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**ISO committee and PCA:**

**Minimum frontal breadth** (we didn’t collect this)

**Face width/bizygomatic breadth linear**

**Bigonial breadth/gonion to gonion linear** (we didn’t collect this)

**Face Length/nasal root depression to menton/Sellion menton linear**

**Interpupillary distance** (we didn’t collect this)

**Nose protrusion/Subnasale to Pronasale linear**

**Nose breadth/alare to alare linear**

**Nasal root breadth**

**Subnasale-sellion length** (we didn’t collect this, may use Sellion to Pronasale instead)

**PCA only:**

**Head breadth/tragion to tragion**

**Have to consider that in person, linear measurements are best to collect. But, when making a molded respirator from plastic, contour measurements might be better. Either way, the contour measurements provide something new to the literature.**

**Alare to Alare Contour (AA\_C) - INCLUDE**

* Correlated with Pronasale to Alare Contour, 0.8870 HIGH
* Correlated with Pronasale to Alare Linear, 0.8962 HIGH
* 17 missing values
* intraRR Coder A= 0.987
* intraRR Coder B=0.974
* intraRR Coder C=0.974
* IntraRR Coder D=0.969
* interRR= 0.952
* Choose between this and ProA\_C and ProA\_C
* Nose Breadth LINEAR included in Zhuang 2007 PCA analysis
* Nose Breadth LINEAR considered relevant to respirator fit by ISO committee
* May need to justify why not Alare to Alare Linear
  + It was not collected due to likely very high correlation with contour
  + Measurements that were collected in previous studies were not necessarily collected here. There are no standards for respirator measurements, and 3D allowed for the collection and utilization of new measurements.



**Back of Head to Glabella Contour (BGl\_C) - DROP**

* Not highly correlated with any other measure
* 520 missing values (25%, highest of all measures by double percentage-wise)
* intraRR Coder A= 0.96
* intraRR Coder B= 0.974
* intraRR Coder C=0.856
* intraRR Coder D=0.947
* interRR=0.043 LOW
* Head circumference not included in Zhuang 2007 PCA analysis
* Not in list of top relevant measures for respirator fit by ISO committee
* Even though this is the only head circumference measure, it would makes sense to drop it due to high NA values and low interRR icc value
* Perhaps head circumference is not exactly needed when respirator straps can be made adjustable

**Bizygomatic Width Contour (BiW\_C)- INCLUDE**

* Correlated with Bizygomatic Width Linear: 0.8934 HIGH
* 17 missing values
* intraRR Coder A= 0.917
* intraRR Coder B= 0.944
* intraRR Coder C=0.849
* intraRR Coder D=0.962
* interRR=0.528 Lower than Linear measurement
* Bizygomatic Breadth LINEAR included in Zhaung 2007 PCA
* Bizygomatic Breadth LINEAR considered relevant to respirator fit by ISO committee
* Even though interRR is lower, it may make sense to use contour instead of linear version considering we are trying to evaluate novel 3D measures

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**Bizygomatic Width Linear (BiW\_L)- DROP**

* Correlation with Bizygomatic Width Contour: 0.8934 HIGH
* 17 missing values
* intraRR coder A: 0.924
* intraRR coder B: 0.915 LOWER than contour, collected almost 50% of the data
* intraRR coder C: 0.692 Lower than contour
* intraRR coder D: 0.926 Lower than contour
* interRR: 0.689
* Bizygomatic Breadth LINEAR included in Zhaung 2007 PCA
* Bizygomatic Breadth LINEAR considered relevant to respirator fit by ISO committee
* Even though interRR is higher, it may make sense to use contour instead of linear version considering we are trying to evaluate novel 3D measures
* Coder B IntraRR is lower for linear

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**Cheilion to Cheilion Contour (ChCh\_C) -DROP**

* Not highly correlated with any other measure
* 43 missing values
* intraRR coder A= 0.984
* intraRR coder B= 0.968
* intraRR coder C= 0.924
* intraRR coder D=0.949
* interRR= 0.966
* not in PCA Zhaung panel
* not considered important to respirator fit ISO committee
* used as third measurement in LANL and deemed critical for respirator fit at that time
* important for mouth bite devices

