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Cognitive abilities amongst the Sámi population

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ABSTRACT

We review and summarize the data contained in three studies on the IQ of Sámi peoples. Their IQ is estimated as highly similar to that of Finns (100.8 vs. 101), but their verbal IQ is lower and their visuospatial IQ is higher. We also examine whether the Sámi/ethnic Finn IQ difference is associated with *g* or not. Using the psychometric meta-analytic/method of correlated vectors hybrid model on two Skolt Sámi populations (resident in Nellim and Sevettijärvi) and Finnish children tested on the WISC, we found no association between the magnitude of the group differences by subtest and *g* loading when vector correlations derived from both comparisons (i.e. Finn vs. Sevettijärvi and Nellim vs. Finn) were meta-analyzed ($Rho = -.094$ *ns*). The theoretical significance of these findings is discussed.

1. Introduction

Lynn (2006) and Lynn and Vanhanen (2012) provide extensive IQ data for various nations and racial groups. Nevertheless, neither source includes any data on the IQs of the Sámi peoples. Collecting and reviewing these data is useful for the purposes of obtaining a more complete and detailed understanding of the IQs of the worlds populations (Lynn, 2010). In this paper we provide a short review of various estimates of the IQ of the Laplanders, along with an analysis employing the method of correlated vectors in which we attempt to determine whether the group difference between Sámi and ethnic Finns is associated with *g* or not.

The Sámi (also Saami, or Lapps) are an unusual Finno-Ugric speaking population isolate that exist in the northern most extent of the range of yet another larger Finno-Ugric speaking isolate, the ethnic Finns (Meinilä, Finnilä, & Majamaa, 2001). They appear to be most closely related genetically to the Chukchi of Siberia (Cavalli-Sforza, Menozzi, & Piazza, 1996), although this is debated, with other studies indicating closer relatedness to the ethnic Finns, and apparently little relatedness to other 'Arctic peoples' (Lahermo et al., 1996). Many of the Sámi were historically reindeer herders or fishermen (Wikipedia, 2013), although today they are largely urbanized while maintaining traditional folkways also (Encyclopedia Britannica, 2013). They are rarely nomadic; amongst herding families there exists clear division of labor, with some members of the family opting to herd reindeer while others choose to remain at home (Encyclopedia Britannica, 2013). There are data indicating admixture between the ethnic Finns and Sámi which is concentrated amongst Finnish populations living in the northern regions of Finland (Meinilä et al., 2001).

2. Methods

We conducted a review of four studies on the IQs of the Sámi people. A nonsystematic literature search yielded only four studies in which Sámi people had been tested on

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Table 1
Column vectors for WISC subtest *g* loadings, the *d*s for the Finns vs. Sevettijärvi Sámi and the Nellim Sámi vs. the Finns (disattenuated for subtest-level reliability in all cases).

WISC subtest	*g* loadings disattenuated	*d* Finns vs. Sevettijärvi Sámi; disattenuated (IQ difference; *d**15)	*d* Nellim Sámi vs. Finns; disattenuated (IQ difference; *d**15)
Block design	.719	.101 (1.51)	.262 (3.94)
Picture completion	.700	−.549 (−8.23)	.846 (12.68)
Picture assembly	.749	.590 (8.85)	−.095 (−1.43)
Object assembly	.654	.128 (1.92)	.406 (6.09)
Coding	.605	.550 (8.25)	.179 (2.69)
Information	.891	.447 (6.71)	−.222 (−3.33)
Comprehension	.889	.390 (5.85)	.324 (4.86)
Arithmetic	.798	−.055 (−.83)	.539 (8.08)
Similarities	.889	.276 (4.13)	−.324 (−4.86)
Vocabulary	.904	.671 (10.06)	−.274 (−4.11)

measures of IQ (Forseius, 1973; Forseius & Seitamo, 1970; Seitamo, 1978, 1991[2]). From what we can gather, there has been little data collected to date on this population. IQ aggregates, derived from these studies, are presented in Table 1. With the exception of the estimates taken from Forseius and Seitamo (1970), these are computed by fixing the IQ of the Finns (the comparison group in these studies) at 101 (their current national IQ; Lynn & Vanhanen, 2012) and subtracting or adding the IQ difference between the Sámi and Finns. We conducted a second analysis in which we employed the absolute IQs of the Sámi, not relative to those of the Finnish comparison groups. In this analysis we also corrected for the Flynn effect based on the difference between the sample year and the present one, assuming an average global gain of .31 points per year from Flynn (2007, 2012), and data on Verbal IQ and Performance IQ gains supplied by Flynn (personal communication). These numbers were freely estimated, rather than estimated relative to a reference population (as in the case of the first analysis). We employed this secondary analysis because giving the IQs of the Sámi relative to the Finns might inflate the Sámi IQs, since the Sámi included were more representative of the Sámi population than the Finns were representative of the Finnish population. (cf. Lynn & Meisenberg, 2010). Moreover, controlling for environments, by comparing two groups of people living in roughly similar conditions, might control for genotypic differences as well (Jensen, 1998). However, the Sámi are no longer nearly as rural as when the 1970s studies were conducted, so the IQ estimates using the relative IQs of the Sámi are probably more realistic.

