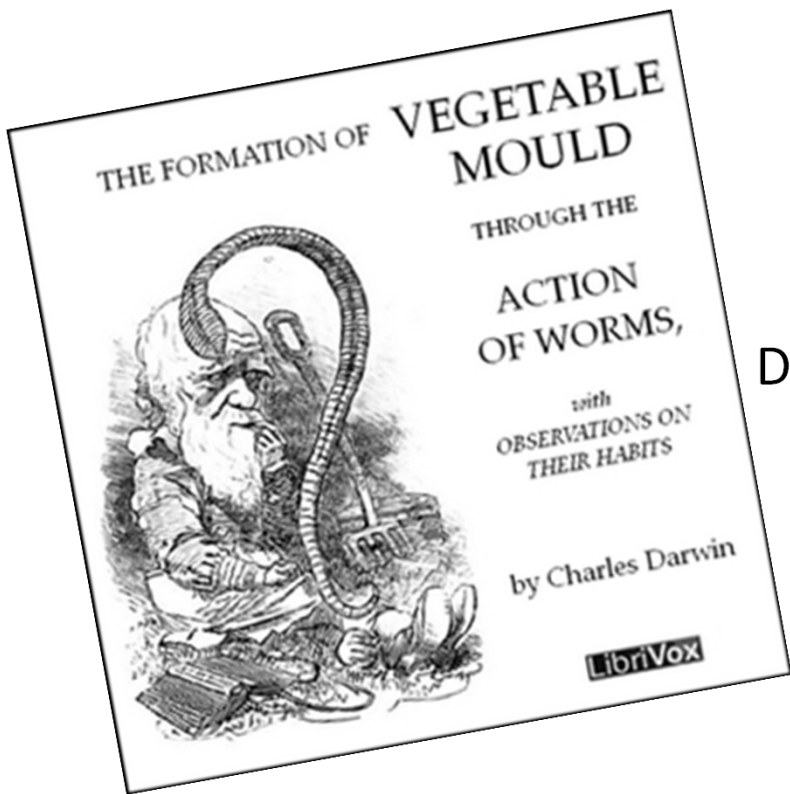


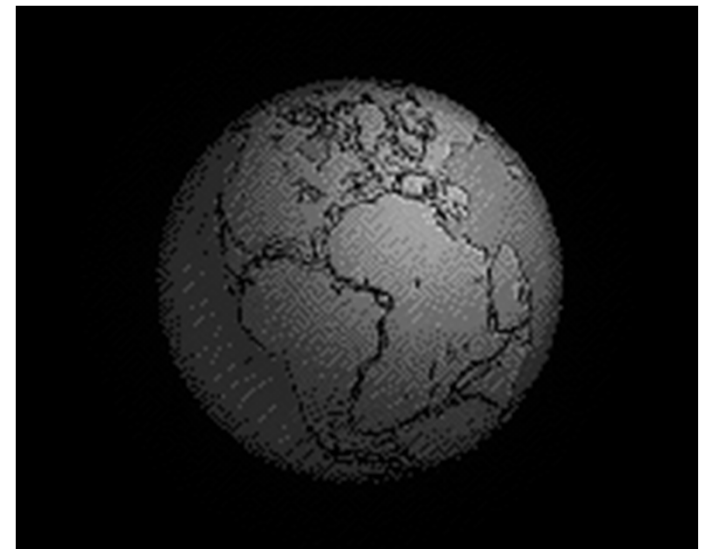
ON THE UNIVERSALITY OF SCIENCE



Jim Clark

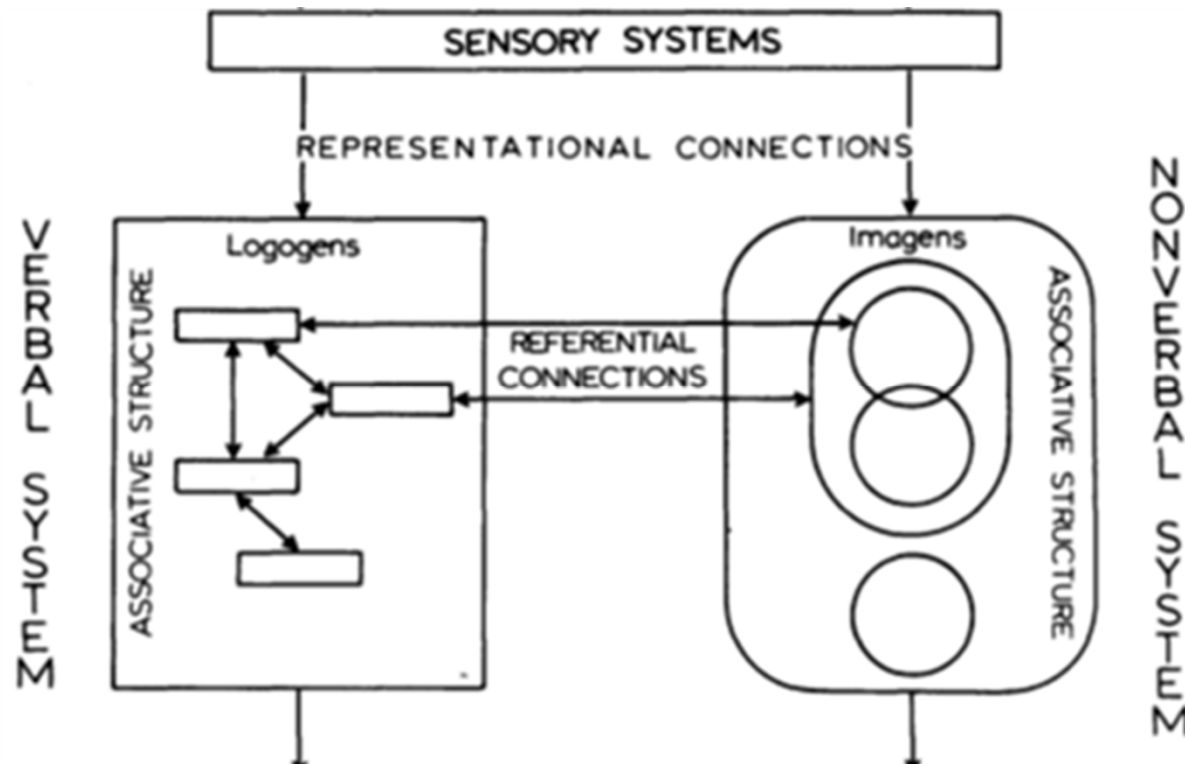
Department of Psychology
University of Winnipeg
Winnipeg Manitoba
Canada
North America
Earth

2025



PREAMBLE

- Me
 - Old, White, Man
 - Cognitive Psychologist
 - Paivio's Dual Coding Theory →
 - Concrete vs Abstract words
 - Philosophy of Science
 - Observational vs Theoretical terms
 - Study of psychological terms (Clark & Paivio)
 - Meaning: Consistency, Distinctiveness, ...
 - Imagery
 - Anti-science rants →
 - UW Postmodern Debate



- “The radical feminist position holds that epistemologies ... of science are androcentric ... science ... serves primarily regressive social tendencies ... its modes of defining research problems and designing experiments... are not only sexist but also racist, classist, and culturally coercive.” (Harding, 1986)

Yahya Jammeh Case Study



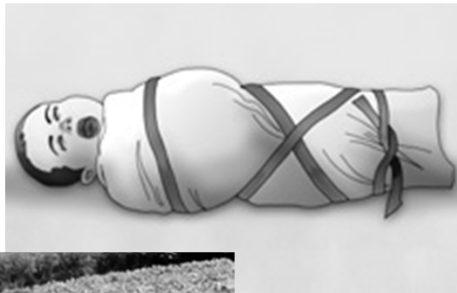
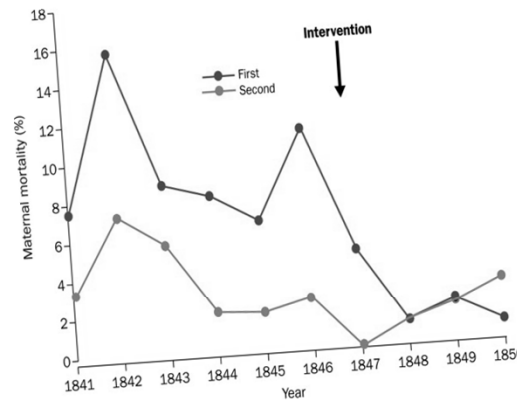
- Former President of Gambia
 - Treatment/Cure for HIV/AIDs: mixture of 7 herbs and spices, White Robes, copy of Quran, prayer beads, praises Allah, ...
 - Only treatment allowed
 - Revealed by ancestors in a dream
 - Family history of traditional African herbalism
 - Army colonel, high school education, no medical training
 - Banned rigorous evaluation & critics

