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The relationship between IQ and climatic variables in African and Eurasian countries

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ABSTRACT

The purpose of the present research was to determine the relationship of IQ to precipitation and other climatic variables in 128 countries of Africa, Asia, and Europe. Lower precipitation, temperature, and nasal index were associated with higher IQ. Temperature range and humidity were positively associated with IQ as predicted by evolutionary theory. Additionally, discriminant function analyses showed that the variables that best discriminated between the groups of countries were IQ, temperature, precipitation, humidity, and nasal index. The discriminant functions correctly classified over 90% of the cases. Precipitation, temperature, and nasal index were contributors to multiple regression with IQ as the dependent variable.

1. Introduction

The purpose of the present research was to extend the temperature and IQ relationship literature by incorporating a broad climatic and seasonality perspective. The present study included not only temperature but also precipitation, nasal index, humidity, temperature range, and precipitation range.

The two most recognized pioneers in the evolutionary increase in intelligence are Lynn (1991) and Rushton (1995). They proposed that greater intelligence develops in colder climates because of the greater difficulty in finding food and coping with the elements. Templer and Arikawa (2006) regarded 129 countries in Africa, Asia, and Europe as having indigenous populations because they existed prior to the voyages of Christopher Columbus. Templer and Arikawa reported correlations with IQ of r = -.76 for winter high temperature, r = -.66 for winter low temperature, r = -.33 for summer high, and r = -.49 for summer low. Skin color is a variable obviously related to temperature. Meisenberg (2004) reported a correlation of r = .89 between IQ and skin color as indexed by skin reflectance for the countries of Africa, Asia, and Europe. Templer and Arikawa confirmed this association by reporting a correlation of r = .92 between IQ and skin color assessed by a physical anthropology book map of these three continents. The Templer and Arikawa skin color and Meisenberg skin color correlated r = .96 (Templer, 2010). Templer and Arikawa conceptualized skin color as indicating the climate that one's ancestors have had for thousands of years.

It would be rash to assume that cold weather is the only condition that can bring about evolutionary increase in intelligence. Templer (2010) said:

> Neither Rushton nor Lynn has ever claimed that climate is the only variable in the evolution of intelligence. Both acknowledge that the high intelligence of Ashkenazi Jews could be a function of selection for those surviving maltreatment over centuries. If I had to use one word to describe the importance of evolutionary change in intelligence, it would be “challenge” because that word implies adversity and opportunity.

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It is not unreasonable to entertain the possibility that regions with less precipitation would bring about evolution of a higher intelligence. Greater precipitation causes greater growth of vegetation so that gathering is relatively easy.

The importance of vegetation in the evolutionary increase in intelligence is strongly implied by Lynn and Vanhanen (2012, p. 380), who said:

> When these peoples settled in the temperate and colder latitudes of North Africa, Asia and Europe, they encountered the problem of survival during the winter and spring. This was a problem because the first humans that evolved in equatorial East Africa subsisted largely on plant foods, of which numerous species were available throughout the year (Lee, 1968; Tooby and DeVore, 1989). In temperate and cold environments plant foods are not available for a number of months in the winter and spring. Thus, "plant foods are often available only during short seasons" (Gamble, 1993, p. 117) and compared to warmer environments there would have been fewer edible plant species, and a concomitant requirement for increased reliance on animals . . . and the obvious problem of keeping warm, including the likely necessity of controlling and even making fire. In effect, these northern temperate environments "pushed the envelope" of Homo's adaptation (Wynn, 2002, p. 400).

The present study examines not only the variable of precipitation but that of nasal index. Greater breadth of nose is more adaptive in a warmer and wetter climate. Nasal width can be roughly assessed by the naked eye. Nevertheless, surprisingly little has been written about nasal breadth or its quantification of nasal index. The nose has two functions, olfactory and respiratory, with the larger part devoted to the latter. Nasal index is essentially a measure of nasal breadth. Nasal index is defined as nasal breadth divided by nasal height times 100.

Ordinarily, the nose is the primary passage for air into the lungs. Thomson and Buxton (1923) explained that if the entering air goes through a wider channel it will flow more freely and be less subjected to the influence of the warm, moist mucous membrane. If the air goes through a narrow passage, the thinner streams will absorb more warmth. Thus, a wider nose is more adaptive for warmer climates and a narrower nose for colder climates. Thomson and Buxton reasoned that in a hot tropical climate, higher humidity is physiologically advantageous because free passage of air absorbs water from the respiratory tract. Nevertheless, they maintained that nasal index is related more to temperature than to wetness. Thomson and Buxton determined the nasal index of 190 male crania at Oxford University. The vast majority of these anthropological groups would not be familiar to most psychologists, e.g., Perak and Bauri and Chilton. Thomson and Buxton listed these groups in four tables with those hot and wet climates having the largest nasal indices followed by hot and dry climates, cold and wet climates, and cold and dry with the lowest nasal index. Thomson and Buxton (1923) said that high humidity is physiologically advantageous in hot humid climates. They related the nasal index to evolution. They described how the lower caste persons in India have broad noses because they have lived in a hot tropical climate for a long while. The higher caste Indians from the north and west have not lived in the hot climate for a sufficient number of generations to have evolved broad noses.