For the third analysis we employed the method of correlated vectors coupled with psychometric meta-analysis in order to determine whether the difference between the Sámi and the Finns was associated with *g*. The PhD thesis of Seitamo (1991) was used as a source of WISC performance data for two mixed-sex Skolt Sámi child populations (one population resident in Sevettijärvi, $N = 81$, mean age 10.8; and a second population resident in Nellim, $N = 30$, mean age 10.75; the former data were published first in Forseius, 1973) and one mixed-sex child population of ethnic Finns resident in the North of Finland ($N = 68$, mean age 10.75).

[2] Seitamo (1991) provided data for a population of Sámi resident in Sevettijärvi that were apparently identical to the data in Forseius (1973).

In order to compute the score differences for each WISC subtest, the group with the higher full-scale IQ was compared against the lower IQ group. Thus the Finns were compared against the lower-IQ Sevettijärvi, and the Nellim, whose IQ was higher than that of the Finns, against the Finns. Values of Cohen's *d* were computed for each group difference on each subtest using means and standard deviations reported in Seitamo's (1991) Tables 23 and 25 (p. 130 and 132). Seitamo does not list standard deviation values for the Picture Completion scores, or for the Arithmetic subtest score in the case of the Nellim Sámi. Thus in these cases we substitute the value of the group cross-subtest mean standard deviation. Data on WISC subtest *g*-loadings were also available from Seitamo's (1991); however, these were estimated using a protocol designed to eliminate culture loading, and therefore they were unsuitable for the present analysis. WISC subtest *g* loadings were instead obtained from the study of Kan (2011, p. 43, Table 3.6), who averages across five batteries and presents disattenuated (reliability-corrected) estimates of the *g* loadings for each subtest. The subtest reliabilities are listed separately on p. 42, Table 3.4; hence, these were used to disattenuate the *d*s by dividing each one by the square-root of the subtest-specific reliability. All column vectors are presented in Table 1.

Hunter and Schmidt (2004) argued that there are various error sources, which can be expected to attenuate correlations between two variables. Chief amongst these is reliability, which we have explicitly controlled here at the subtest-level for both *g* loadings and *d*s. Another source of error stems from the fact that IQ batteries are potentially range-restricted in terms of the standard deviation of their *g*-loadings. Based on the use of WAIS manuals, which are broadly population-representative, te Nijenhuis and van der Flier (2013) have found a standard deviation amongst *g* loadings of .128. Hence to correct our sample for lack of population representativeness we divide the standard deviation of the *g* loadings in the present battery (.110) by the reference value, which yields a *u* value of .859. The vector correlations ($r = d \times g$) for both group comparisons can be divided by this value of *u* so as to correct for this source of range restriction. A final correction is for the validity of the IQ battery, i.e., the degree to which it might fall-short of perfectly measuring the construct *g*. te Nijenhuis and van der Flier (2013) suggest the use of the value of .90 for tests such as the WISC so as to avoid the possibility of overcorrection. They also advise

Table 2
IQ estimates of the Lapps taken from three studies. Estimated relative to a Finish baseline national IQ of 101.

Source	IQ estimated	Test	Verbal	Visuospatial
Forseius and Seitamo (1970)[a]	101.8	KTK		101.8
Forseius (1973)	90.5	WISC FSIQ	89.2	93.6
Forseius (1973)	105.5	KH		105.5
Forseius (1973)	103.5	Stencil		103.5
Forseius (1973)	105.2	Bender Gestalt Test		105.2
Forseius (1973)	100	Draw-a-Man		100
Seitamo (1978)	98.7	WISC	96.4	101
Seitamo (1978)	98.4	Educational achievement		
Seitamo (1991)	104	WISC FSIQ		

[a] This estimate was simply reported in Forseius and Seitamo (1970) — it was not computed on the basis of group comparisons.

that dividing by this should be the last correction made to the vector correlations.

Once the vector correlations for the two group comparisons have been corrected they will be meta-analyzed using the average value of *N* for each pairing. This will yield the final vector correlation value which will indicate whether the Finn-Sámi IQ difference is on *g* or not. The meta-analysis was conducted using publically available software at the Vassar College online statistics functionality (http://vassarstats.net/). The software permits us to conduct the most basic kind of meta-analysis, where the heterogeneity amongst the samples can be estimated and *Rho* is computed purely as a weighted average amongst the sample of correlations.

