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Evolution vs. culture as background factors for international intelligence differences

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1 The question

There are **large differences** in intelligence (ability to think), knowledge (relevant and true knowledge) and the intelligent use of this knowledge **across nations**.

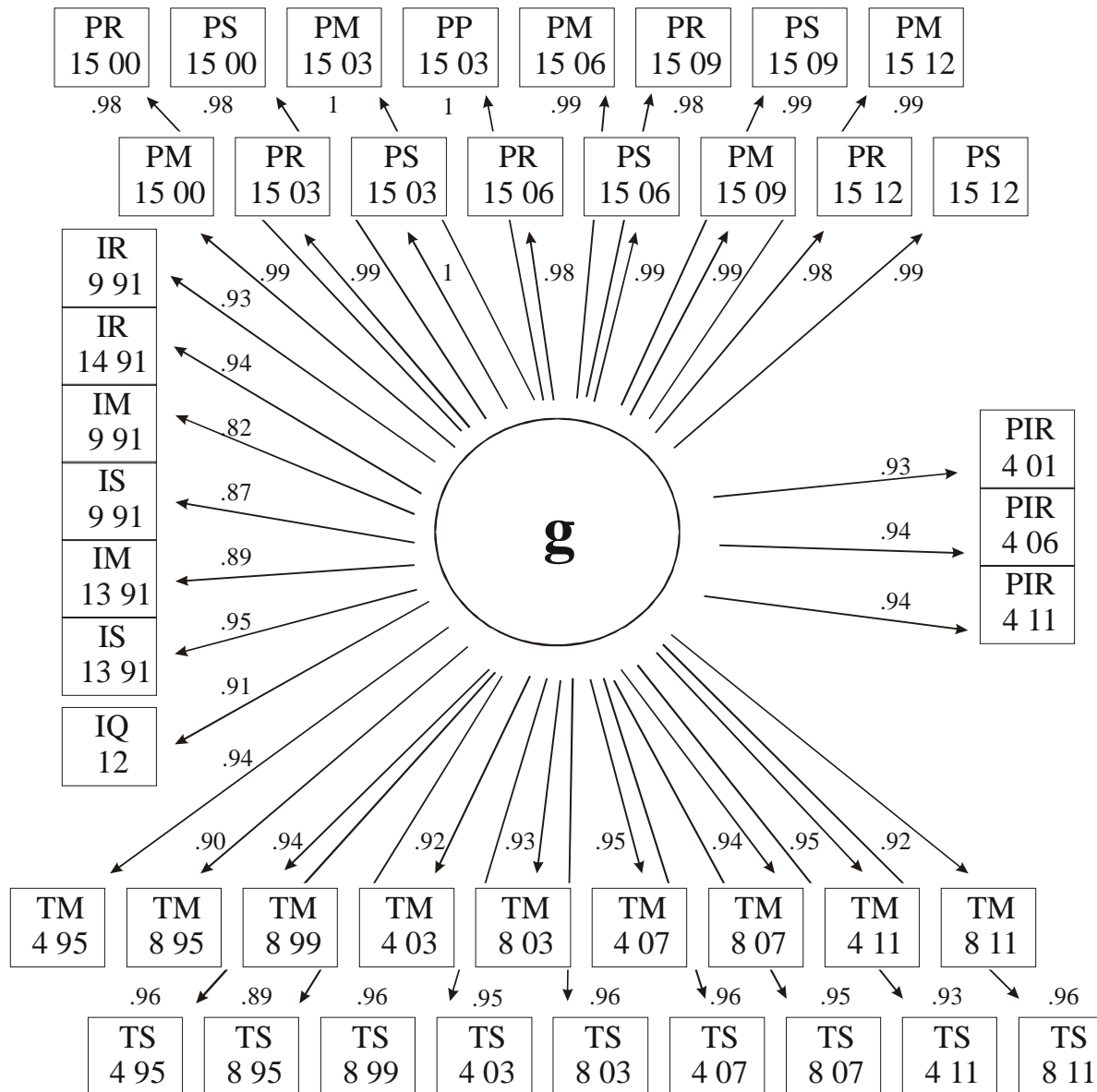
Study	lowest			highest			equ to
	Country	SAS	IQ	Country	SAS	IQ	scho y
TIMSS 2011 4 th grade	Yemen	209	t≈56	Korea S	587	t≈113	t≈11 y
PISA Math 2012 15 year o.	Peru	368	t≈80	Singapo	573	t≈111	t≈6 y
IQ Lynn & Vanhanen 2012	Malawi	t≈233	60	Singapo	t≈557	108.5	t≈16 y
				Hong Ko	t≈553	108	