Humidity was used in our study as a second wetness variable. Humidity refers to the amount of water vapor in the air from which precipitation is inevitable. Humidity without qualification ordinarily refers to relative humidity. High humidity can produce fatigue, breathing problems, and heat stroke. Although it is a common misconception that humidity is higher in warmer climates, an accumulation of reliable evidence, e.g. The New Encyclopaedia Britannica Extended (2010), shows that humidity is higher in climates that are colder and have more precipitation. Because higher humidity is associated with greater adversity and challenge and greater problems in activity and breathing and general health, it hereby hypothesized that higher humidity is associated with higher intelligence. The reader should bear this in mind with respect to the correlations with humidity, temperature, precipitation, and nasal index. It was not until the 1800s that the germ theory was established. The brighter people may have been more successful in finding comfort which indirectly influenced health-related conditions.

Temperature range (difference between summer high temperature and winter low temperature) would appear to require higher intelligence to cope with very cold months and very hot months. Food, preservation of food, clothing, shelter, protection from animals and insects, and protection from the elements in general are different in both extremes in temperature. It would also seem to require higher intelligence to cope with greater range in precipitation (higher vs. lower months in the present study). Extreme precipitation can be associated with flooding, destruction, drowning, diseases, and washing away of the necessities of life. The difficulty of coping with extremely dry weather includes insufficient water for domestic and animal use, insufficient water for farming or successful gathering, insufficient water for cleanliness, and, in the extreme case, dehydration and death. Furthermore, it is virtually common knowledge in psychology that higher intelligence tends to be associated with greater foresight.

2. Method

One hundred twenty-eight countries used in the Templer and Arikawa (2006) study were used in the present study. Yugoslavia was not used because that country no longer exists. The same winter high, winter low, summer high, and summer low temperatures employed in their study were used in the present research. IQ was obtained from Lynn and Vanhanen (2012). The centigrade temperatures were obtained from *Fodor's World Weather Guide* (Pearce & Smith, 1998). Precipitation in mean cubic millimeters per year and relative humidity were obtained from The World Bank Organization (2013). The set of IQs was that of Lynn and Vanhanen (2012).

Two persons assessed the predominant nasal index of all the relevant countries for which information was available (Biasutti, 1967). A technologist with very exacting work was requested to specify the predominant nasal index ranging from 1 to 8. A second highly skilled technician also provided ratings that ranged from 1 to 8 with a higher number

Table 1
Summary of IQ, nasal index, precipitation, and temperature for African (n = 49) and Eurasian (n = 80) countries.

Country	IQ	Precip. (mm/yr)	Monthly Precip.		Precip. Range	Humidity	Nasal Index	Winter Temp		Temp Range	Summer Temp	
			High	Low				High	Low		High	Low
Afghanistan	83	327	102	0	102	39	2	8	-5	41	36	18
Albania	90	1458	174	38	136	52	2	0	4	26	30	18
Algeria	84	89	3	0	13	29	2	17	7	31	38	25
Angola	69	1010	150	0	150	75	7	23	13	14	27	19
Armenia	93	562	53	8	45	52	1	-2	-9	43	34	17
Austria	102	1110	80	39	41	61	2	0	-6	31	25	14
Azerbaijan	87	447	–	–	–	–	2	3	-3	35	32	17
Bahrain	83	83	–	–	–	–	1	20	14	13	37	29
Bangladesh	81	2666	356	1	355	–	–	26	13	18	31	26
Belarus	96	618	102	31	71	70	1	-5	0	35	24	14
Belgium	100	847	90	62	28	75	1	4	0	22	21	12
Benin	69	1039	358	10	348	75	7	27	23	3	26	23
Bhutan	78	2200	–	–	–	–	3	10	5	17	22	20
Botswana	72	416	123	0	123	33	7	24	5	26	31	18
Brunei	92	2722	–	–	–	–	6	30	24	7	31	25
Bulgaria	93	608	73	29	44	59	2	4	-3	32	29	0
Burkina Faso	67	748	272	1	271	45	5	33	0	17	33	23
Burma (Myanmar)	86	918	142	1	141	59	4	28	14	16	30	24
Burundi	70	1274	–	–	–	–	5	29	17	11	28	19
Cambodia	89	1904	–	–	–	–	6	31	0	11	32	24
Cameroon	70	1604	841	51	790	74	7	30	21	6	27	20
Central African Rep.	68	1343	237	18	219	62	8	32	20	–	29	21
Chad	72	322	206	0	206	28	5	32	13	25	38	23
China	100	645	237	1	236	–	3	7	-3	32	29	21
Congo (Brazzaville)	73	1543	355	5	350	65	8	28	17	14	31	0
Congo (Zaire)	65	1646	269	0	269	43	7	27	14	16	30	19
Cote d'Ivoire	71	1348	607	20	587	77	8	31	23	5	28	23
Croatia	90	1113	198	26	172	51	1	12	6	23	29	21
Cyprus	92	498	76	1	75	49	–	16	7	18	35	22
Czech Republic	97	677	77	32	45	60	2	0	-5	29	24	14
Denmark	98	703	71	32	39	73	1	3	-2	24	22	14
Djibouti	68	220	25	0	25	63	3	29	23	18	0	31
Egypt	83	51	10	0	10	35	2	20	10	25	35	23
Equatorial Guinea	59	2156	–	–	–	–	7	31	19	10	29	21
Eritrea	68	384	–	–	–	–	2	26	14	15	29	18
Estonia	97	626	78	21	57	73	2	-4	-10	30	20	12
Ethiopia	63	848	268	10	258	48	3	24	9	13	22	12
Finland	97	532	87	25	62	–	3	-5	-13	33	20	11
France	98	867	70	44	26	67	2	8	2	23	25	15
Gabon	66	1831	506	8	498	78	7	28	20	11	0	23
Gambia	65	836	500	0	500	50	5	31	15	15	30	23
Georgia	93	1026	75	15	60	51	1	7	0	32	0	19
Germany	102	700	65	34	31	–	1	2	-3	26	23	13
Ghana	71	1187	–	–	–	–	7	33	22	6	28	23
Greece	92	652	62	32	30	49	2	11	5	27	32	0
Guinea-Bissau	66	1577	–	–	–	–	7	29	17	6	31	24
Guinea	66	1651	–	–	–	–	7	31	22	14	28	22
Hong Kong	107	–	407	26	381	71	–	18	13	18	31	26
Hungary	99	589	67	34	33	59	2	0	-5	33	28	16
Iceland	98	1940	88	36	52	75	1	2	-2	16	14	9
India	81	1083	533	8	525	70	3	19	10	19	29	22
Indonesia	89	2702	409	36	373	68	6	30	23	7	30	23
Iran	84	228	36	0	36	59	2	13	3	85	38	25
Iraq	87	216	30	0	30	29	1	0	6	36	42	26
Ireland	93	1118	74	40	34	83	1	8	2	17	19	12
Italy	102	832	92	35	57	64	2	0	4	25	29	20
Japan	105	1668	188	46	142	60	3	5	-3	30	27	18
Jordan	87	111	62	0	62	38	1	12	4	28	32	18
Kazakhstan	93	250	–	–	–	–	3	-7	-15	42	27	16
Kenya	72	630	142	12	130	49	3	25	16	12	28	18
Korea, North	104	1054	263	11	252	41	3	-1	-11	39	28	20
Korea, South	106	1274	–	–	–	–	3	3	-6	34	0	0
Kuwait	83	121	26	0	26	55	1	16	9	30	39	30
Kyrgyzstan	87	533	–	–	–	–	3	-1	0	40	30	17
Laos	89	1834	338	1	337	80	6	28	14	17	0	24