3. Results

Row 1 in Table 2 gives an IQ of 101.78 from a sample of Skolt Sámi children ($N = 191$). These children were administered the KTK, a Finnish test of visuospatial reasoning.

Rows 2–7 are taken from a study published by Forseius (1973) where rural Finns and Skolt Sámi were compared on IQ. Row 8 is taken from a study from Seitamo (1978). There was one group of Sámi in the study (Sevetti), which were broken out by sex and compared to a Finnish group, also broken out by sex.

The IQs tend to be slightly below those of the Finnish. This is consistent with group-level data on provincial IQs, which show that low-*g* provinces tend to contain high percentages of Sámi (Dutton & Lynn, 2014; Staffan, 2013). It is also consistent with brain size data, since the Sámi have cranial capacities of 1399 cc (for men) and 1301 cc (women), slightly below the cranial capacities of Europeans (Smith & Beals, 1990; Yrjo, 1927). In fact, the brain size of the Sámi is anomalously *low*, since arctic peoples generally have larger brains than would be expected from their IQs (Kura, Armstrong, & Templer, 2014; Lynn, 2006), possibly due to their generally higher visuospatial IQs, which may be more expensive in terms of "cortical real estate" (Lynn, 1987, 1994; Lynn & Hattori, 1997).

Table 3 presents the Flynn effect corrected Sámi IQs from four studies. When not known, we have assumed an IQ increase of three points per year, following Lynn (2006). This is a conservative estimate for the secular gain, since performance tests tend to show higher gains and most of the tests used were performance. Therefore, the estimates above are probably slight overestimates of the Sámi IQ. The Draw-a-Man was standardized in 1961 (Harris, 1963), and was administered in 1968. The KH and Stencil tests are part of the KTK test, which was also standardized in 1963 (Elonen et al., 1963). We have omitted the Bender Gestalt Test results, since the Bender results are only given as raw scores.

Table 4 presents the corrected vector correlations for each group comparison along with the final meta-analytic estimate of the overall vector correlation between studies.

Table 4, row 1 presents the disattenuated vector correlation computed when the Finns are compared with the Sevettijärvi Sámi. The correlation is positive and significant, suggestive of a "Jensen effect" (i.e., a positive mediating role for *g* in generating the group difference; Rushton, 1998). Table 4 row 2 compares the Nellim Sámi with the Finns, revealing a significant negative vector correlation, or "anti-Jensen effect" in the group difference. In Table 5, the meta-analytic cross-study *Rho* is computed. The value is not significantly different from zero. The value of Chi Squared was significant indicating substantial heterogeneity amongst the studies.

4. Discussion

These data suggest that the Sámi have the same profile that most people of the world have, i.e., they perform better on spatial than on verbal tests relative to the Caucasoid norm

Table 3
Flynn effect corrected IQ estimates of the Lapps taken from four studies. These have been corrected for the Flynn effect on the basis that they are not estimated relative to the Finnish national reference IQ.

Source	IQ estimated	Test	Verbal	Visuospatial
Forseius and Seitamo (1970)*	101.8	KTK		101.8
Forseius (1973)	102.5	KH		102.5
Forseius (1973)	103.3	Stencil		103.3
Forseius (1973)	96.5	Draw-a-Man		96.5
Seitamo (1978)	90.8	WISC	90.9	91.3
Seitamo (1991)	99.8	WISC		

Average global gain: .31 points per year. From Flynn, 2007, 2012.

Table 4
Disattenuated vector correlations for both Finn vs. Sámi group comparisons on the WISC.

Reference	Test	*r* (disattenuated)	Mean N
Seitamo (1991) Finns vs. Sevettijärvi Sámi	WISC	.398*	74.5
Seitamo (1991) Nellim Sámi vs. Finns	WISC	−.715*	49

Note.
* $p < .05$, $r =$ vector correlation $d \times g$.

(Lynn, 2006). The Sámi appear to have very slightly lower fullscale IQ than the ethnic Finns (100.8 vs. 101; it is important to keep in mind that the Sámi IQ is likely an overestimate as it is over-weighted by spatial IQ); however, the group differences across abilities do not seem to be mediated by *g*, which is uncharacteristic for population group differences (te Nijenhuis, personal communication). It is worth noting that we only have a *K* of 2 in the meta-analysis and that the addition of extra data might alter the outcome of future meta-analyses; therefore, this result must be interpreted cautiously.

One problem with our study is that fewer Sámi than Finns today were urbanized in the 1970s, when these studies were conducted (Encyclopedia Britannica, 2013), yet all of the Finns sampled were non-urban. Therefore in the first analysis, where we used the *d* for comparisons rather than the absolute IQ of the Sámi, we may have overestimated the Sámi IQ, since the sampled Finns may have been unrepresentatively low-IQ.