Other Examples

- Bloodletting
- Semmelweis
- Infant restraints



4



Umida Akhmedova (RFE/RL)

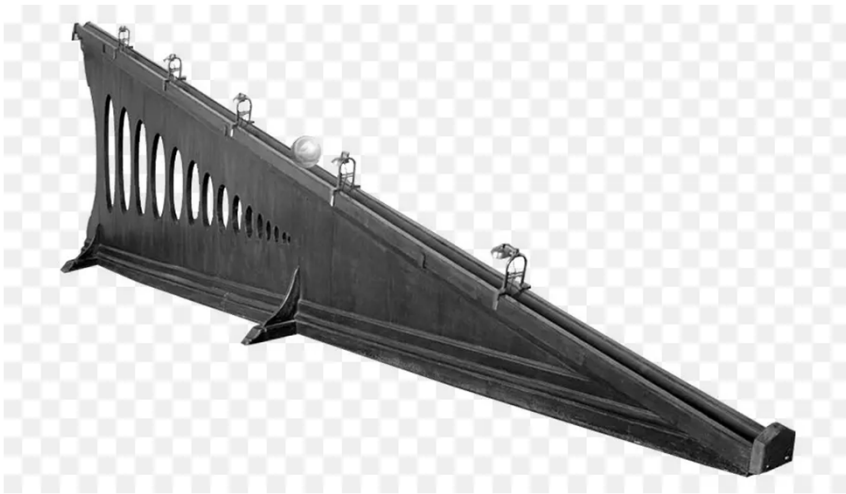
Yahya Jammeh Case Study



- Is it meaningful to ask whether the herbal treatment is effective?
- If so, how would we determine its effectiveness?
- What theory explains efficacy or lack?
- Would conclusions be universal & transcend culture?
- Should “xenos” ask such questions and propose answers?

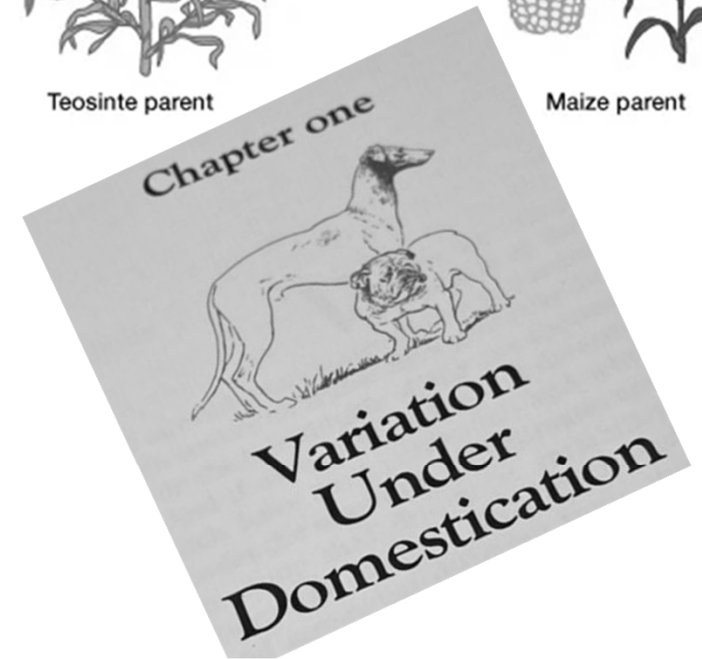
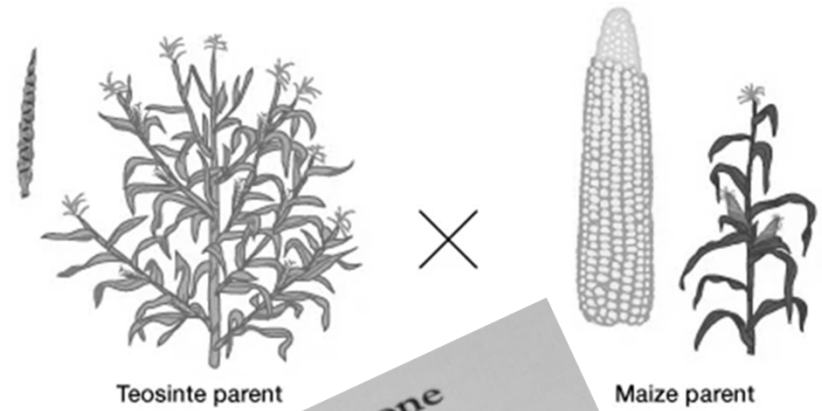
Universality of Science

- Science explains how natural world works
- Empiricism is essence of science
 - Theory consistent with systematic Observation
- Science-based findings & explanations are Universal

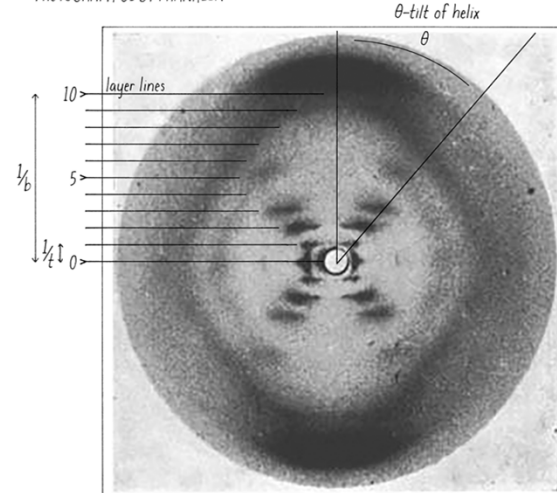


ETHNO EPISTEMICS

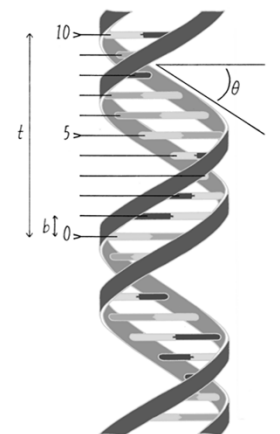
- Perspectives that state or imply an alternative epistemic basis for understanding the natural world than science
 - Islamic Epistemics
 - Hindu (Vedic) Epistemics
 - Traditional Chinese Epistemics
 - Christian Epistemics
 - Afrocentric Epistemics
 - Indigenous Epistemics



PHOTOGRAPH 51 BY FRANKLIN



b - distance between bases
 t - distance for one complete turn of helix



Islamic Epistemics



8

- “... modern science is just one of the several major forms of science that the world has witnessed in its history. Islamic science, ... as it has been cultivated in Islamic civilization, is another form of science.”
(Bakar, 2003, p. 33)

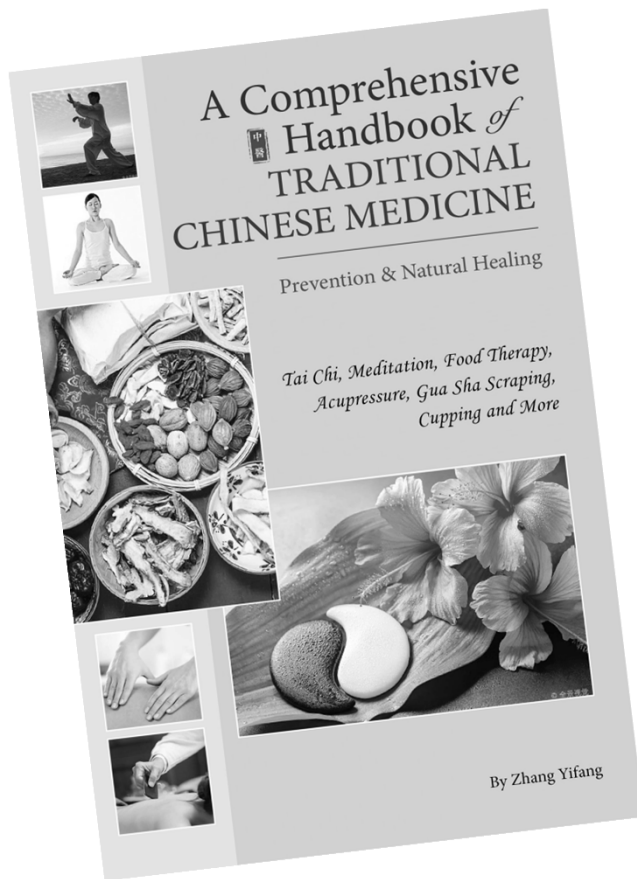
- Journal of Islamic Sciences: “explores—from Islamic perspectives—religious and philosophical implications of data and theories originating in the natural, biological, and cognitive sciences. The journal is dedicated to fostering a renewed and rigorous relationship with the spiritual and intellectual traditions of Islam.”
- “serious Muslim thinkers have thus concluded that the solution is to develop a new type of science, and they insist that the Islamic ... worldview, and principles ... produce a more generally fruitful science, which they call “Islamic science.” (Guessoum, 2010, p. 59)

- “... an increasing number of middle-class Hindus ... embrace the view ... that the most eminent findings of modern science, whether in ... physics, mathematics, or biology, are the same as the highest truths known to the sages to whom the Vedas are attributed.” (Lai, 2005)
- “... vedic sciences include Jyotish (vedic astrology, science of time), Ayurveda (the science of healing), Tantra (the knowledge of universal patterns of energies) ... and Vastu (science of space ...).”