SAS: Student Assessment Score (M=500, SD=100), uncorrected results,

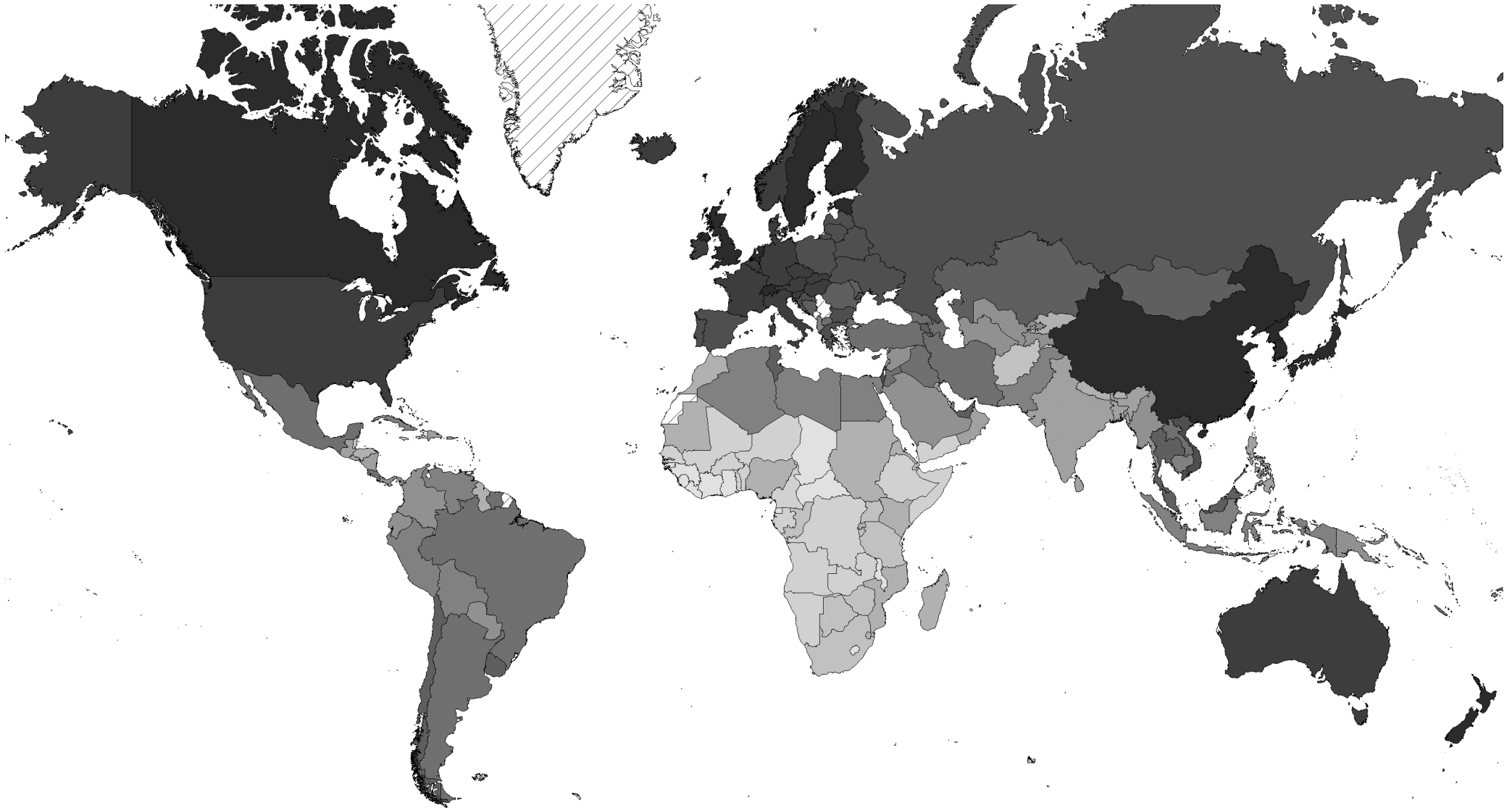
t≈ transformed in other scale,

equ to scho y: difference equivalent pure school attendance years (35 points in SAS, 3 points in IQ, younger students larger, older students smaller increase).

In different test measures **the pattern is similar.**



G factor of international differences (Rindermann, 2015)



Cognitive ability levels around the world, darker represents higher values (including estimates for 27 countries, 173 measured; R, 15)

There are **stable differences** in cognitive ability and its indicators **across time** (relative pattern stability, not absolute; R, 15).

Cognitive ability estimates (in parentheses number of countries)	Tech- nology -1000 (Comin)	Tech- nology 0 (Comin)	Tech- nology +1500 (Comin)	Tech- nology +2000 (Comin)	Eminent Scientists -800 to +1950 (Murray)	Enlightenm ent Index 18 th cent. (Mokyr)	
CA corrected (max 197)	.48	.36	.82	.77	.37	.34	
SAS mean corr (max 98)	.28	.38	.78	.71	.36	.32	
SAS 95% corr (max 98)	.26	.40	.76	.75	.37	.33	
SAS 05% corr (max 98)	.26	.37	.75	.68	.35	.32	
	Patents 1991-2007 (WIPO)	High tech exports 2007 (WEF)	Airline security 2009-10 (AERO)	Inno- vation 2013 (WIPO)	Science Nobel Prizes 1901-2004	High Citations 1987 (Cole)	Top univer- sities 2010-2013
CA corrected (max 197)	.49	.52	.53	.83	.37	.44	.74
SAS mean corr (max 98)	.46	.46	.50	.79	.35	.42	.61
SAS 95% corr (max 98)	.51	.46	.57	.81	.37	.45	.65
SAS 05% corr (max 98)	.41	.45	.45	.76	.35	.40	.58
	Cognitive achievement in history (-1950)		Cognitive achievement in modernity		Cognitive achievement total average		
CA corrected (max 197)	.53		.72		.69		
SAS mean corr (max 99)	.55		.67		.70		
SAS 95% corr (max 99)	.55		.70		.73		
SAS 05% corr (max 99)	.53		.64		.67		

But why?

There have to be **long-term** stable determinants (pattern stability).

2 What not

Education,
modernisation,
politics,
wealth etc.

are all relevant, but not long-term factors
(theoretically and empirically highly variable).

Geography (drought, heat, “no tameable and domesticable animals and plants” etc.) is a manageable challenge and it is theoretically (contentwise, substantially) not convincing.

→ evolutionary-genetic factors

→ cultural factors

3 Evolutionary approach

Main problem:

Intelligence coding genes and national differences in them are not known, also not their way of work via proteins, neurological structures and neurological processes on cognitive development resulting in psychological intelligence differences.

We cannot explain international differences in cognitive ability based on genes. “A” cannot explain “B” if we do not know “A”.

Huge body of **indirect evidence** (and first, until now not replicated direct evidence) that genes contribute to international cognitive ability differences.

Behavioural genetics and individual differences

High heritabilities ($h^2 = .50$ to $.80$) make it rather **improbable** that genes are not involved in group differences as in international differences (Jensen, 1970, pp. 21ff.; Sesardic, 2005, chapter 4).

But not (logically) compelling (ecological fallacy problem).

Correspondence of intelligence coding genes and intelligence differences at the international level

The **COMT Val158Met** ($r_{\text{ind}} \approx .25$) correlates across groups with