These results are somewhat consistent with Cold Winters theory (Lynn, 1991, 2006). As Hart (2007, p. 417), noted, a higher IQ for the Sámi is expected from this theory. Nevertheless, the Sámi may live in a lower quality environment, thus their genotypic IQ might actually be higher still.

It should be noted that the higher spatial than verbal IQ of Sámi is consistent with that of other arctic peoples (Lynn, 2006), and with other Mongoloid populations, whose ability profiles have been attributed to cold selection (Lynn, 1987, 1991). This may relate to the fact that visuospatial ability is more useful than verbal ability for hunting (e.g., Lynn, 1991, 2007). This suggests that the Sámi might have evolved their distinct cognitive profile in response to recurrent features of an Arctic ecology over the last 2,000 years (before which they may have more closely approximated the other Caucasoids in terms of the structure of their mental abilities). This would support Kura's (2013) and Woodley and Figueredo's (2013) conjecture of very recent accelerated evolution in response to cold temperatures. Alternately, perhaps there has been admixture amongst the Sámi and Mongoloid Arctic peoples, thus introgression involving contextually adaptive genes for visuospatial ability may have influenced their ability profile. Interestingly, the IQ of the Laplanders is higher than that of the Inuit peoples, whose IQ is around 90.5, and the Aleut, whose IQ is around 92 (Lynn, 2006). This may be related to the fact that Mongoloid Arctic peoples are genetically close to the North Amerindians, whose IQ is about 86 (Lynn, 2006), whereas the Sámi are genetically about equidistant from the Amerindians and Europeans (Jensen, 1998; Lynn, 2007 estimates the IQ of the Mongols using a similar strategy). Comparing the IQ of the Sámi to that of three other Arctic groups, the Ainu, Tungus and Altai, the Sámi exhibit similar IQs to the Ainu (IQ 97; Kura et al., 2014) but possess substantially higher IQs than the Tungus and the Altai (Tungus IQ 70–80, Altai IQ 67–75; Lynn & Shibaev, under review). The latter study listed two samples of Tungus, who attained IQs of 70 and 80. The latter sample was extremely poor and isolated (information about the living conditions of the first sample was not given), which may account largely for their low IQ. The study also cited one study of Altai IQ where Altai (who were largely illiterate) received IQs of 67 or 75, depending on the test.

Owing to the similarity of the environments of the Sámi and Finns in the studies reviewed, factors such as nutrition or poor schooling are rendered weaker explanations of the observed small aggregate IQ difference (cf. Lynn, 2006). However, nomadic groups often have lower IQs due to disruption of schooling (Ceci, 1991),[3] and it is possible that, although the Sámi and Finns lived in similar communities and had similar SES, the Finns were still wealthier than the Sámi (cf. Bruce, 1940). If the Sámi were less educated because of schooling disruption, this would primarily negatively impact their verbal IQ (Cahan & Cohen, 1989; Lynn, 1990). Nevertheless, since a number of *Finns* in the villages described in Forseius (1973) were reindeer-herders, this is not especially likely. Thus, there are several viable hypotheses about the origin of the Sámi IQ profile, both genetic and environmental.

Two final problems with the present study are, firstly, that all of our samples are Skolt Sámi; there are no other Laplanders included in this sample. Skolts are not the only subgroup of Sámi, and they were somewhat more isolated than other Sámi when the studies were conducted (Forseius, 1973), so the samples may therefore be unrepresentative. Secondly, our estimate for the Finnish national IQ (101) is somewhat conservative. A higher Finnish IQ is indicated by reaction time studies (Woodley, te Nijenhuis, & Murphy, under review), which are not included in Lynn and Vanhanen's (2012) review. Therefore, the Finnish IQ, and by extension the Sámi IQ (which in the first analysis was estimated relative to the Finnish IQ), may be somewhat higher than that estimated here.

There may also be more data on the IQ of the Sámi: we found additional studies conducted by the Seitamo group that we were unable to obtain owing to their extreme obscurity. However, until the other data are obtained and analyzed, this material should be sufficient to form the basis of a reasonable estimate of the Sámi IQ.

Table 5
Basic meta-analysis of the two vector correlation analyses involving the results of comparing Finnish and two groups of Sámi children on the WISC.

Variable	*K*	*N*	*Rho*	85% CI	χ^2
Finns–Sevettijärvi Sámi and Nellim Sámi–Finns	2	123.5	−.094	−.268–.085	48.67*

Note.
* $p < .05$, $df = 1$.

[3] We are grateful to the second reviewer, who pointed out this problem.

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