- “[In 2001] ... the university grants commission approved ... university-level courses in Vedic astrology, an attempt to restore Hindu pride by demonstrating how Aryan civilization was central to India's historical achievements.” (Ruparelia, 2006)

- TCM “validation” cultural
- “biomedical-style research sustains Chi`nese medicine as an academic discipline and boosts legitimacy by producing mainstream forms of evidence, while teaching takes a broader definition of ‘evidence’ and legitimises traditional knowledge as well as bioscience.” (Brosnan, 2016)



- “according to the existing theories about etiology and pathogenesis in TCM, disease arises when an imbalance exists between the different energies of the human body through qi excess or deficiency or alternatively when an excess of air, dryness, heat, or cold occurs either due to the influence of the environment or for entirely internal reasons.” (Shui, 2021)
- “Epistemic hybridity within TCM highlights the relevance of considering multiple legitimate evidence bases that include diverse ways of knowing and doing rather than the current emphasis on a single biomedical epistemology to evaluate the safety and treatment outcomes of any health modality.” (Brosnan et al, 2018)

Christian Epistemics

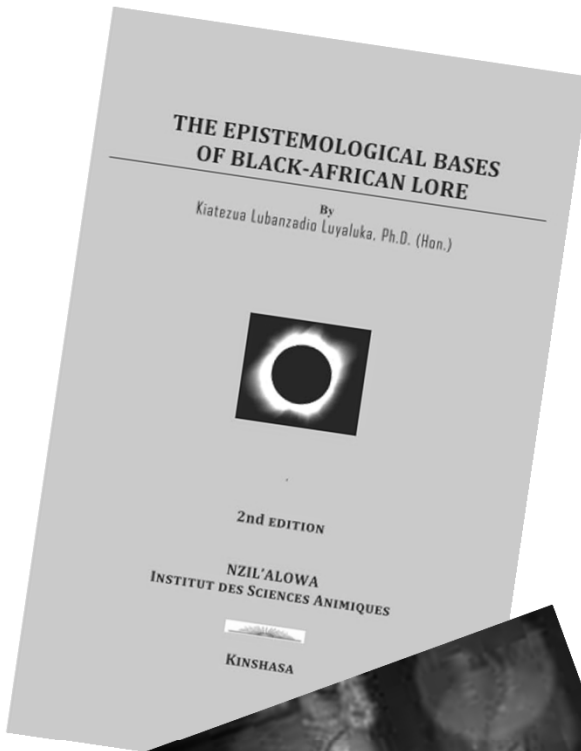
- Christianity even has a “discipline” concerned with foundations for faith
 - “Apologetics has rarely been taken as providing a conclusive proof of Christianity; many apologists believe that to insist on such proof is to sacrifice the supernatural element to purely rational considerations. Some theologians have been skeptical about the value of apologetics to a religion based on faith.” (Brittanica)



- “This synergy between theology and epistemology leads me to argue that a ‘spiritual turn in epistemology’ can be taken on the basis of firm commitment to God and the good.” (Di Ceglie, 2023, *Christian epistemology. How faith can shape and promote rationality*)
- “But even if we grant that belief in God is not supported by adequate evidence, it doesn’t follow that belief in God is unjustified unless we assume that evidentialism is true – unless we assume that justification requires adequate evidence.” (Smith, *Epistemology of Religion*, 2014)

Afrocentric Epistemics

16

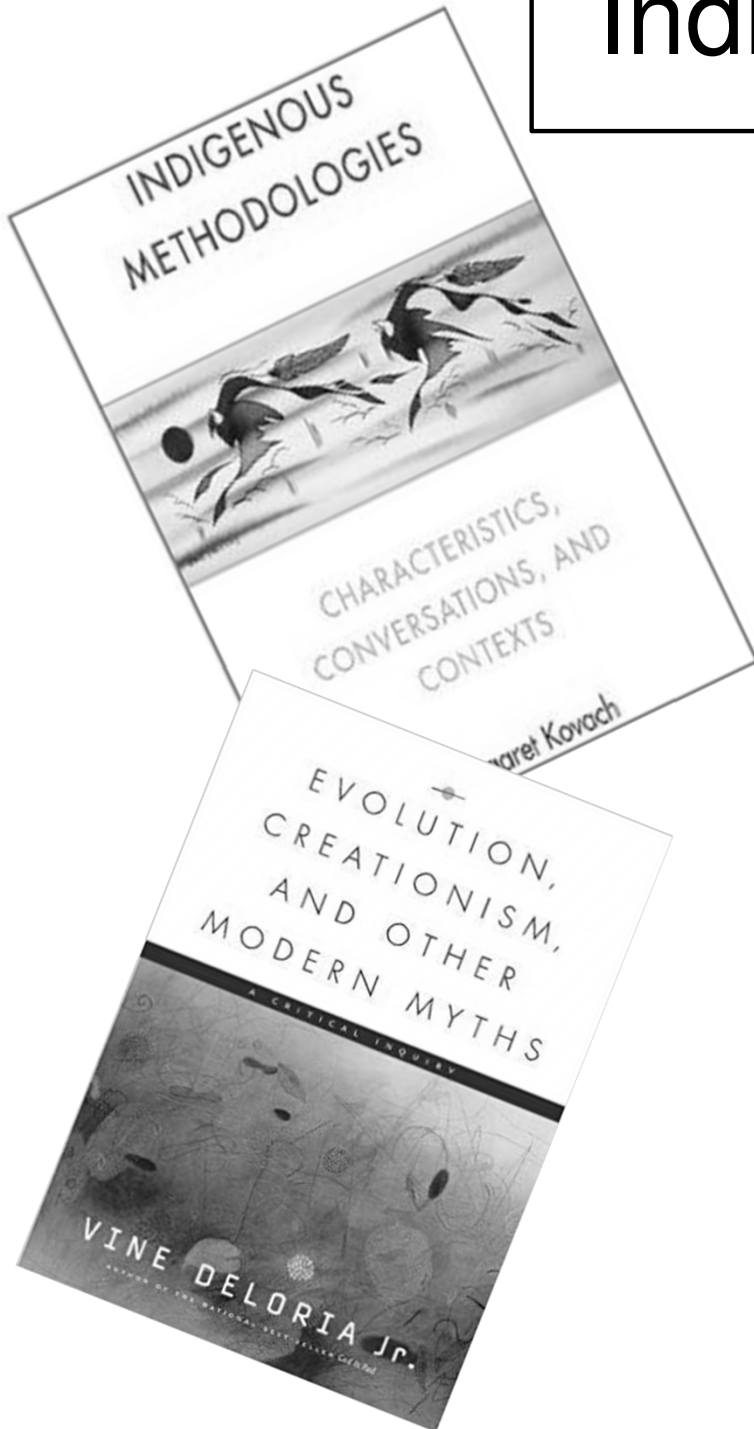


- African Ways of Knowing: three forms (Ngara, 2017)
 - Supernatural Cognition: humans gain knowledge through the help of supernatural powers, such as ancestors, alien spirits,
 - Natural Cognition: using faculties such as intuition and reason. In Africa intuition of the heart and reason of the head are not mutually exclusive, but interrelated.
 - Paranormal Cognition or Extra-sensory Perception: includes abilities such as clairvoyance and telepathy