**Gonion to Submandibular Contour (GoSub\_C) – INCLUDE**

* Correlated with Tragion Submandibular Contour: 0.785
* 127 missing values
* intraRR coder A=0.937
* intraRR coder B=0.950
* intraRR coder C= 0.919
* intraRR coder D=0.944
* interRR=0.923
* not in PCA Zhaung panel
* not considered important to respirator fit ISO committee
* could be good to include because it does seem relevant to respirator fit and not previously collected in facial anthro surveys
* submandibular was a little hard to locate on people who had high BMI because body fat occluded neck, however, this would affect respirator fit anyway

**Nasal Root Breadth Length (NRB\_L)- INCLUDE**

* not highly correlated with any other measure
* 15 missing values
* intraRR coder A: 0.830
* intraRR coder B: 0.757
* intraRR coder C: 0.384
* intraRR coder D: 0.915
* interRR: 0.245
* included in Zhaung PCA panel
* considered relevant to respirator fit by ISO panel
* coder B icc is considered fair
* iccs are not super strong, but this seems important to respirator fit across the board



**Pronasale to Alare Linear (ProA\_L) – DROP**

* Correlated with Alare to Alare Contour 0.8962
* Correlated with Pronasale to Alare Contour 0.9712
* 16 missing values
* intraRR coder A= 0.986
* intraRR coder B= 0.974
* intraRR coder C=0.961
* intraRR coder D=0.982
* interRR 0.950
* not included in Zhaung PCA panel
* not considered important to respirator fit ISO committee

**Pronasale to Alare Contour (ProA\_C)- DROP**

* Correlated with Alare to Alare contour 0.8870
* Correlated with Pronasale to Alare Linear 0.9712
* 16 missing values
* intraRR coder A=0.975
* intraRR coder B=0.960
* intraRR coder C=0.945
* intraRR coder D=0.964
* interRR=0.931
* not included in Zhaung PCA panel
* not considered important to respirator fit ISO committee
* good icc values, but not notably better than AA\_C

**Pronasale to Subnasale Linear (ProS\_L)- DROP**

* Correlated with Pronasale to Subnasale Contour 0.8963
* 19 missing values
* intraRR coder A: 0.931
* intraRR coder B: 0.931
* intraRR coder C: 0.955
* intraRR coder D: 0.975
* interRR: 0.938
* included in Zhaung PCA panel (nose protrusion)
* considered relevant to respirator fit by ISO committee
* slightly smaller than ProS\_C



**Pronasale to Subnasale Contour (ProS\_C) - INCLUDE**

* Correlated with Pronasale to Subnasale Linear 0.8963
* 31 missing values
* intraRR coder A: 0.969
* intraRR coder B: 0.941 HIGHER than coder B intraRR for linear
* intraRR coder C: 0.686
* intraRR coder D: 0.967
* interRR: 0.850
* LINEAR version include in Zhaung PCA panel (nose protrusion)
* LINEAR version considered relevant to respirator fit by ISO committee
* Slightly larger than ProS\_L
* Even though interRR is lower, it may make sense to use contour instead of linear version considering we are trying to evaluate novel 3D measures

**Sellion to Pronasale Length (SelP\_L) -DROP**

* Correlated with Sellion to Pronasale contour 0.9931
* 15 missing values
* intraRR coder A: 0.991
* intraRR coder B: 0.978
* intraRR coder C: 0.970
* intraRR coder D: 0.992
* interRR: 0.968
* not included in Zhaung PCA panel
* not important for respirator fit ISO committee
* Sellion to Subnasale was not collected in this work (despite being included in Zhaung PCA and relevant to respirator fit by ISO panel), so this or contour measure may make a good substitute