(continued on next page)

Table 1 (*continued*)

Country	IQ	Precip. (mm/yr)	Monthly Precip.		Precip. Range	Humidity	Nasal Index	Winter Temp		Temp Range	Summer Temp	
			High	Low				High	Low		High	Low
Latvia	97	641	70	27	43	68	2	-4	-10	32	22	0
Lebanon	86	661	191	0	191	64	1	14	6	25	31	19
Lesotho	72	788	–	–	–	–	7	16	1	29	30	16
Liberia	65	2391	996	31	965	81	7	30	23	4	27	22
Libya	84	56	184	0	184	60	2	17	9	20	29	22
Lithuania	97	656	97	30	67	70	1	-5	-11	34	23	12
Luxembourg	101	934	79	54	25	70	2	3	-1	24	23	13
Macedonia	93	619	–	–	–	–	2	5	-3	34	31	15
Malawi	71	1181	208	0	208	45	7	23	7	20	27	17
Malaysia	92	2875	276	123	153	63	6	29	21	9	30	21
Mali	69	282	76	0	76	27	2	32	15	21	36	24
Mauritania	74	92	34	0	34	39	2	29	14	18	32	23
Moldavia	95	450	–	–	–	–	2	-1	-8	35	27	16
Mongolia	98	241	86	1	85	54	3	-19	-32	54	22	11
Morocco	85	346	92	0	92	69	2	18	6	27	33	18
Mozambique	72	1032	172	31	141	63	8	26	14	16	32	22
Namibia	72	285	85	0	85	27	7	0	7	19	26	16
Nepal	78	1500	373	3	370	83	3	18	2	27	29	20
Netherlands	102	778	81	43	38	70	1	5	0	22	22	13
Niger	67	151	179	0	179	30	3	34	14	20	34	23
Nigeria	67	1150	289	15	274	46	7	31	19	10	29	22
Norway	98	1414	131	44	87	74	1	-2	-7	24	17	0
Oman	83	125	28	1	27	64	1	25	19	17	36	31
Pakistan	81	494	92	0	92	60	3	20	7	31	38	27
Philippines	86	2438	389	3	386	66	6	30	23	8	0	24
Poland	99	600	70	21	49	70	2	0	-5	29	24	14
Portugal	95	854	128	3	125	60	2	13	6	21	27	16
Qatar	78	74	–	–	–	–	1	22	13	25	38	29
Romania	94	637	87	27	60	72	2	2	-6	34	28	16
Russia	96	460	86	30	56	62	3	-13	-20	43	23	13
Rwanda	70	1212	–	–	–	–	5	26	12	13	25	14
Saudi Arabia	83	59	30	0	30	32	1	25	0	26	39	26
Senegal	65	686	191	0	191	66	2	26	18	13	31	24
Sierra Leone	64	2526	–	–	–	–	7	29	24	4	28	23
Slovakia	96	824	–	–	–	–	2	0	-5	31	26	15
Slovenia	95	1162	–	–	–	–	2	2	-4	31	0	0
Somalia	68	282	–	–	–	–	3	30	22	13	35	27
South Africa	72	495	124	4	120	41	7	19	5	22	27	16
Spain	97	636	59	13	46	55	2	12	6	22	28	17
Sri Lanka	81	1712	382	64	318	73	3	25	18	9	27	21
Sudan	72	416	68	0	68	27	3	32	18	19	37	24
Swaziland	72	788	–	–	–	–	7	19	6	19	25	15
Sweden	101	624	73	24	49	69	1	-2	-7	29	22	13
Switzerland	101	1537	93	62	31	65	2	0	-5	26	21	14
Syria	87	252	47	0	47	36	1	0	2	37	39	22
Taiwan	104	918	291	75	216	68	3	21	15	17	32	25
Tajikistan	87	691	184	14	170	59	3	-1	-10	40	30	17
Tanzania	72	1071	290	31	259	71	5	28	16	13	29	21
Thailand	91	1622	338	9	329	62	6	30	17	15	32	24
Togo	69	1168	261	6	255	56	7	31	22	5	27	23
Tonga	87	918	234	88	146	73	3	30	24	5	29	23
Tunisia	84	207	71	2	69	58	2	15	5	29	34	21
Turkey	90	593	119	21	98	64	1	6	-2	30	28	16
Turkmenistan	87	161	48	3	45	45	2	3	-2	36	34	23
Uganda	73	1180	263	74	189	66	5	26	15	9	24	14
Ukraine	96	1875	84	35	49	65	2	0	-8	35	27	16
United Arab Emirates	83	78	–	–	–	–	1	23	12	16	38	28
United Kingdom	100	1220	79	45	34	66	1	6	2	17	19	12
Uzbekistan	87	206	–	–	–	–	3	3	-6	39	33	18
Vietnam	96	1821	326	4	322	71	6	25	18	15	33	25
Yemen	83	167	–	–	–	–	1	28	23	13	36	29
Zambia	77	1020	228	–	–	44	7	24	8	18	26	17
Zimbabwe	66	567	185	1	184	42	6	21	7	20	27	16