- “... no theories ... are disconnected from cultural ways of seeing, viewing, and setting norms. Asians and Africans have done this as much as Europeans ... [but] ... Europe has imposed its versions on the rest of us.” (Asante, 2020, p. 206)
- “The ‘African Renaissance’ is understood ... as a ... reclamation of indigenous or traditional African ‘ways’ - of knowing, seeing, doing and valuing - a ... promotion of ‘African culture’.” (Horsthemke, 2010, p. 30)

Indigenous Epistemics

18

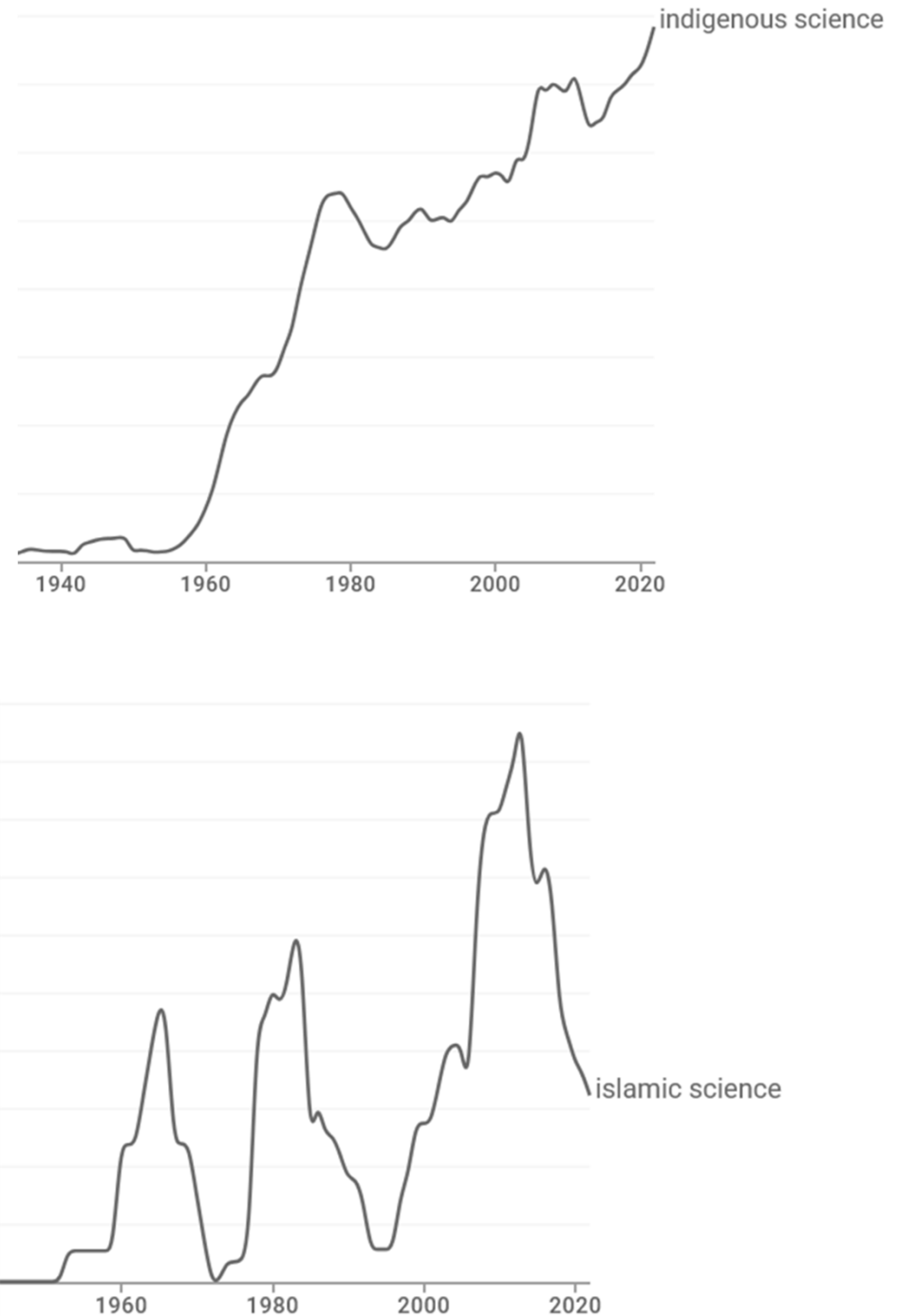
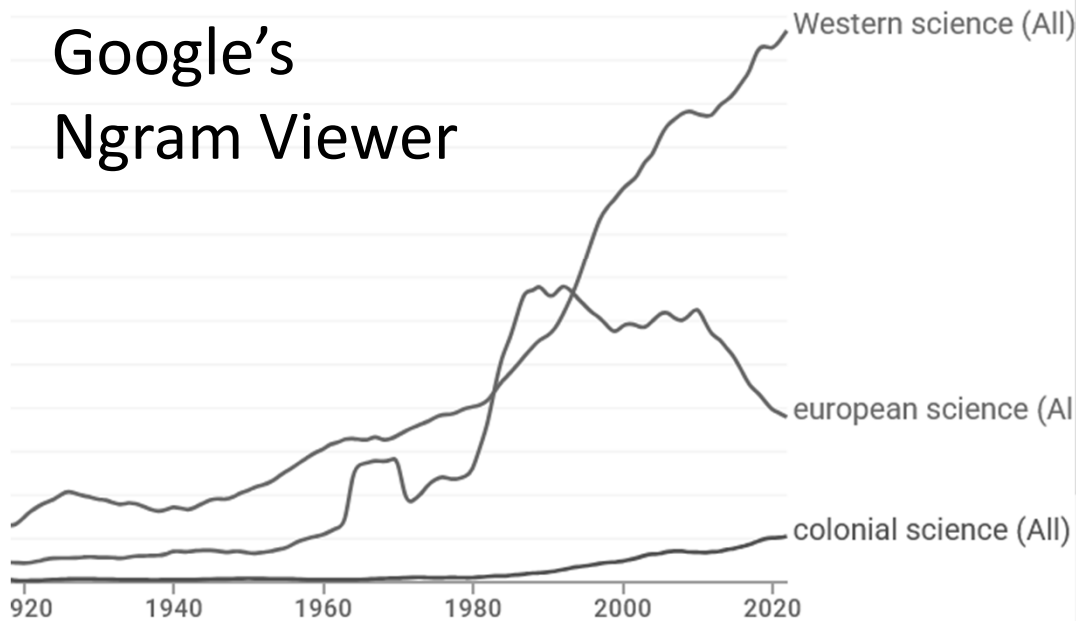


- “... conventional ... research is a reductive way of knowing, and contrasts with indigenous epistemologies that are ... holistic.” (Kovach, p. 130)
- “... 'science' is culturally relative. Native American science ... presents a very different way to arrive at 'reality'.” (Leroy Little Bear)

- Colorado “refers to traditional Native knowledge ... as ‘Native science’ ... to place Native nature-wisdom on par with Western science.” (Knudston & Suzuki, 1992).
- “... mātauranga Māori is ‘the unique Māori way of viewing themselves and the world, which encompasses ... ancient knowledge of the human, natural and spirit worlds as well as modern ... knowledge ... developed collectively by Māori It refers ... to ways of knowing.”

How pervasive are these ideas?

Phrases in
Google's
Ngram Viewer



FAULT LINES IN ETHNO EPISTEMICS

21

- Some reservations about Ethno Epistemics
 - Ethnocentric
 - Anti-science
 - Harmful Consequences
 - Flawed Beliefs
 - Supranatural



Ethnocentric

22

- Elements of Ethno Epistemics difficult or impossible to accept without embracing the founding culture
 - “Māori whakapapa describes how the kauri and tohorā (sperm whale) are brothers, but they were separated when the tohorā chose the ocean over the forest. In this research area we looked at how this connection could possibly help save the kauri from kauri dieback disease.”



- “According to ancient studies, the second toe is directly related to pregnancy. Therefore, the ring in the toe creates acupressure, which leads to a healthy pregnancy. It also helps the bride to be mentally stable. The specific nerve where the ring produces acupressure is connected to the uterus. This keeps the parameters in and around the uterus stable, making the pregnancy healthy and stable.”