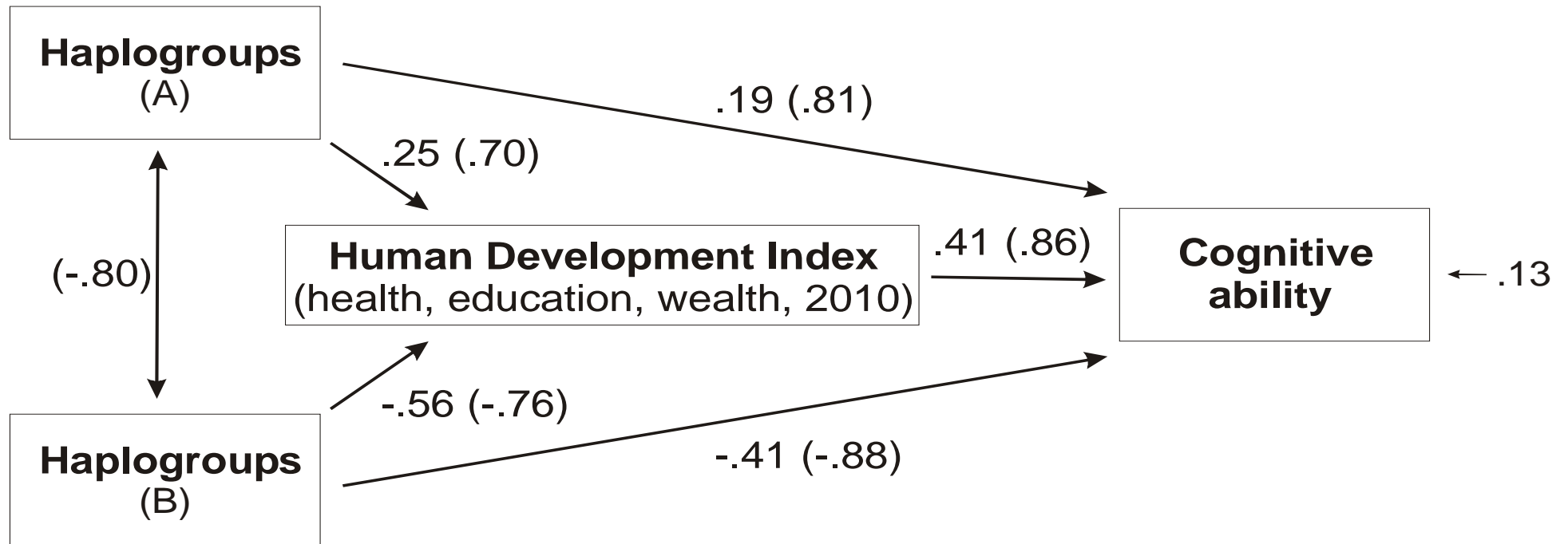
- agriculture (vs. hunter-gatherer society, $r = .41$),
- latitude ($r = .55$) and
- intelligence ($r = .57$).

FNBP1L (rs236330) ($r_{\text{ind}} \approx .12$) correlates across groups with

- intelligence ($r = .81$) (Piffer, 2013).

(One study, group level.)

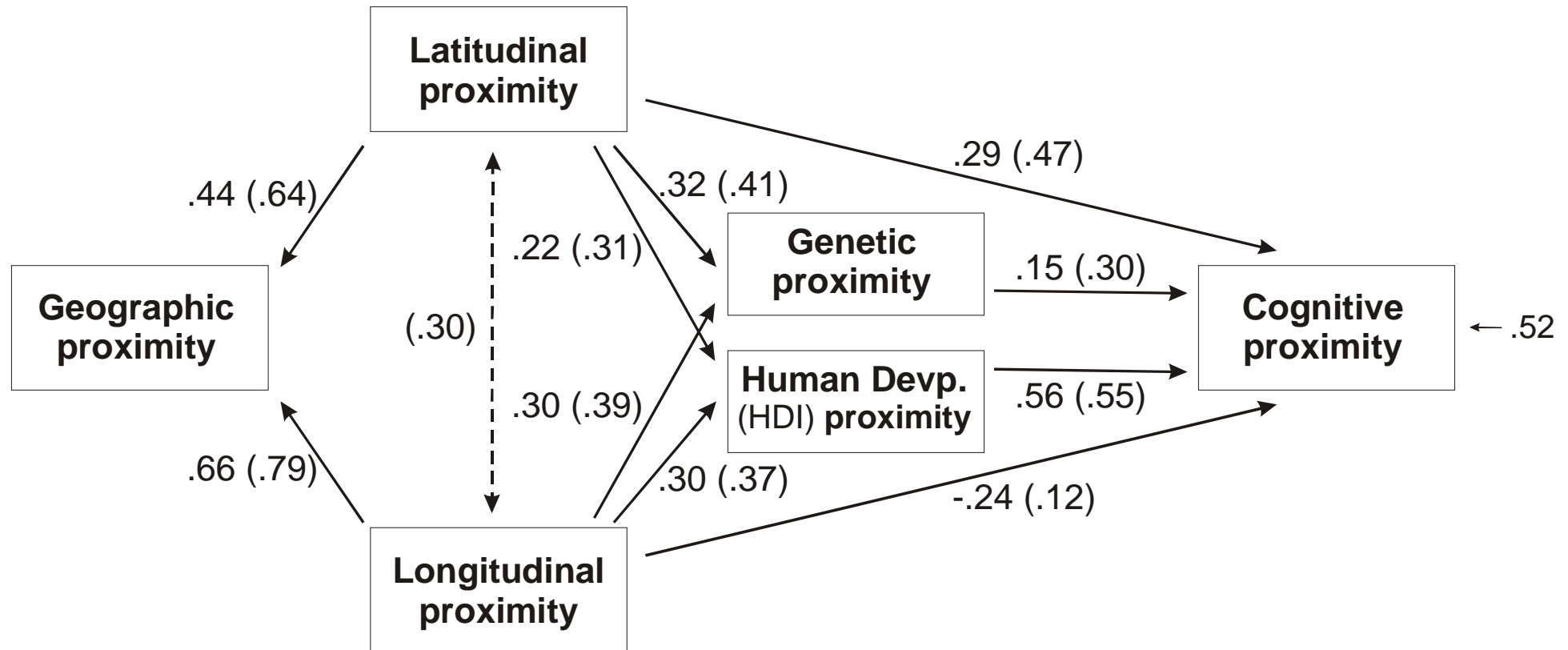
Correspondence of international distributions of general genetic markers and intelligence



Prediction of cognitive ability using two general **haplogroup** sets and a society developmental indicator ($N=47$ countries) (Rindermann, Woodley & Stratford, 2012)

The effect is robust: in within-country analyses in Italy and Spain for the same genetic markers the same pattern emerged.

