 44.57 8.07 1.52 . 877 -24.75+1.65x

i--j 43.42 44.57 1.13 1.52 .961 -11.49+1.29x

4.4

Brahmin - 2

a--b 32.6 12.35 1.50 3.04 0.99 5.78+2.01x

c--d 31.775 40.8 1.323 7.87 0.89 23.93+5.30x

e--f 12.35 31.775 3.04 1.32 . 978 -20.79+4.25x

g--h 40.3 43.27 7.87 1.27 .731 - 5.09+1.18x

i--j 42.55 43.27 0.05 1.27 .126 28.15+3.55x

k--l 42.55 50.8 0.455 7.87 .306 28.24+5.30x

Bengali :-

S-1, (Sports 1-short run)

a1,a2 15.72 6.42 .810925 .355106 .645914 y= 6.87464

a2,b 6.43 20.27 3.55106 0.26096 .980918 y= 1563489

b,c 20.27 12.43 0.26096 3.55106 .9810077 y= -14.62543

c,d 12.43 14.96 .355106 .867409 .666172 y= -5.26723

d,e 14.96 28.63 .867409 5.55230 .960979 y= -63.38807

e,f 28.63 15.44 5.55230 .534217 .534217 y= 1461175

f,g 15.44 20.49 .300666 .353412 .973095 y= 2.827608

g,h 20.49 27.53 .353412 .874128 .65485 y= -5.65610

h,i 27.53 25.65 .874128 .473814 .657933 y= 15.83231

- 2.828447x

+ .0720856x

+13.347x

+16.2729x

+6.15125x

+.289294x

+1.1439x

+1.61962x

					+.356617x
i.j	25.65	27.68	.473814	.942337	
.7233121	y= -9.46422				
					+1.448118x
j,k	27.7	25.52	.942337	.396988	
.7019981	y= 17.38695				
					+0.293824x
k,l	25.52	15.9	.396988	1.31453	
.802761	y= -51.93197				
					+.265799x
l,m	15.9	13.23	1.31453	6.94319	
.494287	y= 17.40752				
					-.262737x
m,n	13.23	15.24	.694319	.3747069	
.454186	y= 15.21572				
					+.245113x
n,h	15.54	154.31	.374699	1.157179	.995475
	y= 159.0874				
					.3074248x
h,w	154.31	52.4	1.15515	4.34051	
.2044297	y= 170.93320				
					-.768157x

S-2, (Sports 2-High Jump)

a1,a2	14.65	6.64	.427200	.415210	.9978941
	y= -7.56805				
					+.9698328x
a2,b	6.64	20.69	.4152107	4.03608	
.9929359	y= 14.28132				
					+.9651632x
b,c	20.69	11.7	.403597	.419524	.998090
	y= 9.765252				
					+1.03147x
c,d	11.7	15.59	.419524	.375324	
.997955	y= 5.153485				
					+.872015x
d,e	15.59	11.62	.375326	.4118159	
	.997507	y= -5.44153			
					+1.09439x
e,f	11.62	15.68	4.11825	4.16654	
	.997476	y= 5.442599			
					+1.094454x
f,g	15.68	20.75	.4166341	.4694786	
	.9966539	y= 3.140326			
					+1.1232066x
g,h	20.75	25.69	.4694786	.4805291	
	0.99042	y= 4.654995			
					+1.013755x

Conclusion : From the previous experimental result it is seen that the ratios of two organs of the same species are same. Not only that, the ratio of the two organs for different castes are almost same. From this we can conclude that the cell generation time of cells of any organ are same, otherwise it is not possible.

We see from the tables of sports there are close relations between the lengths of different parts of the bodies of the same type of experts in sports. This is applicable to other type of experts also.

Seeing the relations of the lengths of different parts of one child's body it can be predicted in which line the child will show his or her maximum capacity.

REFERENCE

1. Heinmets,F. – Mathematical Modeling in Simulation Process(1970)