The Symmetrical Nature of Bilateral Asymmetry (δ) of Deciduous and Permanent Teeth

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Although there have been numerous studies of crown-size asymmetry and its implications, effectively beginning with BALLARD (*Anglo Ortho* 14: 67–70, 1944) it is not known whether left-right crown-size asymmetry (δ) is symmetrically or asymmetrically distributed and therefore whether means, standard deviations and such measures as s^2 (SUAREZ, *Am J Phys Anthrop* 41:411–416, 1974) are appropriate for evolutionary or developmental comparisons.

Accordingly we calculated individual buccolingual asymmetry values (δ) for 24 pairs of teeth (14 permanent and 10 deciduous) from 201 subjects, using optical scanner measurements from serial casts of each subject (VAN DER LINDEN ET AL, *J Dent Res* 51:1100, 1972). Then, percentiles for left-right asymmetry were computed as well as the mean, the standard deviation, and the third moment about the mean (V_3).

As shown in the table, left-right asymmetry values (δ) for both deciduous and permanent teeth are in general sufficiently symmetrical for Gaussian statistics. By this token, variability in the magnitude of asymmetry (σ) is greatest for the permanent canines, molars, and upper lateral incisors ($\sigma = 0.70$–0.74) and smallest for the deciduous canines ($\sigma = 0.16$–0.22). Moreover the range of asymmetry values is generally larger for the permanent teeth than for their deciduous predecessors. Finally, as we have previously shown for the permanent teeth, RMS asymmetry values are generally greater for the more lateral tooth of each morphological class (GARN ET AL, *Angle Ortho* 36:55–62, 1966).

In view of these findings, the measure s^2 is appropriate to describe variability of left-right buccolingual asymmetry of both deciduous and permanent teeth, since it is (mathematically) identical with σ^2. However, with a low-order and insignificant rank-order correlation (rho) for variances of successional teeth it is difficult to attach a purely genetic explanation to the relative magnitudes of asymmetry variances so expressed. Nevertheless, the fact that RMS left-right crown-size asymmetry is two times larger in Down's syndrome than in normal individuals (GARN ET AL, *J Dent Res* 49:465, 1970) crown-size asymmetry variance may prove an increasingly useful measure in the study of other karyotypic abnormalities, malformation syndromes and dismorphogenesis.

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TABLE

BUCCOLINGUAL CROWN-SIZE ASYMMETRY (δ) OF DECIDUOUS AND PERMANENT TEETH

Tooth	No. Pairs	Mean	SD	Percentiles 5	15	50	85	95	Skew (V_3)
di^1	160	0.00	0.24	−0.39	−0.25	−0.04	0.20	0.38	0.66
di^2	174	−0.02	0.24	−0.42	−0.24	−0.06	0.20	0.40	−0.31
dc	199	−0.02	0.16	−0.29	−0.17	−0.03	0.16	0.25	−0.02
dm^1	201	−0.01	0.23	−0.32	−0.23	−0.02	0.19	0.36	0.52
dm^2	200	−0.01	0.24	−0.38	−0.21	−0.01	0.19	0.35	−1.11
I^1	194	0.13	0.53	−0.67	−0.31	0.08	0.54	1.03	0.89
I^2	177	0.12	0.70	−0.88	−0.41	0.14	0.63	1.10	0.66
C	129	0.03	0.74	−0.85	−0.45	0.02	0.53	1.13	−1.42
P^1	132	0.02	0.24	−0.36	−0.23	0.01	0.25	0.37	0.22
P^2	107	0.01	0.25	−0.37	−0.24	0.01	0.29	0.42	0.12
M^1	200	0.00	0.30	−0.50	−0.27	0.00	0.24	0.42	0.77
M^2	96	0.06	0.74	−1.02	−0.57	0.01	0.65	1.29	1.02
di_1	135	−0.02	0.28	−0.60	−0.27	0.00	0.21	0.39	−0.80
di_2	172	0.00	0.35	−0.55	−0.26	−0.01	0.31	0.58	−0.76
dc	199	−0.01	0.22	−0.33	−0.18	0.00	0.20	0.33	0.47
dm_1	196	−0.08	0.27	−0.66	−0.33	−0.01	0.15	0.31	−0.68
dm_2	201	0.00	0.20	−0.19	−0.13	0.00	0.15	0.27	−0.54
I_1	200	0.02	0.40	−0.61	−0.33	0.02	0.31	0.65	0.62
I_2	192	−0.01	0.38	−0.68	−0.31	−0.02	0.32	0.73	−0.17
C	153	0.09	0.49	−0.76	−0.33	0.08	0.48	0.80	0.63
P_1	137	−0.04	0.29	−0.48	−0.30	−0.01	0.17	0.36	0.02
P_2	108	−0.03	0.30	−0.55	−0.26	−0.03	0.24	0.41	−0.29
M_1	200	0.07	0.29	−0.34	−0.14	0.05	0.31	0.49	−1.15
M_2	103	0.11	0.42	−0.61	−0.32	0.14	0.46	0.81	0.73