Correspondence of general genetic proximity and intelligence proximity at the international level



Prediction of cognitive ability proximity by latitudinal, longitudinal and genetic proximity ($N=67$ correlations and 840 comparisons; Becker & Rindermann, 2014)

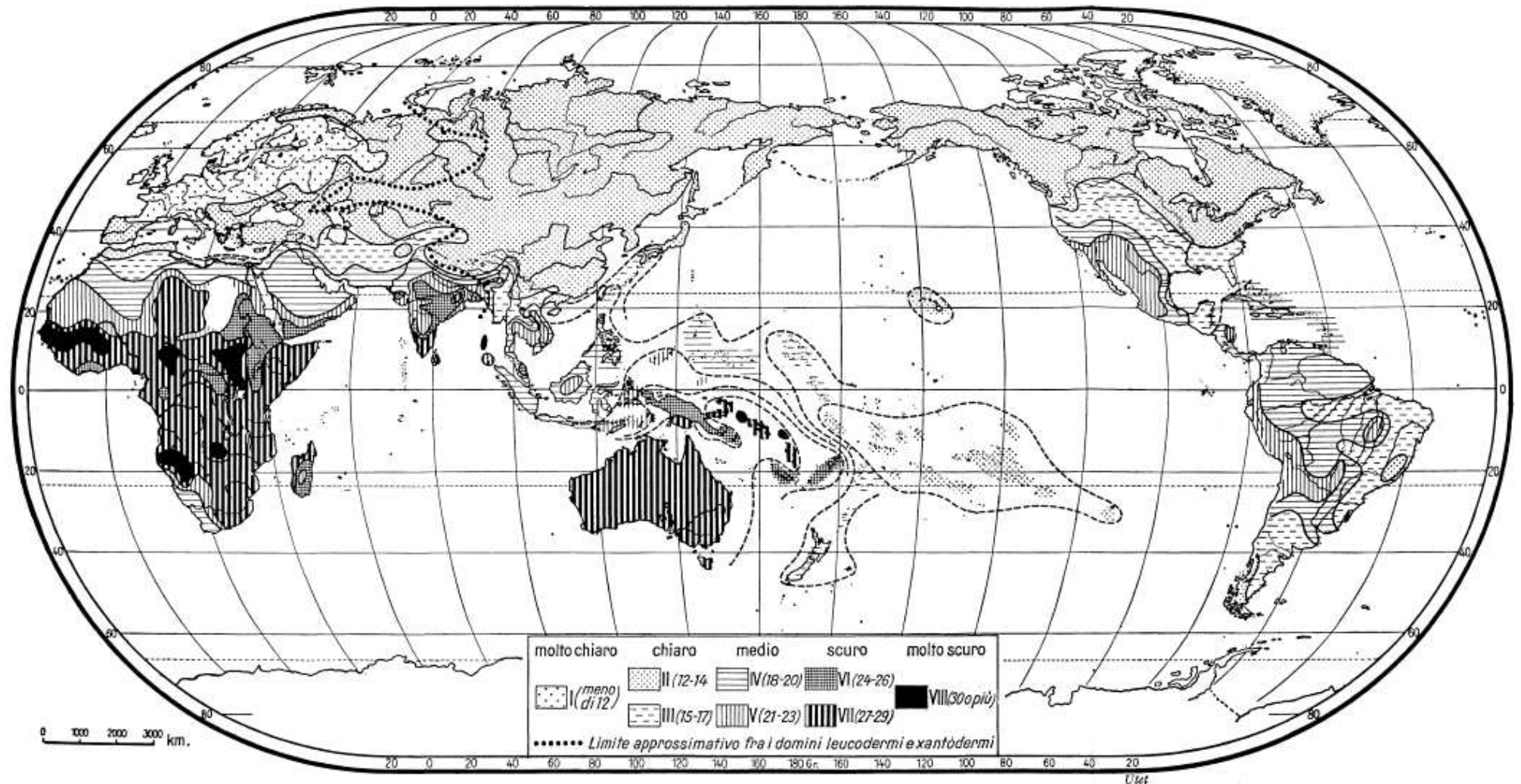
Skin brightness (skin colour)

(About the used term: Not colour is measured, but reflectance. Colour is not the relevant aspect, but high or low melanization. “Reflectance” is not the correct evolutionary association: Skin didn’t become “reflecting” as white to protect against sun but lost melanization to enable more vitamin D synthesis in regions with less sunlight.)

Only **indicator** variable, **no causal** variable.

Maybe pleiotropic effects (Jensen, 2006), but no proof.

Individual level: $r = .20$ (Jensen, 2006).



DISTRIBUZIONE DELLA VARIA INTENSITÀ DEL COLORE DELLA PELLE

(R. BIASUTTI).

(Biasutti, 1967, p. 224, Tavola VI)

	CA (corrected)	SAS M (corr., all)	SAS M (ncorr., PTP)	SAS 95% (nc., high ability)	SAS 05% (nc., low ability)	GNI 2010 HDR
Jablonski & Chaplin, ad. (education partialled out)	.82 (.64) (.62)	.58	.69	.66	.69	.68 (.56) (.50)
Templer & Arikawa (education partialled out)	.90 (.87) (.82)	.81	.79	.78	.76	.54 (.31) (.20)
Biasutti, adapted (education partialled out)	.87 (.74) (.80)	.76	.74	.70	.75	.50 (.26) (.19)
Skin brightness average (education partialled out)	.87 (.74) (.80)	.74	.74	.69	.74	.50 (.25) (.18)
Skin brightness average excluding sub-S-Africa	.76	.71	.68	.64	.69	.34

$N_{\max JC}=48$, $N_{\max TA}=129$, $N_{\max B}=188$, $N_{\max A}=188$ or $N_{\max NAf}=145$ countries.

In parentheses partial correlations, first distance to equator (absolute latitude) partialled out, second school quality mean and adult education mean.