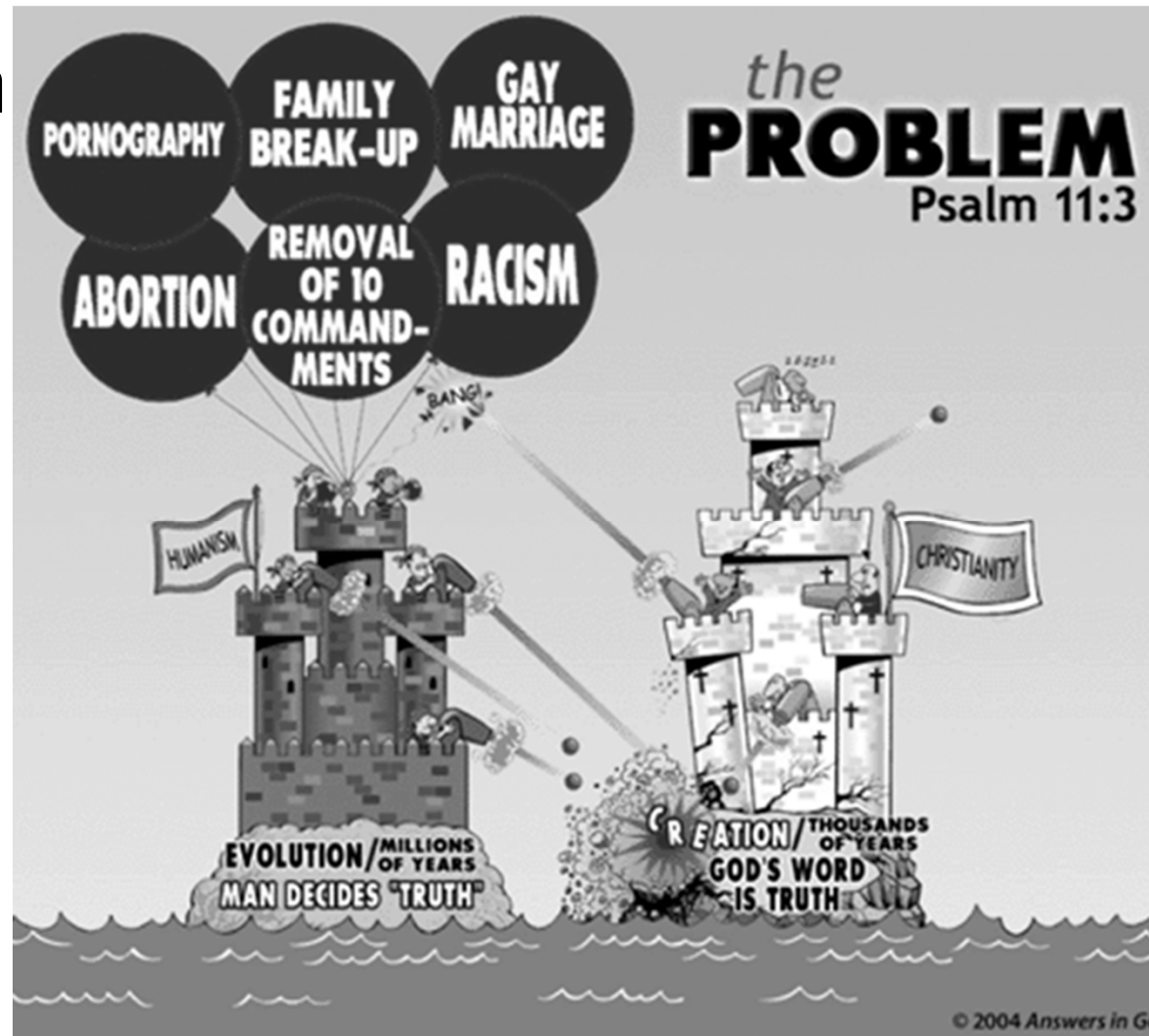


- Casts Science in a Negative Light
 - Undermines trust in science
- “According to an Alaska Native saying, ‘Researchers are like mosquitoes; they suck your blood and leave.’ This saying reflects the fact that an extensive body of health-related research has been conducted about indigenous populations around the world, but appears to have had little impact on their overall well-being.” (Cochran et al., 2008)



- “To develop new scientific knowledge, such as Hindu Theology ... is only possible if Hindu intellectuals have an independent view of science. Western hegemony planted by Western invaders thousands of years ago is still felt. The negative effects ... are firmly rooted ... For hundreds of years, Western scholars have hidden evidence of Indian science.” (Donder et al, 2020)
- In Australia, indigenous researchers have claimed that Western research has “led to a continuing oppression and subordination of Indigenous Australians in every facet of Australian society to the point that there is no where that we can stand that is free of racism.” (Cochran et al., 2008)

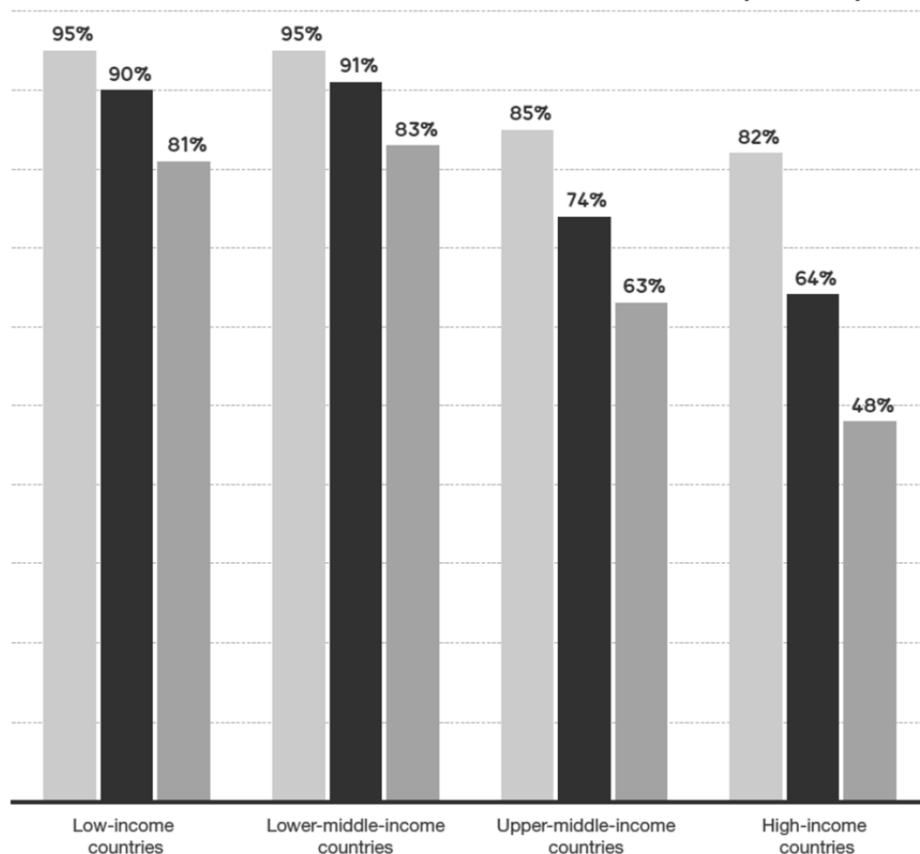
- "One of the great dangers of creationism is the way that it, like other extremist views, tends to demonize the enemy. ... telling us that Darwin stole his theory from others without giving them credit ... blaming evolutionism for Hitler and Nazism."
(Pennock, 1999)



- Trust in Scientists & Vaccine Hesitancy
- Elevated levels due to Conspiracy theories →

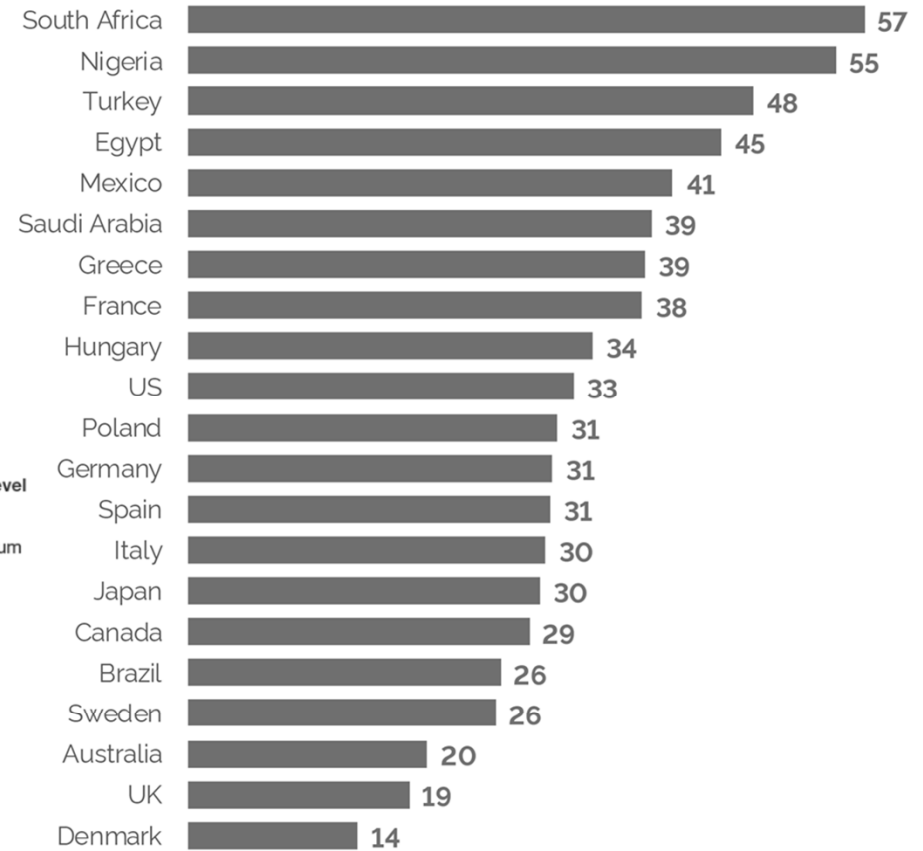
Vaccines are safe.