indicating a larger nasal index. The product moment correlation between the two raters was $r = .97$. The mean of the two raters was used. It is here parenthetically noted that Australian aborigines have the largest nasal index in the world but this is not used in the present study because most inhabitants of that nation (and continent) are not indigenous.

Table 2
Descriptive statistics of all study variables.

Variable	N	Mean	SD	Skewness[d]		
				Statistic	Transformed	Transformation
IQ	128	84.36	11.67	0.05	0.05	na
Annual Precipitation [a]	128	917.35	658.96	4.53	0.62	Square Root
High Monthly Precipitation [a]	101	182.28	106.90	9.20	0.77	Log^{10}
Low Monthly Precipitation [a]	100	19.42	23.06	6.74	0.74	Log^{10}
Precipitation Range [a]	100	162.40	166.78	-2.29	0.28	Log^{10}
Humidity	97	58.27	14.68	-2.39	Transformation Unsuccessful	
Nasal Index	125	3.45	2.28	3.08	1.73	Square Root
Winter high temperature [b]	128	15.70	12.86	-1.71	-1.71	na
Winter Low Temperature [b]	128	6.67	11.36	-1.90	-1.90	na
Temperature Range [c]	127	22.76	11.77	5.90	0.36	Square Root
Summer high temperature [b]	128	29.10	5.20	-0.09	-0.09	na
Summer low temperature [b]	128	18.93	6.15	-4.14	-0.55	Square Root
Valid N (listwise)	93					

Note: a = precipitation measured in millimeters; b = temperature in Celsius degrees; c = difference between summer high and winter low temperature; d = skewness after data transformations.

Lynn and Vanhanen (2012) reported a mean IQ of $r = 62$ for the Australian aborigines.

3. Results

Table 1 contains the summary of IQ, nasal index, and the temperature and precipitation variables for all 128 countries. Table 2 contains the means, standard deviations, and skewness for all of these variables. Table 3 contains the product moment correlational matrix for all of these variables. Inspection of the data shows a different pattern of correlation for the 48 African and the 80 Eurasian countries. It is apparent that for the African countries higher IQ is associated with lower temperature, lower precipitation, and lower nasal index. For Eurasia, the only significant correlations were with temperature. The IQ – precipitation correlation of r (48) = -.46 for Africa was greater than the correlation of r (80) = .09 for Eurasia (z = -3.13, p = .002). There were other significant correlational differences between Africa and Eurasia. The African IQ correlations were higher for monthly high precipitation (z = -2.95, p = .003), precipitation range (z = -2.19, p = .029, and temperature range (z = 2.02, p = .043). Eurasian countries' IQ correlations were higher for monthly low precipitation (z = -4.25n, p < .001), humidity (z = 2.25, p = .024, and summer high temperature (z = 4.16, p < 001). The Appendix contains z and probability values for differences between Eurasian and African countries.