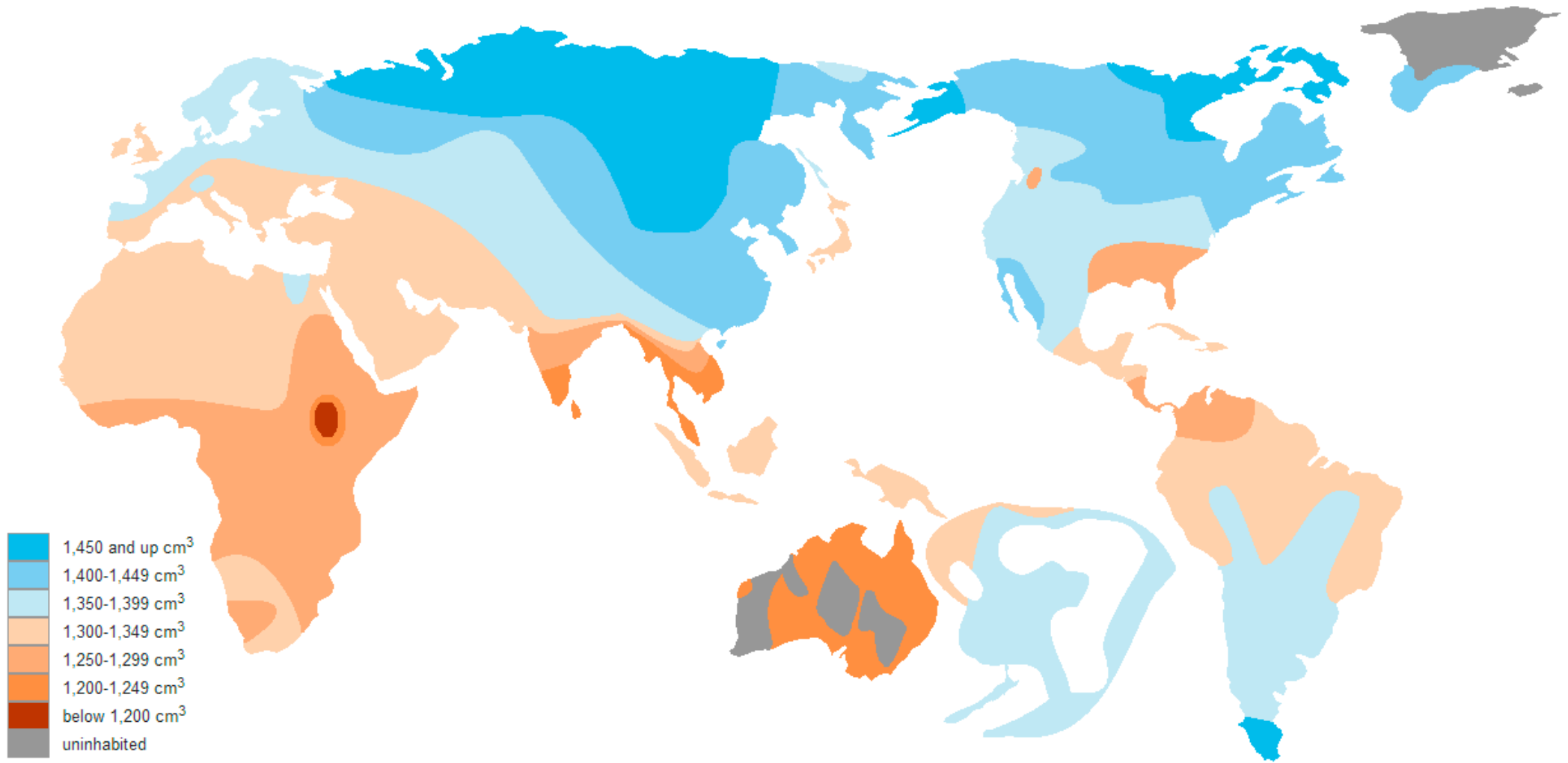
Comparisons with the Jablonski and Chaplin data ($r=.91$, $N=43$) and the original Biasutti data ($r=.98$, $N=129$) show that the numbers of Templer and Arikawa are correct.

But: Source of data? Newer and more data needed.

Brain size (cranial capacity)

Brain size and intelligence are related:

- *individually*: $r=.56$ (Deary et al., 2007, meta-analyses lower at around $r=.40$, Rushton & Ankney, 2009);
- *evolutionarily*: increase of brain size in evolution ($r=.95$; Henneberg & de Miguel, 2004, p. 27);
- *historically*: in 20th century head and brain sizes increased and similarly average intelligence of each generation (Lynn, 1990);
- *cross-nationally* ($N=164$) using data from Beals et al. (1984) cranial capacity and intelligence correlate at $r=.77$ (and cranial capacity with absolute latitude at $r=.70$ [Meisenberg, personal communication]).



(following Beals et al., 1984, p. 304, Figure 3)

	CA (corrected)	SAS M (corr., all)	SAS M (ncorr., PTP)	SAS 95% (nc., high ability)	SAS 05% (nc., low ability)	GNI 2010 HDR
Cranial capacity, Beals, Meisenberg smoothed	.73 (.50) (.54)	.59 (.32) (.27)	.56 (.33) (.22)	.52 (.28) (.11)	.56 (.34) (.26)	.45 (.22) (.22)
Cranial capacity, Beals, not smoothed	.58 (.35) (.47)	.52 (.29) (.37)	.51 (.32) (.35)	.46 (.26) (.26)	.52 (.33) (.36)	.34 (.13) (.20)
Cranial capacity, Beals, both combined	.68 (.46) (.53)	.58 (.33) (.33)	.56 (.36) (.30)	.52 (.29) (.20)	.57 (.37) (.34)	.42 (.19) (.22)
C. capacity/height, Beals, Meisenberg smoothed	.67 (.59) (.53)	.42 (.23) (.04)	.44 (.28) (.10)	.38 (.21) (-.04)	.47 (.33) (.19)	.30 (.13) (.01)

In parentheses first row: distance to equator (absolute latitude) partialled out, second line school quality mean and adult education mean partialled out.

But: Source of data? Newer and more data needed.

Evolutionary theories

Cold-winter-theory

Selection by **climatical harshness**: challenges better copable with higher intelligence.

Richard Lynn (1987, 2006); Edward Miller (1991); Michael Hart (2007); Philippe Rushton (1997/1995).

r/K-theory

Selection towards higher **parental investment** in individual offspring. Intelligence an attribute of a *K*-strategy more useful in cold climates. Philippe Rushton (1997/1995).

Novel challenges

Selection by **novelty**: challenges better copable with higher intelligence.

Satoshi Kanazawa (2004).

High cognitive ability level of Jews and genetic theories

Selection by **society**: constraints better copable with higher intelligence.

E.g. Cochran & Harpending (2009).

Evidence for recent (accelerated) evolution among humans

E.g. resistance against infectious diseases, lactose tolerance (lactase persistence), skin brightness, systems of respiration and circulation (Cochran & Harpending, 2009).

If other traits were recently modified why not intelligence too?

Sedentism, agriculture, densification and urbanisation → **burgher personality effect** (including intelligence).

E.g. Clark (2007); Cochran & Harpending (2009, pp. 113ff.); Frost (2010); Unz (2013).

Summary on evolutionary-genetic factors

No direct or only weak direct evidence

(genes→physical structures and processes→intelligence; differences in gene frequencies across nations correlated with differences in intelligence).

But huge indirect evidence.

Theoretically and empirically the best source: **cranial capacity**. Bigger brains lead to higher intelligence. Empirical evidence on different levels.

But also a rather cautious measure of a possible evolutionary impact.

All genetic theories are in the long run environmental theories, environmental pressures, which have resulted via selection in genetic and physic changes.

