Reproducibility, and repeatability of corneal topography measured by Revo NX, Galilei G6 and Casia 2 in normal eyes.

Running head: Comparison of two optical biometers

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Numerical results for repeatability resp. reproducibilitycontain six quantities computed for observers separately resp. for the entire dataset:

* Mean
* Standard deviation
* Sw
* TRT
* CoV[%]
* ICC

**Mean** is the arithmetic mean of input values.

**Standard deviation** is the sample standard deviation, ie. with N-1 in the denominator, where N is the sample size.

**Sw** = within-subject standard deviation, is the root mean square of sample standard deviations of values measured on a single object, ie.

Sw = ((σ12+...+σM2)/M)1/2,

where M is the number of objects (eyes) and σk equals the sample standard deviation of values measured on the k-th object.

**TRT** = test-retest repeatability, is defined as = 2,77·Sw.

**CoV** = within-subject coefficient of variation, is defined as = Sw/Mean or = 100·Sw/Mean when reported as %.

**ICC** = intraclass correlation coefficient, is defined as the ratio of appropriate estimated variances. For this, it is assumed that there is a set of measured values yij for the i-th object in j-th repetition; i = 1, 2, ..., N (N = the number of objects) and j = 1, 2, ..., Ni (different numbers of repetitions are permitted for different objects). The measured values are modelled by the equation below:

yij = μ + σAei + σBeij,

where μ is the average value and e's are independent realizations of a standard normal random variable and σA2 and σB2 are resp. interclass and intraclass variances. ICC is given by:

ICC = sA2/(sA2 + sB2),

where sA2, sB2 are estimated values of the variances σA2, σB2 according to the equations:

ΣiΣj(yij - yi)2 = (M - N)sB2,

Σi(yi - y)2 = (N - 1)(sA2 + sB2/H),

where yi denotes the mean value for i-th object: yi = Σjyij/Ni, while y denotes the overall mean: y = Σiyi/N. In the above, M = ΣiNi equals the total number of measurements and H = N/Σi(1/Ni) is the harmonic mean of Ni's.