It is apparent from inspection of the data that there were high intercorrelations among IQ, temperature, precipitation, and nasal index for the 15 countries traditionally regarded as "Mongoloid." These countries are Burma (Myanmar), Cambodia, China, Hong Kong, Indonesia, North Korea, South Korea, Laos, Malaysia, Mongolia, Philippines, Taiwan, Thailand, and Vietnam. Table 6 (above the diagonal) contains the correlations for these countries. The highest correlations with IQ were r (15) = -.70 for high winter temperature; r (15) = .70 for temperature range; and r (14) = -.84 for nasal index.

In order to complete the three-section division, the correlational matrix for the non-Mongoloid Eurasian countries was determined and is contained in Table 6 (below the diagonal). The highest correlations with IQ were r (51) = -.67 for monthly low precipitation, r (65) = -.40 for summer low temperature, and r (65) = -.61 for summer high temperature.

Nasal index yielded sizable correlations in Tables 3–5. Inspection of the nasal index distribution suggests that it is inversely related to its morphological counterpart of skin color. Reflectance-assessed skin color (Meisenberg, 2004) correlated r (47) = -.72, p < .001 for the African countries; r (47) = -.35, p < .002 for the Eurasian countries; r (124) = -.73, p < .001 for the African and Eurasian countries combined; r (14) = -.77,

Table 3
Pearson Product Moment Correlations of Eurasian (n = 80) and African (n = 48) countries.

	1	2	3	4	5	6	7	8	9	10	11	12
1 IQ	–	-.02	-.31**	.43***	-.44***	.30**	-.60***	-.69***	.60***	.46***	-.33***	.29**
2 Precipitation.		–	.71***	.54***	.57***	.57***	.52***	.21*	.27**	-.50***	-.43***	.18*
3 Monthly high. precip.			–	.23*	.96***	.38***	.66***	.43***	.42***	-.60***	-.20*	-.02
4 Monthly low precip.				–	-.01	.60***	-.10	-.37***	-.21*	-.16	-.65***	.49***
5 Precip. range					–	.23*	.71***	.54***	.50***	-.57***	.01	-.19
6 Humidity						–	.01	-.17	-.01	-.26**	-.52***	.19
7 Nasal index.							–	.60***	.52***	-.56***		-.10
8 Winter high temp.								–	.95***	-.77***	.44***	-.58***
9 Winter low temp.									–	-.81***	.40***	-.60***
10 Temp. range.[a]										–	.07	.29**
11 Summer high temp.											–	-.73***
12 Summer low temp.												–

*p < .05, **p < .01, ***p < .001.
[a] Difference between summer high temperature and winter low temperature.

Table 4
Correlational matrices for African (above diagonal) and Eurasian (below diagonal) countries.

	1	2	3	4	5	6	7	8	9	10	11	12
1 IQ	–	-.46**	-.55***	-.30*	-.57***	-.14	-.58***	-.64***	-.46**	.46**	.20	.08
2 Precipitation.	.09	–	.82***	.65***	.80***	.61***	.74***	.36*	.44**	-.66***	-.55***	.26
3 Monthly high precip.	.02	.74***	–	.56***	.99***	.54**	.62**	.44**	.43**	-.68***	-.61***	.32
4 Monthly low precip.	.55***	.46***	.17	–	.50**	.62***	.40*	.26	.52**	-.74***	-.52**	.19
5 Precip. range	-.17	.56***	.94***	-.14	–	.52**	.63***	.44**	.42*	-.66***	-.59***	.32
6 Humidity	.34**	.54***	.42**	.52***	.21	–	.27	.06	.54**	-.67***	-.36*	-.01
7 Nasal index.	-.16	.62***	.70***	-.02	.69***	.19	–	.28	.22	-.43**	-.48**	.27
8 Winter high temp.	-.39***	.28*	.42**	-.33*	.50***	.02	.42***	–	.84***	-.63***	.08	-.38*
9 Winter low temp.	-.36**	.31**	.37**	-.20	.42**	.04	.36**	.96***	–	-.84***	.03	-.49***
10 Temp. range.[a]	.11	-.55***	-.52***	-.25*	-.40**	-.37**	-.38**	-.72***	-.79***	–	.48**	.12
11 Summer high temp.	-.52***	-.39***	-.09	-.69***	.17	-.63***	.07	.55***	.49***	.03	–	-.61***
12 Summer low temp.	.37**	-.14	-.14	.58***	-.34**	.24	-.17	-.72***	-.68***	.32**	-.76***	–

*p < .05, **p < .01, ***p < .001.
[a] Difference between summer high temperature and winter low temperature.

$p < .001$ for Mongoloid countries; and $r\ (63) = -.29$, $p < .023$ for non-Mongoloid Eurasian countries. The respective correlations for the skin darkness anthropological map (Templer & Arikawa, 2006) correlated $r\ (48) = .64$, $p < .001$ for the African countries; $r\ (77) = .44$, $p < .001$ for the Eurasian countries; $r\ (125) = .72$, $p < .001$ for the African and Eurasian countries combined; $r\ (14) = .94$, $p < .001$ for Mongoloid countries; and $r\ (63) = .28$ for non-Mongoloid Eurasian countries.