		Skin brightness	Cranial capacity	Consangui nity	CA (corrected)
Skin brightness, mean	r (r _p) N	1 (179)	.61 (.57) (179)	-.60 (75)	.87 (.83) (179)
Cranial capacity, own assignment	r (r _p) N	.61 (.57) (179)	1 (179)	-.21 (75)	.58 (.47) (179)
Consanguinity	r (r _p) N	-.60 (75)	-.21 (75)	1	-.62 (-.60) (75)
G factor evolution	r (r _p) N	.90 (.88) (179)	.90 (.89) (179)	-	.81 (.74) (179)
G factor genes	r (r _p) N	.91 (.90) (75)	.70 (.71) (75)	-.77 (-.76) (75)	.77 (.75) (75)

First line correlations and in parentheses partial correlations (GNI per capita partialled out). Skin brightness (Biasutti-Jablonski-mean) and cranial capacity (own assignment) in the same country samples of 179 nations.

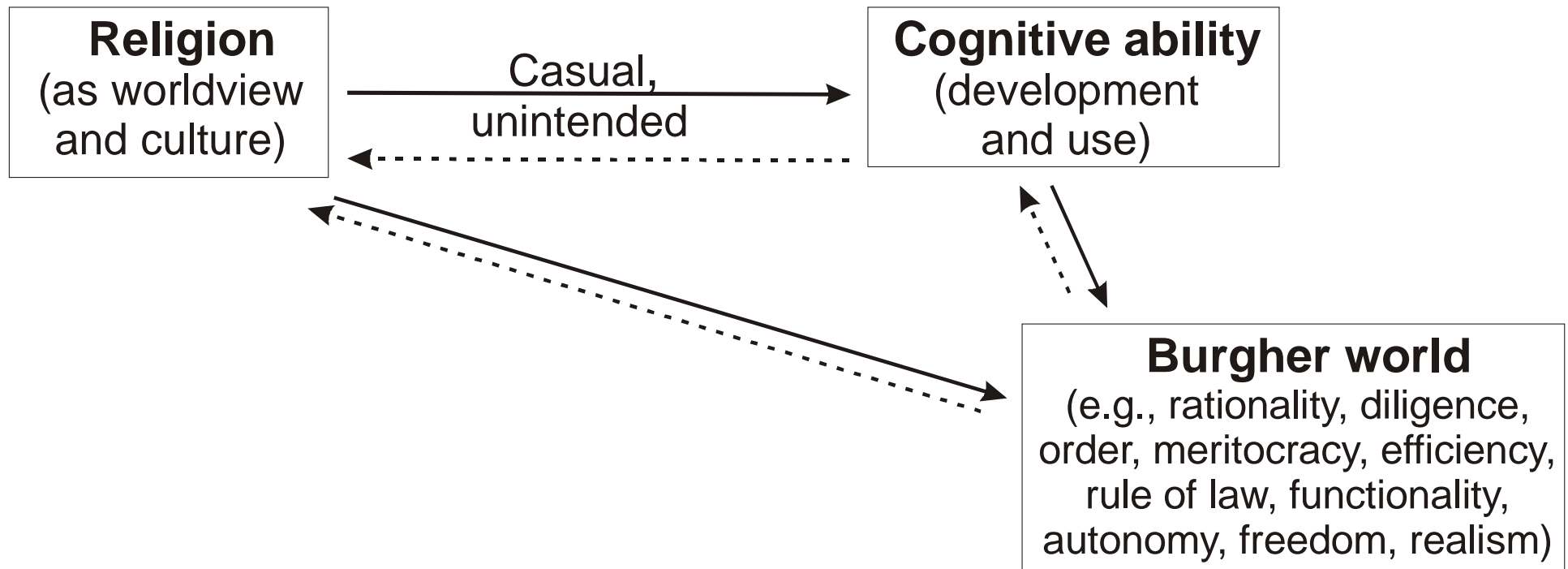
4 Cultural approach

Culture is a worldview (“Weltanschauung”) that *describes* the world and how it *should* be and via both and changing the behaviour of people *shapes* this world.

Religions are worldviews, the oldest and due to their long-term impacts the most important ones.

Religions take effect via

- the *original message* (initial holy text),
- *the exemplary figure of the religious founder* and his role model function,
- the *interpreted and revised doctrine* and its changing understanding across time and
- via the *lived practice* in present time.



Theoretical model for effects of religion on cognitive ability and the development and preservation of a burgher world

Worldviews and religions matter, ideas change people, we want to give three examples:

(1) North vs. South America

“The British colonies had a **better educated population, greater intellectual freedom** and **social mobility**. ...

The 13 British colonies had nine **universities** in 1776 for 2.5 million people. New Spain [Mexico], with 5 million, had only two universities ... , which concentrated on theology and law.

Throughout the colonial period the Inquisition kept a tight **censorship** and suppressed heterodox thinking.”

(Maddison, 2001, p. 108)

(2) Youth in Germany with Christian or Muslim religion

Higher **religiosity** among **Muslim** youth is corresponding to lower **education**

while among **Christian** youth (Germans or immigrants) higher **religiosity** corresponds to higher **education**
(Baier et al., 2010, pp. 90f.).

For **violence**, the religious effect is reversed:

More **religious Christian immigrants** become **less violent**
while **more religious Muslim immigrants** become **more violent**
(Baier et al., 2010, pp. 117f.).

(3) Communism versus liberty

South Korean children are about 6 to 8 cm **taller** than their North Korean peers (Schwekendiek & Pak, 2009).

West Germans were around 1 to 2 cm taller than past East **Germans** (Komlos & Kriwy, 2003).

Religions and their impact on education and thinking

(sketchy and shortened, content of religion and its practice)

Catholicism

- + Truth in Bible has to be **interpreted**.
- + Scholastic **philosophy of reason** (Thomas Aquinas; e. g. Sombart, 1998/1913).
- + **Education** by monasteries and orders.
- + Institutional education of the religious elite.
- + Rule of law. In European history mental power independent from secular power.
- Traditionally intellectual elites have no own family and no own children.
- Problems of paternalism and dogmatism.

Protestantism

- + Appreciation and practice of **own** reading and **own** thinking (e. g. Hegel, 2001/1837).
- + **Liberty** and **autonomy** (Martin Luther).
- + Appreciation and practice of **education**, **order** (including rule of law, = meritocracy) and **industry** (e. g. Weber, 2001/1905).
- + Traditionally intellectual elites with own family and with own children in social and genetic exchange with other leading groups (e. g. merchants).
- Problems of radicalism or dissolution.

Islam

- + Antimagic approach, ban on pictures.
- ± Written language without vowels.
- **Violation of rationality** from 11th century to this day.
- Learning in Koran schools as **rote learning** of given truth without own thinking/questioning.
- **No liberty, no rule of law.**
- **No equal rights for women** results in low educational level of women and this leads to lower educational competence as mothers for children.