**Sellion to Pronasale Contour (SelP\_C) - INCLUDE**

* Correlated with Sellion to Pronasale linear 0.9931
* 15 missing values
* intraRR coder A: 0.991
* intraRR coder B: 0.977
* intraRR coder C: 0.962
* intraRR coder D: 0.992
* interRR: 0.850 LOWER than linear
* not included in Zhaung PCA panel
* not important for respirator fit ISO committee
* Sellion to Subnasale was not collected in this work (despite being included in Zhaung PCA and relevant to respirator fit by ISO panel), so this measure may make a good substitute
* Even though interRR is lower, contour is novel 3D measurement

**Sellion to Dorsal Hump Contour (SelDH\_C) – DROP**

* Not correlated with any other measure
* 14 missing values
* intraRR coder A: 0.926
* intraRR coder B: 0.920
* intraRR coder C: 0.503
* intraRR coder D: 0.943
* interRR: 0.825
* not included in Zhuang PCA panel
* not considered important to respirator fit by ISO committee
* probably repetitive with Sellion to Pronasale

**Sellion to Menton Linear (SelM\_L) – INCLUDE**

* Correlated with Subnasale Menton Contour 0.8020
* Correlated with Subnasale Menton Linear 0.8641
* 224 missing values (11%)
* intraRR Coder A: 0.995
* intraRR Coder B: 0.969
* intraRR Coder C: 0.977
* intraRR coder D: 0.997
* interRR: 0.873
* included in Zhaung PCA panel
* considered important for respirator fit by ISO committee



**Subnasale to Menton Linear (SnasM\_L) – DROP**

* Correlated with Sel Menton Linear 0.8641
* Correlated with Subnasale Menton Contour 0.9466
* 225 missing values (11.1%)
* IntraRR coder A: 0.954
* IntraRR coder B: 0.849
* intraRR coder C: 0.899
* intraRR coder D: 0.986
* interRR: 0.521
* not included in Zhaung PCA panel
* not considered important for respirator fit ISO committee

**Subnasale to Menton Contour (SnasM\_C) – INCLUDE**

* Correlated with Sellion to Menton Linear 0.8020
* Correlated with Subnasale to Menton Linear 0.9466
* 236 missing values (11.7%)
* intraRR coder A: 0.980
* intraRR coder B: 0.921 (higher than linear)
* intraRR coder C: 0.963
* intraRR coder D: 0.989
* interRR 0.809 (higher than linear)
* not included in Zhaung PCA panel
* not considered important for respirator fit ISO committee
* I want to include this because I think it gives contour context to the Sellion to Menton Linear, in conjunction with sellion to pronasale contour and Pronasale to Subnasale contour (creates full Sellion to menton contour)

**Submandibular to Menton Linear (SmanM\_L) – DROP**

* Correlated with Submandibular to Menton Contour 0.9614
* 242 missing values (12%)
* intraRR coder A: 0.522
* intraRR coder B: 0.692
* intra RR coder C: 0.879
* intraRR coder D: 0.964
* interRR 0.299
* not included in Zhaung PCA panel
* not considered important for respirator fit ISO committee

**Submandibular to Menton Contour (SmanM\_C) – INCLUDE**

* correlated with Submandibular to Menton Linear 0.9614
* 281 missing values (14%)
* intraRR coder A: 0.457
* intraRR coder B: 0.740
* intraRR coder C: 0.885
* intraRR coder D: 0.970
* interRR: 0.329
* not included in Zhaung PCA panel
* not considered important to respirator fit ISO committee
* want to include, but low interRR and intraRR values
* I think gives info that has not previously been captured, and provides context to Tragion Submandibular contour
* Submandibular was variable based on BMI
* Might help with sizing N95s?