Further analyses were conducted in order to gain additional insight into the relationship between IQ and the study variables. Two discriminant function analyses were performed to assess predictive efficacy of IQ, annual precipitation, highest monthly precipitation, lowest monthly precipitation, precipitation range (difference between highest and lowest month), humidity, nasal index, winter high temperature, winter low temperature, summer high temperature, temperature range (difference between summer high temperature and winter low temperature), and summer low temperature on membership. The first analysis had significant discriminant functions with non-Mongoloid Eurasian countries (n = 66), African countries (n = 47), and Mongoloid countries (n = 15); the second analysis had significant discriminant functions for African, Mongoloid, and non-Mongoloid Eurasian countries. Variables were entered in a stepwise manner.

The first analysis examined non-Mongoloid Eurasian, African, and Mongoloid countries. Of the original 128 countries, 35 were missing at least one discriminating variable; 93 were retained. Two significant discriminant functions emerged: Function 1–Wilks' Lambda = .10, $X^2(12) = 203.45$, $p < .001$, $\eta^2 = .77$; Function 2—Wilks' Lambda = .41, $X^2(5) = 78.53$, $p < .001$, $\eta^2 = .66$. The first function isolated African countries from non-Mongoloid Eurasian and Mongoloid countries. The second function isolated Mongoloid countries from non-Mongoloid Eurasian and African countries. See Table 6 for function group centroids. The structure Matrix, shown in Table 7, shows that IQ, nasal index, and temperature variables separate African countries from non-Mongoloid Eurasian and Mongoloid countries, while the precipitation variables separate Eurasian and Mongoloid countries. Precipitation and low summer temperature differentiate between non-Mongoloid Eurasian and Mongoloid countries. Ninety-two percent of the African countries, 100% of the Eurasian countries, and 83% of the Mongoloid countries were correctly classified.

The second stepwise discriminant function analysis was conducted to determine the study variables that best distinguish African countries from Eurasian countries. Thirty-five countries were missing at least one discriminant variable, leaving 93 countries available for analysis. As shown in Table 8, IQ, annual precipitation, nasal index, temperature range, and

Table 5
Correlational matrices for Mongoloid (above diagonal) and non-Mongoloid Eurasian (below diagonal) countries.

	1	2	3	4	5	6	7	8	9	10	11	12
1 IQ	–	-.56*	-.18	.23	-.22	-.33	-.84***	-.70**	-.61*	.70**	-.36	-.28
2 Precipitation.	.08	–	.67*	.44	.49	.39	.77**	.71**	.74**	-.79**	.54*	.47
3 Monthly high precip.	-.17	.70***	–	.35*	.93***	.52	.65*	.70**	.77**	-.71**	.81**	.80**
4 Monthly low precip.	.67***	.56***	.23	–	.03	-.01	.03	.20	.33	-.34	.15	.17
5 Precip. range	-.46**	.43**	.89***	-.16	–	.49	.61*	.61*	.65*	-.58*	.75**	.77**
6 Humidity	.46*	.61***	.44**	.61***	.16	–	.63*	.63*	.64*	-.61*	.58*	.55
7 Nasal index.	-.37**	.45**	.43**	.10	.40*	.15	–	.81***	.79**	-.83***	.64*	.51
8 Winter high temp.	-.51***	.02	.13	-.57***	.32*	-.24	.11	–	.98***	-.96***	.88***	.82***
9 Winter low temp.	-.44***	.07	.07	-.46**	.22	-.24	-.07	.96***	–	-.98***	.90***	.84***
10 Temp. range.[a]	.07	-.43***	-.37**	-.27*	-.21	-.32*	-.14	-.59***	-.69***	–	-.79***	-.73**
11 Summer high temp.	-.61***	-.56***	-.28*	-.82***	.07	-.76***	-.05	.56***	.48***	-.16	–	.95***
12 Summer low temp.	-.40**	-.20	-.02	-.52***	.19	-.27***	-.04	.51***	.48***	-.13	.55 ***	–

*p < .05, **p < .01, ***p < .001.
[a] Difference between summer high temperature and winter low temperature.

Table 6
Functions at group centroids.

Country	Function	
	1	2
African	-2.25	-.13
Eurasian	1.45	-.65
Mongoloid	.97	3.17

summer high temperature distinguished between these two groups of countries. Combined, they significantly explain 76% of the variance in the discriminant function, Wilks' Lambda = .25, X^2 (5) = 121.81, p < .001. Ninety-two percent of the African countries and 95% of the Eurasian countries were correctly classified.

Five stepwise linear regression analyses were conducted regressing IQ on each of the study variables for (a) African countries, (b) non-Mongoloid Eurasian countries, (c) Mongoloid countries, (d) Eurasian countries, and (e) all countries. Winter high monthly temperature and nasal index combined to explain 58% of the variance in IQ among the African countries F(2, 32) = 21.94, p < .001. Winter high temperature, nasal index, precipitation range, monthly high precipitation and humidity combined to account for 98% of the variance in IQ among the non-Mongoloid Eurasian countries, F(5, 78), = 61.41, p < .001. With the Mongoloid countries, nasal index, monthly high precipitation, and summer low temperature combined to account for 99% of the variance in IQ. Regressing IQ on the study variables for Eurasian countries showed that monthly low precipitation and temperature range combined to explain 37% of IQ.