Animism

- + Frequently with very complex constructions of the world.
- **Magic** is seen as method to find truth; magic as short cut with avoidance of strenuous rational thinking and with avoidance of critical proof of empirical hypotheses (e. g. Lévy-Bruhl, 1923/1922).
- No necessity of own reading and own and rational thinking.

East-Asian Confucianism

- + Appreciation and practice of **education, learning** and **hard work** (e. g. Weber, 1951/1920).
- ± Even though there is no appreciation of independent thinking - learning and thinking to solve given problems and as **achievement** for the family are strongly held in high esteem.

Judaism

- + Appreciation and practice of **own reading** Torah and Talmud (Murray, 2007).
- + In Occident appreciation of **education** at the marriage market.
- + In Occident since 19th century high appreciation and practice of education and **own thinking** (e. g. Van Den Haag, 1969; Nisbett, 2009) as legitimate ways out of marginalisation.
- Problems of radicalism or dissolution.

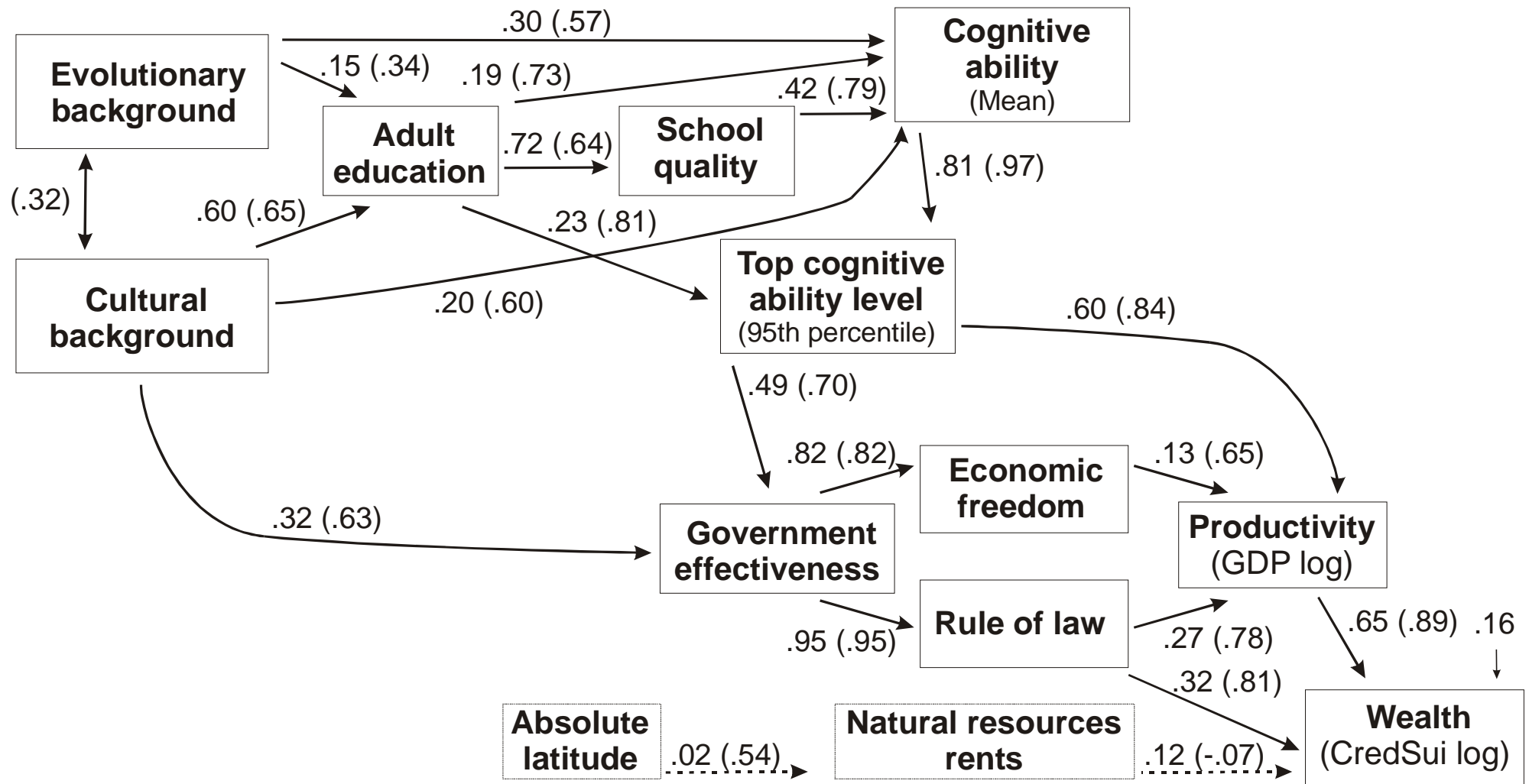
	CA (corr.)	SAS M (corr., all)	Adult education	Books
Animism	-.65 (-.38)	-.53 (-.26)	-.53 (-.08)	-.31 (-.15)
Judaism	.08 (.03)	.05 (.02)	.08 (.06)	.08 (.06)
Christianity	.26 (.31)	.22 (.32)	.46 (.44)	.39 (.39)
Catholicism	.15 (.17)	.02 (.14)	.23 (.02)	.04 (.06)
Orthodoxy	.22 (-.04)	.10 (-.13)	.22 (.13)	.02 (-.12)
Protestantism	.19 (.23)	.35 (.40)	.33 (.48)	.60 (.62)
Islam	-.26 (-.63)	-.39 (-.68)	-.37 (-.55)	-.48 (-.53)
Hinduism	-.04 (.03)	-.13 (.00)	-.09 (-.13)	-.02 (-.08)
Buddhism	.15 (.21)	.14 (.14)	-.01 (-.06)	-.03 (.10)
Confucianism	.31 (.38)	.30 (.32)	.14 (.00)	.04 (-.02)
Weighted religions	.60 (.66)	.62 (.73)	.66 (.57)	.64 (.65)
N	199	108	193	85

Correlations with percentages of members in countries (in parentheses excluding developing countries)

Weighted Religions = (Prot·1) + (Cathol·0.5) + (Orthodox·0.2) + (Rest-Christ·0.3) + (Muslim·(-0.4)) + (Hindu·(-0.4)) + (Buddh·0.2) + (Animist·(-1)) + (Confuc·0.8) + (Jew·0.8).