Welcome Global Monitor (2018)



In some nations, over half of people think that harmful side effects of vaccines are hidden from the public

Would you say the following statement is true or false? (Answers for "The truth about the harmful effects of vaccines is being deliberately hidden from the public" shown % of adults in each country who answered either "definitely true" or "probably true")



Gov

30 July - 24 August 2020

Negative Implications

28

- Politicized “Science”
 - Promotion of Ethno Epistemics part of nationalist agenda
 - Reactionary and Regressive
- I urge "rejection of ethnoscience ... dehumanizes us ... enjoins us to stop struggling against the limits that our cultural heritage imposes on our knowledge and our freedoms ... local standards of truth and morality." (Nanda, 1998)



- Hindu nationalism is “... also about asserting the superiority of Hindu culture and ancient Indian mythical knowledge ... mythical beliefs of Hindutva pseudoscience led the BJP science minister Harsh Vardhan in 2017 to fund research to validate the idea that panchagavya, a concoction that includes cow urine and dung, is a remedy for a wide array of ailments. During the pandemic, ... BJP ministers ... started to assert the benefits ... in curing and preventing the coronavirus.” (Kinnvall & Singh, 2022)

- “The Chinese Government – President Xi Jinping – is ... driving the expansion of the TCM market ... in a speech ... in spring 2018 ... he devoted at least half an hour ... to TCM, and explained there was no need to test the efficacy and toxicity of such treatments. “(Kinhuanet, 2019)
- “The Chinese Communist Party’s staunch support for TCM does not end at rhetoric. Party representatives have not only extolled ... TCM through state-controlled media ..., but have also passed legislation allowing for more lax regulations on TCM ...” (Welter, 2021)

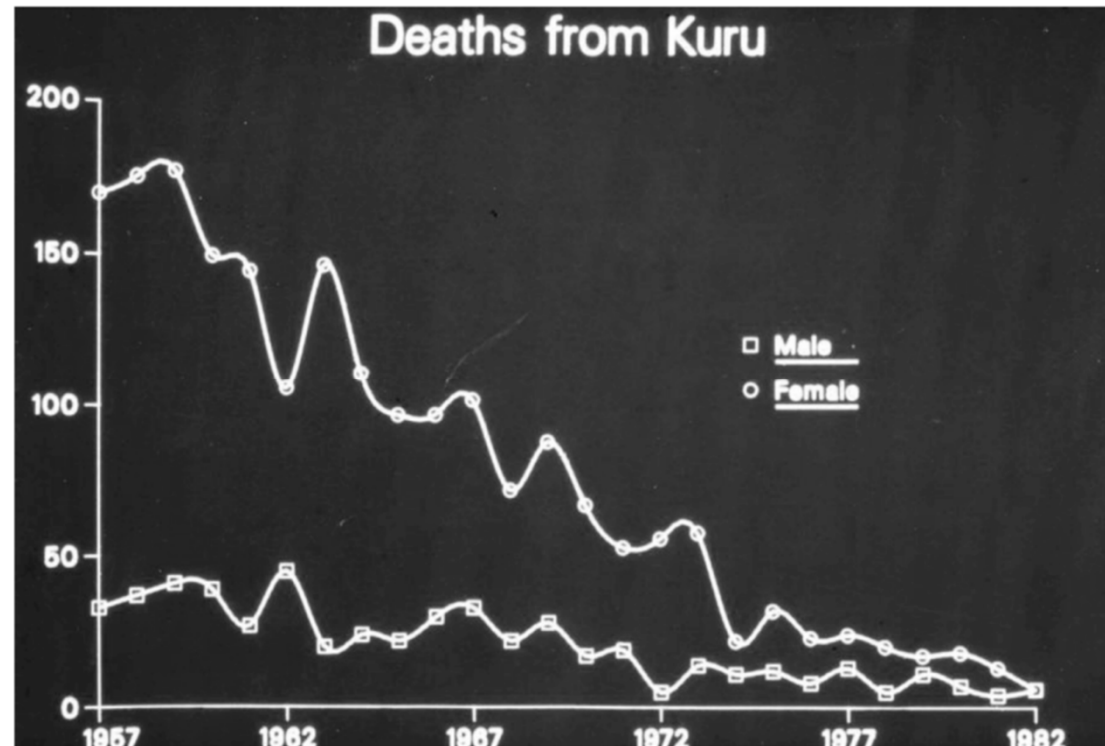


False Beliefs

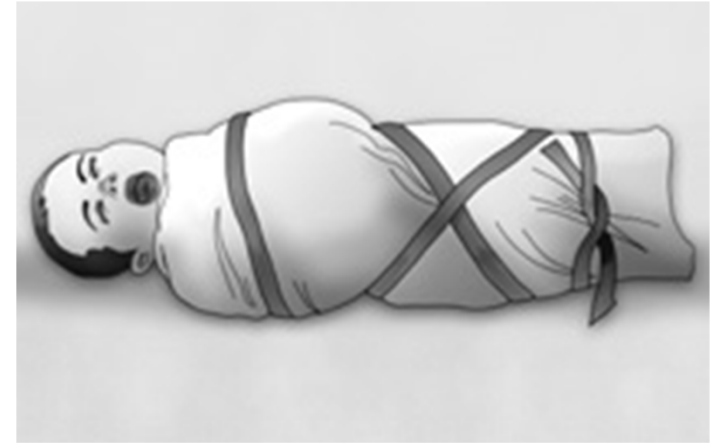
- Societies host false beliefs and practices
- Revealed by science
- Bloodletting
 - Practiced for 1000s of years in multiple cultures
- Kuru Disease
 - Fore tribe of New Guinea
 - Funeral practice



31



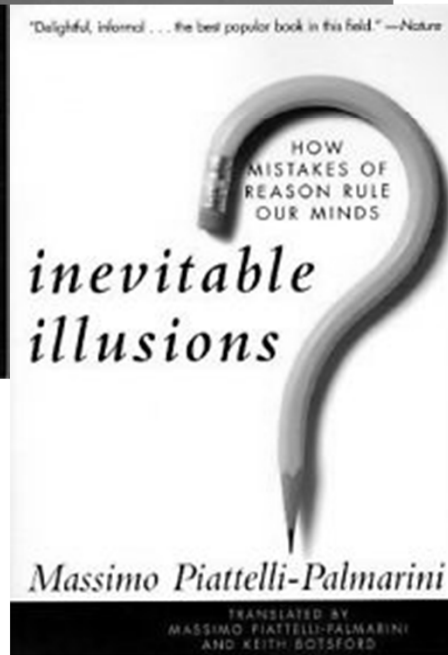
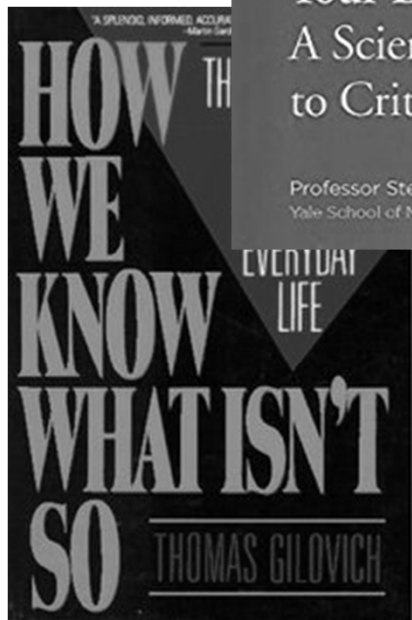
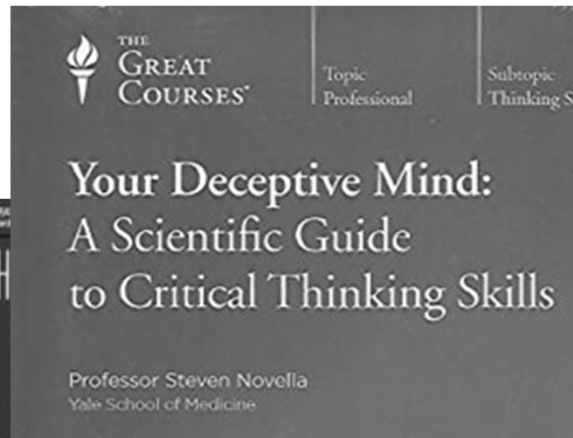
- Hip Dysplasia
 - Prevalence varies across cultures
 - Infant restraints
 - Japan program to reduce swaddling
 - ...