For all countries collectively, winter high temperature, nasal index, and annual precipitation combined to account for 61% of the variance in IQ, F(3, 91) = 46.46, p < .001. Table 9 contains a summary of the regression coefficients and Table 10 contains a summary of the analysis of variance results.

4. Discussion

It should be borne in mind that some of the analyses and inferences were not made until the data were inspected. Nevertheless, some cohesiveness does appear to be present.

Table 7
Correlation between study variables and the discriminant function.

Variable	Function	
	1	2
IQ	.69*	.21
Winter high temperature	-.57*	.29
Nasal index	-.53*	.51
Winter low temperature	-.41*	.30
Temperature range	.29*	-.21
Monthly low precipitation	.23*	.13
Summer low temperature	-.13*	.07
Summer high temperature	-.12*	.03
Monthly high precipitation	-.19	.40*
Precipitation range	-.26	.39*
Annual precipitation	.06	.33*
Humidity	.07	.21*

Table 8
Function coefficients discriminating African (n = 48) and Eurasian (n = 80) countries.

Variable	Function 1 Coefficient
IQ	.67
Annual precipitation	1.09
Nasal index	-.69
Temperature range	.58
Summer high temperature	.43

Precipitation was the first variable selected for this study because, as maintained by Lynn and Vanhanen (2012), it is obviously related to the history of coping with the physical environment. Precipitation correlated negatively and significantly with IQ in the African countries and in the Mongoloid countries. It contributed significantly to four of the five multiple regressions. Tables 4 and 5 show a different pattern of IQ correlations with Africa and Eurasia. Africa has substantial negative correlation with precipitation, temperature, and nasal index. (The positive precipitation range correlation is consistent with the challenge theory of evolution.) In contrast, Eurasia has primarily negative temperature but not precipitation or nasal index correlations.

Thomson and Buxton (1923) should be lauded as pioneers in nasal index research. All five of the correlational matrices support their contention that larger nasal index is associated with higher precipitation. In regard to temperature, the Eurasian and Mongoloid countries' data support the assertion that nasal index correlates positively with temperature. The correlations, however, are negative for the 128 countries and the African countries. All five matrices showed higher correlation with temperature than precipitation so as to support the contention of Thompson and Buxton that nasal index is more highly correlated with temperature than is precipitation. Thompson and Buxton deserve credit for giving a generally good picture of the correlates of nasal index. It should be pointed out, however, that not all correlations between nasal index and temperature are positive. The negative correlation between nasal index and summer nigh temperature is apparently a function of summer temperatures being higher in North Africa than in Sub-Saharan Africa.

The use of nasal index in research is apparently the first study reported in any literature since the anthropological report of Thomson and Buxton (1923). It seems that nasal index is a more prominent variable in regions that include a tropical and subtropical climate. With the two-group division, nasal index correlates with IQ -.58 with African and -.14 with Eurasian countries. With the three-group division, IQ correlates -.84 with the Mongoloid countries, -.58 with the African countries, and -.37 with the non-Mongoloid Eurasian countries.

The determination of IQ on the basis of seasonal range may not have been previously reported in psychological literature. Correlation of the difference between summer high temperature and winter low temperature was $r = .58$, p ,001 for all 128 countries; $r = .48$, p < .001 for the 48 African countries, $r = .70$, p < .001 for the 15 Mongoloid countries; and $r = .07$ for the non-Mongoloid Eurasian countries. It would appear that coping with very cold winters and very hot summers requires greater resourcefulness.

Table 9
Summary of Regression of IQ on study variables.

Variable	B	SE	β	t	Sig.	Sr^2
African Countries (n = 48)						
Winter high temperature	-.55	.13	-.52	-4.30	< .001	.24
Nasal index	-5.20	1.44	-.43	-3.61	.001	.17
Non-Mongoloid Eurasian Countries (n = 65)						
Winter high temperature	-.29	.07	-.33	-4.23	< .001	.05
Nasal index	-6.05	1.39	-.33	-4.35	< .001	.05
Precipitation range	-23.33	5.55	-.90	-4.01	< .001	.04
Monthly high precipitation	19.58	6.15	.67	3.19	.002	.03
Humidity	.10	.05	.14	2.08	.041	.01
Mongoloid Countries (n = 15)						
Nasal index	-29.92	1.06	-1.25	-27.37	< .001	.90
Highest monthly precipitation	40.32	2.77	.96	14.58	< .001	.26
Summer low temperature	-7.66	1.09	-.41	-7.02	< .001	.06
Eurasian Countries (n = 80)						
Monthly low precipitation	8.34	1.51	.61	5.53	< .001	.35
Temperature range	2.00	.83	.27	2.41	.020	.07
All Countries Combined (n = 128)						
Winter high temperature	-.42	.08	-.46	-5.51	< .001	.13
Nasal index	-9.50	1.84	-.49	-5.15	< .001	.12
Annual precipitation	.34	.08	.33	4.18	< .001	.08

On the basis of univariate and multivariate analysis, it is here very tentatively and cautiously suggested that there are two phases in the evolutionary increase in intelligence as humans migrated from the center of Africa. The first is from the center of Africa to northern Africa and the second occurred in Eurasia. The progression of lower precipitation and lower temperature from central to northern Africa is probably not complicated by a large array of relevant variables. Higher intelligence is needed to devise methods to irrigate farms and tend to livestock in an arid land. Lesser intelligence is needed to use these methods that have been devised generations before. The desert of North Africa provides the adversity and the water provides the opportunity if one uses Templer's (2010) conceptualization of adversity + opportunity = challenge. North Africa seems to provide few opportunities for additional evolutionary increase in intelligence. Meisenberg (2008) provides rationale for the possibility of decrease in IQ over generations if a high intelligence is not needed, and he cited research indicating smaller brains in domesticated animals than their

Table 10
Analysis of Variance of IQ by Country Region.