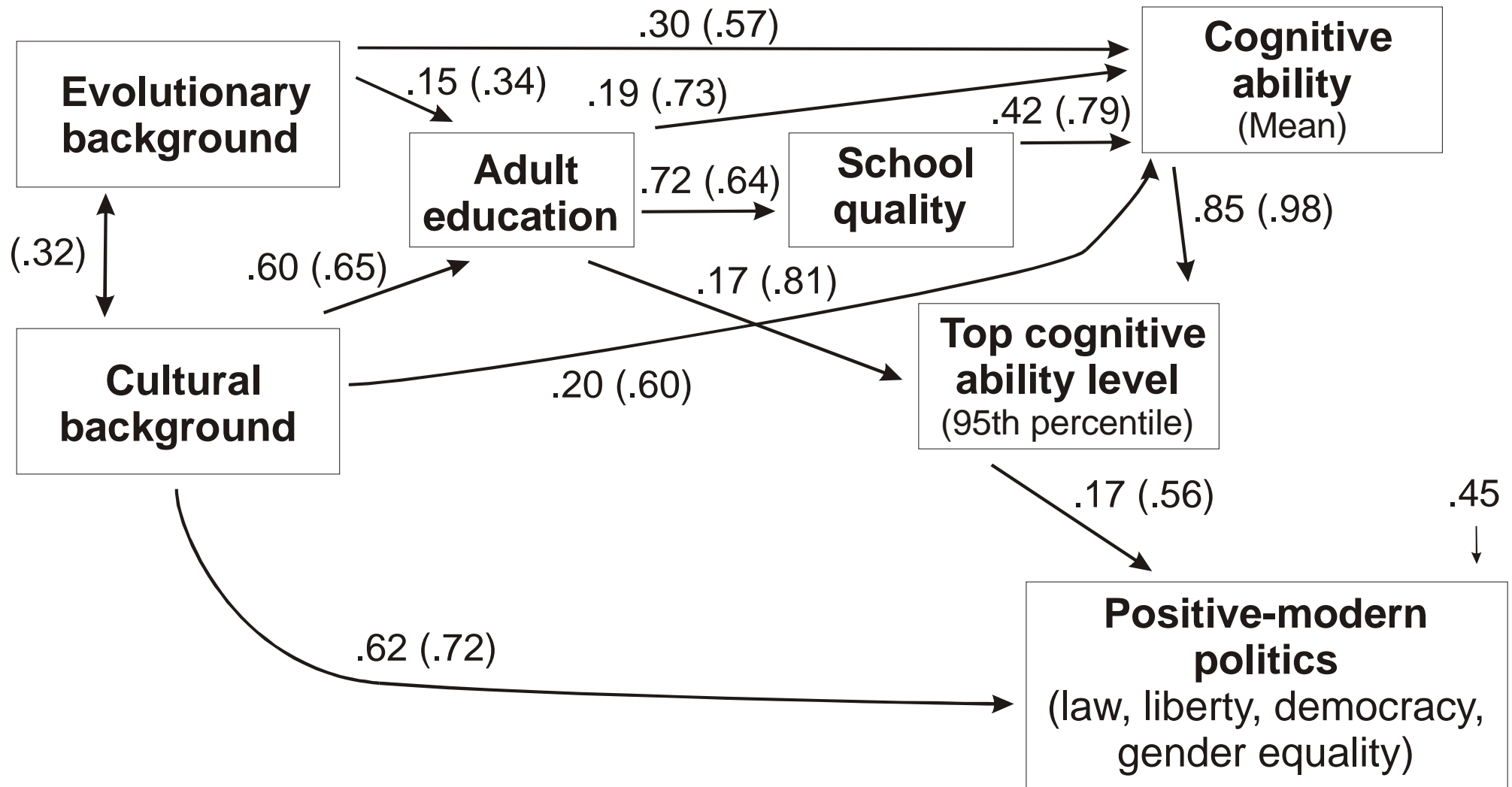
	Enlight. (Mokyr)	Trust (WVS)	Rule of law	Demo- cracy	Political freedom	Economic freedom	Gov. effec.	Low corr.
Animism	-.18	-.30	-.40	-.27	-.19	-.38	-.46	-.36
Judaism	-.01	-.01	.07	.10	.07	.05	.09	.07
Christianity	.23	.07	.38	.60	.61	.28	.38	.36
Catholicism	.10	-.14	.22	.37	.44	.12	.24	.19
Orthodoxy	-.08	-.06	-.04	.14	.01	.04	-.02	-.08
Protestantism	.38	.54	.44	.42	.42	.32	.40	.52
Islam	-.16	-.16	-.33	-.51	-.53	-.16	-.32	-.33
Hinduism	-.05	-.06	-.03	.04	.02	-.01	-.01	-.04
Buddhism	-.06	.07	-.06	-.15	-.21	-.09	-.03	-.07
Confucianism	-.04	.23	.15	.00	-.02	.13	.18	.17
Weighted religions	.34 (.36)	.44 (.46)	.62 (.60)	.66 (.67)	.64 (.58)	.45 (.58)	.64 (.65)	.63 (.61)
N_{max}	186	117	198	189	194	180	198	183

5 Path models



Global wealth model

direct: $\beta_{\text{Evo} \rightarrow \text{CA}} = .30$, $\beta_{\text{Cul} \rightarrow \text{CA}} = .20$; **total:** $\beta_{\text{Evo} \rightarrow \text{CA}} = .37$, $\beta_{\text{Cul} \rightarrow \text{CA}} = .50$



Global politics model (political well-being)

For **politics** the impact of culture is much stronger than for **wealth** ($\beta_{\text{Cultot} \rightarrow \text{Pol}} = .71$, $r_{\text{Cul-Pol}} = .72$ vs. $\beta_{\text{Cultot} \rightarrow \text{Wealth}} = .32$, $r_{\text{Cul-Wealth}} = .61$).

6 Conclusion

Background factors **evolution** and **culture** are **theoretically and empirically important global factors** explaining **stable pattern differences** between nations in cognitive ability and in aspects of economy, politics and society.

See also research in economics:

e.g. by Spolaore and Wacziarg (2013),

“How deep are the roots of economic development?”:

“The evidence suggests that economic development is affected by traits that have been transmitted across generations over the very long run ... biologically (via genetic or epigenetic transmission) and culturally (via behavioral or symbolic transmission).” (p. 325)”

Limitations:

Empirical proof for historical and macro-social processes will be never as compelling as the **experimental proof** of theories at the **level of individuals**.

Longitudinal reciprocal effects difficult to model (with empirical data).

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