Fallibility of Human Cognition

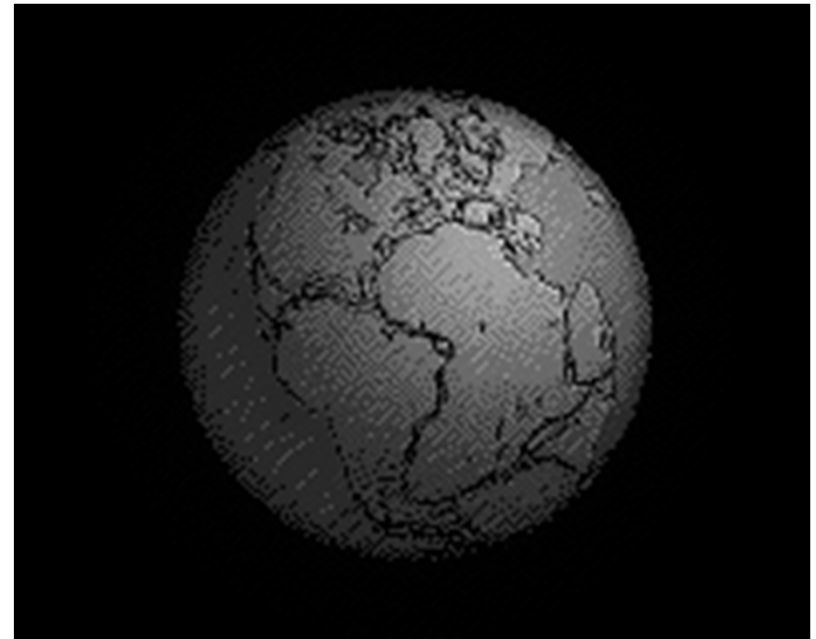
33

- Numerous Cognitive Biases
 - Confirmation Bias
 - Overconfidence in Intuition
 - Illusory Correlation
 - Trust in Anecdotes
 - ...



- “Societal norms may also prevent challenges to received beliefs, silencing people who note failures.” (Hong & Henrich, 2021)

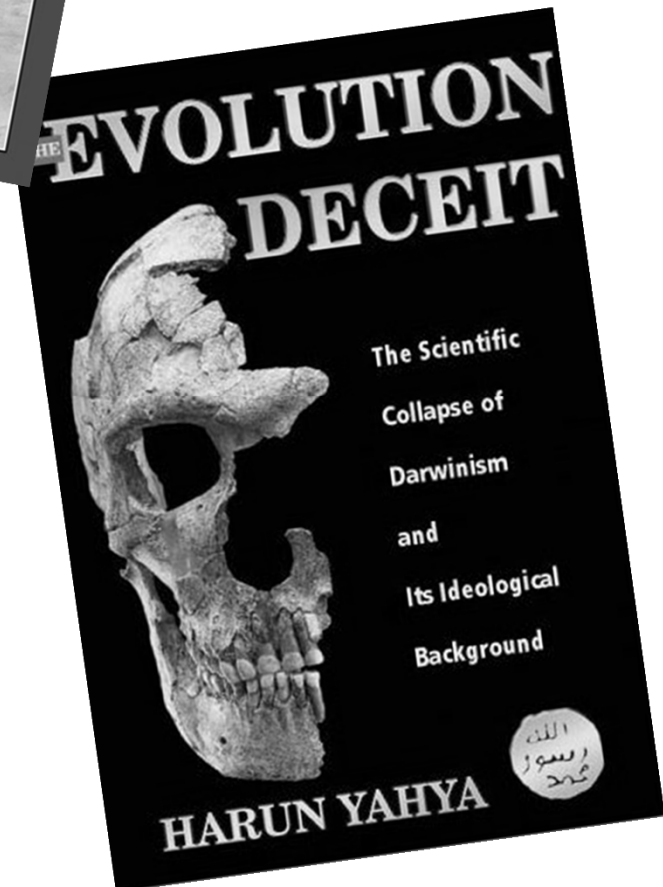
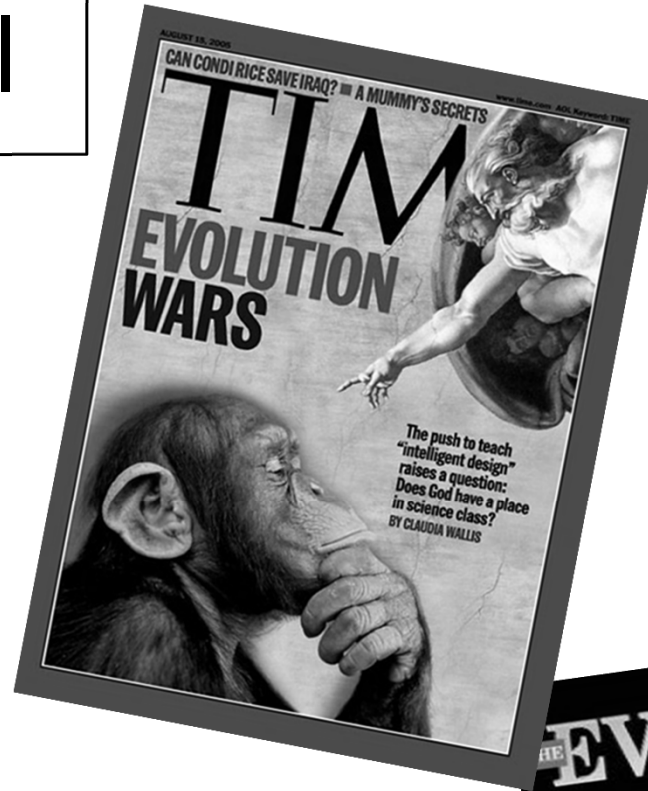
- “World” NOT Intuitive
- “... science involves a special mode of thought ... the world just is not constructed on a common-sensical basis. ...science requires a conscious awareness of the pitfalls of 'natural' thinking. ...lay theories are highly unreliable.” (Wolpert, 1992, *The Unnatural Nature of Science*)



The Supranatural

35

- Central theme of Ethno Epistemic views
- Supranatural ideation incompatible with science, or at best an uncomfortable fit
- Vedic sciences include **sacred** myths.