Variable	Source	SS	df	MS	F	Sig.	η^2
African Countries (n = 48)							
Winter High Temperature	Country	795.34	2	397.72	21.94	< .001	.58
Nasal Index	Error	580.10	32	18.13			
	Total	1375.54					
Non-Mongoloid Eurasian Countries (n = 65)							
Winter High Temperature	Country	8204.90	5	1640.98	61.41	< .001	.80
Nasal Index	Error	2084.15	78	26.72			
Precipitation Range	Total	10289.05					
Monthly High Precipitation							
Humidity							
Mongoloid Countries (n = 15)							
Nasal Index	Country	682.26	3	227.42	272.65	< .001	.99
Monthly High Precipitation	Error	5.84	7	4.87			
Summer Low Temperature	Total	688.10					
Eurasian Countries (n = 80)							
Monthly Low Precipitation	Country	1564.96	2	782.48	15.82	< .001	.37
Temperature Range	Error	2720.14	55	49.46			
	Total	4285.09					
All Countries (n = 128)							
Winter High Temperature	Country	7739.70	3	2579.90	46.46	< .001	.61
Nasal Index	Error	5052.79	91	55.53			
Annual Precipitation	Total	12792.49					

counterparts in the wild, e.g., wolf brains weighing 140 grams in contrast to 100 grams in domesticated dogs the same size (Kruska, 1987). It is possible that lower temperature and less precipitation provided the adversity and challenge for Africans as they moved from central Africa to northern Africa. After arriving in Eurasia from Africa, it may have been temperature that provided the greatest adversity and challenge.

It is acknowledged that there are alternative explanations for our findings that do not involve evolutionary processes over thousands of years. These include migration, dysgenesis, and reproductive and contraceptive practices. Woodley, te Nijenhuis and Murphy (2014) asked, "Were the Victorians cleverer than us?" They said that during the reign of Queen Victoria from 1837 to 1901, there was an explosion of creative genius. Woodley et al. did a meta-analysis with British reaction time from 1884 to 2004 and reported a decline of 14 IQ points since Victorian times. The authors attributed the decline to dysgenic fertility. Lynn (2011) methodically reviewed the dysgenic decline in Britain and Europe and the United States. Meisenberg (2007) attributed the decline in Muslim intelligence from that at the time of the Muslim Empire to the more highly educated and presumably more intelligent persons using more contraception.

There has been considerable theoretical and empirical work on general intelligence and temperature. It is here recommended that an array of climatic variables be correlated with various cognitive abilities such as spatial ability, verbal ability, and creativity. Such variables can be used, for example, to investigate the contentions of some that, although East Asians have higher IQs than Northern Europeans, they may not be more creative.

Appendix A. Fisher's z-test comparing African (n = 48) and Eurasian (n = 80) correlation coefficients

Variable		1	2	3	4	5	6	7	8	9	10	11	12
IQ	z	–	3.13	-2.95	-4.25	2.19	-2.25	-2.62	-1.80	-0.65	2.02	4.16	1.17
	Sig		.002	.003	<.001	.029	.024	.009	.072	.516	.043	<.001	.242
Precipitation	z		–	-.735	1.24	2.21	0.52	1.18	3.56	0.76	-0.99	-1.09	-1.00
	Sig			<.001	.215	.027	.603	.238	<.001	.447	.322	.276	.317
Monthly high precip.	Z			–	2.14	6.04	0.79	0.58	0.11	0.32	-1.22	-2.90	-1.96
	Sig				.032	<.001	.430	.562	.912	.749	.223	.004	.050
Monthly low precip.	Z				–	3.16	.070	2.01	2.83	3.62	-3.13	1.31	1.58
	Sig					.002	.484	.044	.005	<.001	.002	.190	.004
Precip. Range	z					–	1.69	-0.49	-0.36	0.03	-1.65	-3.91	-2.67
	Sig						.091	.624	.719	.976	.099	<.001	.008
Humidity	z						–	0.38	0.21	2.60	-2.57	1.69	0.52
	Sig							.704	.834	.009	.010	.091	.603
Nasal index	z							–	-0.85	-0.80	-0.32	-3.12	-2.39
	Sig								.395	.424	.749	.002	.017
Winter high temp.	z								–	-4.18	0.90	-2.83	-1.90
	Sig									<.001	.368	.005	.057
Winter low temp.	z									–	-0.77	-2.67	-1.31
	Sig										.441	.008	.190
Temperature range	z										–	-2.66	0.75
	Sig											.008	.453
Summer high temp.	z											–	-1.48
	Sig												.136
Summer low temp.	z												–
	Sig												

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