**Top of Head to Otobasion Contour (TrHO\_C) – DROP**

* Not highly correlated with any other measurement
* 283 missing values (14%)
* intraRR coder A: 0.981
* intraRR coder B: 0.971
* intraRR coder C: 0.857
* intra RR coder D: 0.964
* interRR: 0.871
* not included in PCA Zhaung panel
* not considered important to respirator fit ISO committee

**Tragion to Earlobe Juncture Contour (TrEJ\_C) – DROP**

* Not highly correlated with any other measurement
* 33 missing values
* intraRR coder A: 0.979
* intraRR coder B: 0.935
* intraRR coder C: 0.946
* intraRR coder D: 0.823
* interRR: 0.776
* not included in Zhaung PCA panel
* not considered important to respirator fit ISO committee
* sometimes occluded by helix

**Tragion to Gonion Contour (TrGo\_C) – DROP**

* Not highly correlated with any other measure
* 80 missing values (4%)
* intraRR coder A: 0.971
* intraRR coder B: 0.969
* intraRR coder C: 0.871
* intraRR coder D: 0.777
* interRR: 0.880
* not included in Zhaung PCA panel
* not considered important for respirator fit ISO committee
* often occluded by helix

**Tragion to Sellion Contour (TrSel\_C) – DROP**

* Correlated with Tragion to Submandibular Contour 0.6548
* Correlated with Tragion to Subnasale Contour 0.8902
* Correlated with Tragion to Tragion Contour 0.9540
* Correlated with Tragion to Tragion Linear 0.7114
* 31 missing values
* intraRR coder A: 0.993
* intraRR coder B: 0.990
* intraRR coder C: 0.993
* intraRR coder D: 0.732
* interRR: 0.866
* not included in Zhaung PCA panel
* not considered important for respirator fit ISO committee
* Would be good to include, but highly correlated with Tragion to Tragion contour

**Tragion to Submandibular Contour (TrSman\_C) – INCLUDE**

* No correlations over 0.75
* Correlated somewhat with Tragion to Sellion 0.6548
* Tragion to Subnasale Contour 0.7238
* Tragion to Tragion Contour 0.6719
* Tragion to Tragion Linear 0.6826
* 132 missing values (6.5%)
* intraRR coder A: 0.993
* intraRR coder B: 0.997
* intraRR coder C: 0.965
* intraRR coder D: 0.907
* interRR 0.949
* not included in Zhaung PCA panel
* not considered important for respirator fit ISO committee
* novel measure that helps contextualize face length, good RR numbers, no correlations over 0.75

**Tragion to Subnasale Contour (TrSnas\_C) – DROP**

* Correlated with Tragion to Sellion 0.8902
* Correlated with Tragion to Submandibular 0.7238
* Correlated with Tragion to Tragion Contour 0.8753
* Correlated with Tragion to Tragion Linear 0.7053
* 71 missing values
* intraRR coder A 0.971
* intraRR coder B 0.988
* intraRR coder C 0.983
* intraRR coder D 0.740
* interRR 0.958
* not in Zhaung PCA panel
* not considered important for respirator fit ISO committee
* probably not important to include instead of Tragion to Tragion Contour

**Tragion to Tragion Contour (TrTr\_C) – INCLUDE**

* Correlated with Tragion Sellion Contour 0.9540
* Correlated with Tragion Submandibular 0.6719
* Correlated with Tragion Subnasale 0.8753
* Correlated with Tragion to Tragion Linear 0.7414
* 38 missing values
* IntraRR coder A 0.997
* intraRR coder B 0.989
* intraRR coder C 0.993
* intraRR coder D 0.932
* interRR 0.958
* linear version included in PCA panel, but NOT considered important for respirator fit by ISO committee
* Could include both this and linear version bc they are not highly highly correlated

**Tragion to Tragion Linear (TrTr\_L) - INCLUDE**

* Not correlated more than 0.75 with any other measure
* Correlated with Tragion to Sellion Contour 0.7114
* Correlated with Tragion to Submandibular Contour 0.6826
* Correlated with Tragion to Subnasale Contour 0.7053
* Correlated with Tragion to Tragion Contour 0.7414
* 34 missing values
* IntraRR coder A 0.998
* IntraRR coder B 0.992
* IntraRR coder C 0.995
* intraRR coder D 0.995
* interRR 0.989
* average between 14-15cm (vs contour average is high 20s)
* linear version included in PCA panel, but NOT considered important for respirator fit by ISO committee