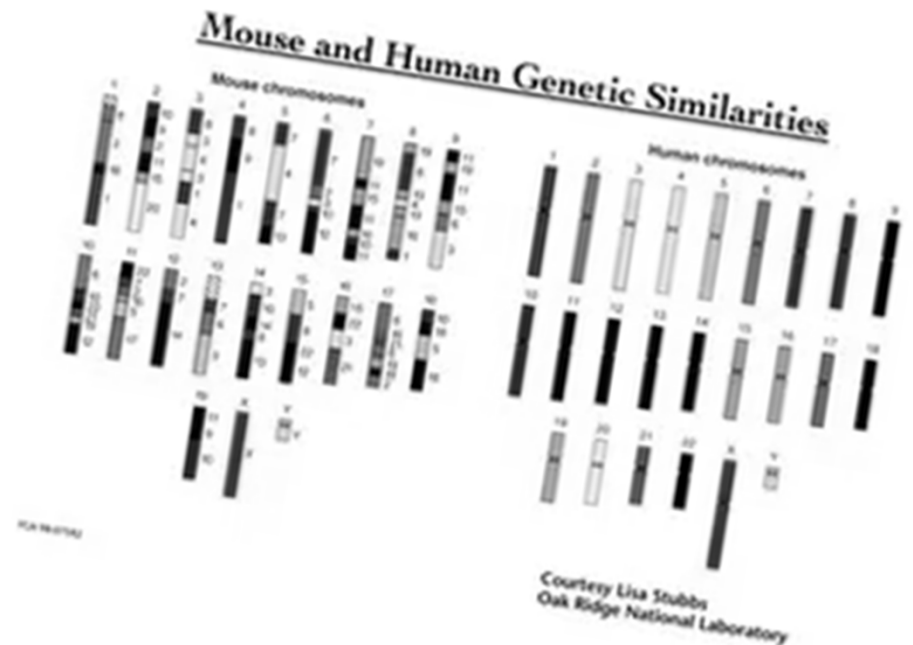


- With respect to Islamic science, “Nasr’s highly critical stance toward modern science can best be understood in the light of his notion of sacred science, which he describes as “the application of the supreme knowledge of the One and the Absolute to the plane of relative existence.” (Hasbullah et al, 2018)
- “Knowing can thus come through prayer as a way people connect themselves with those around them, the living, the nonliving, and the ancestral spirits.” (Chilisa, p. 114)

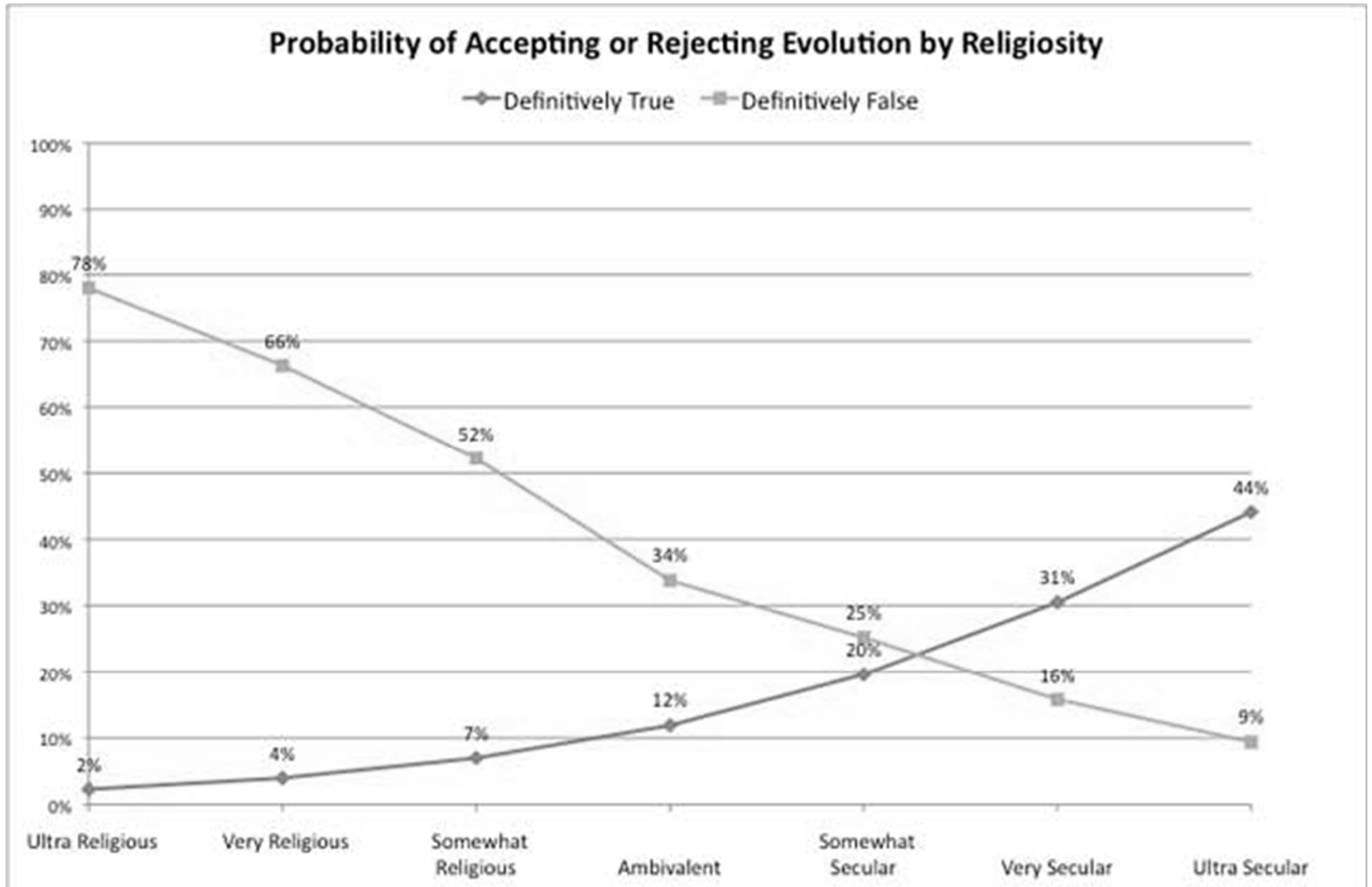
- “In most Indigenous epistemologies, knowledge is acquired through revelation, such as dreams, visions, and intuition, ... Knowledge is also regarded as spiritual, which is understood as coming from the spirit world and ancestors. This spiritual knowledge cannot be observed by physical means; therefore, it cannot be measured or quantified. (Marsh et al, 2015)
- “The high level of popular misuse of science in the Muslim world indicates that major conflicts between science and religion will have an increasingly Islamic flavor in the coming years.” (Edis, 2001)

- "However, it is not just evolution that has to go, in their [*intelligent-design theorists*] view. They want to transform science at its most fundamental methodological level. They want science to reject ... naturalism and to reincorporate appeals to supernatural entities and powers. ... a shift to a 'theistic science' " (Pennock, 1999)
- "The spiritual element is what makes science Islamic." (National Center for Science Education)

- Challenge to incorporating or accommodating supernatural within science
- Belief in evolution as proxy
 - Negative relationship at individual level
 - Negative relationship at national level
 - Religiosity of Scientists
 - Preference for religion or science when conflict



Keysar (2014)

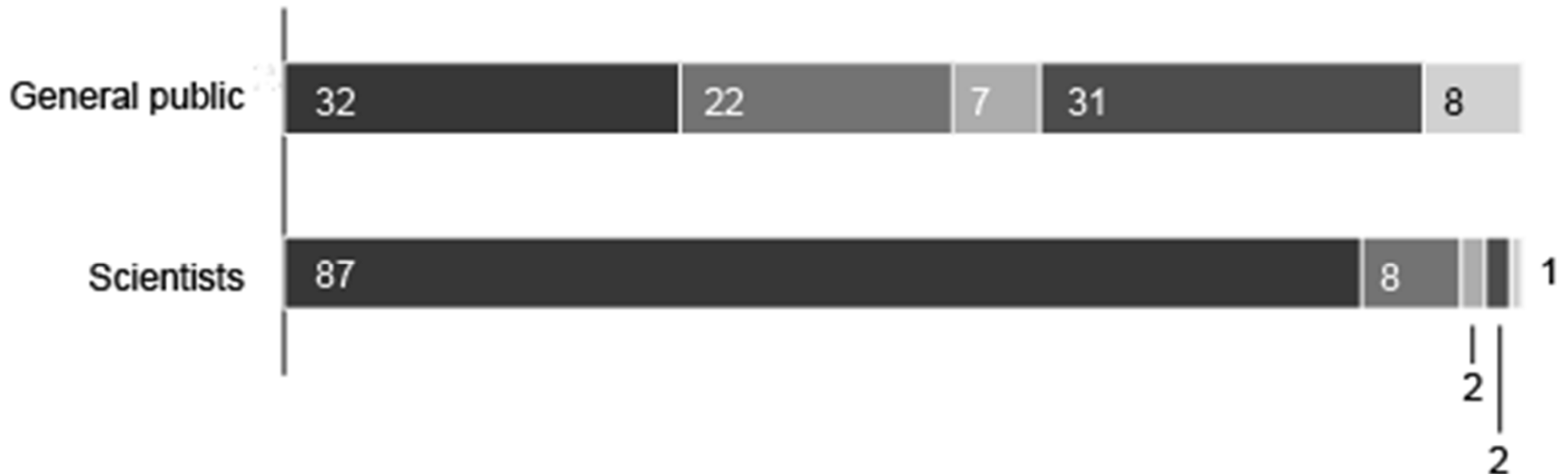


Caveat about term “Evolution”

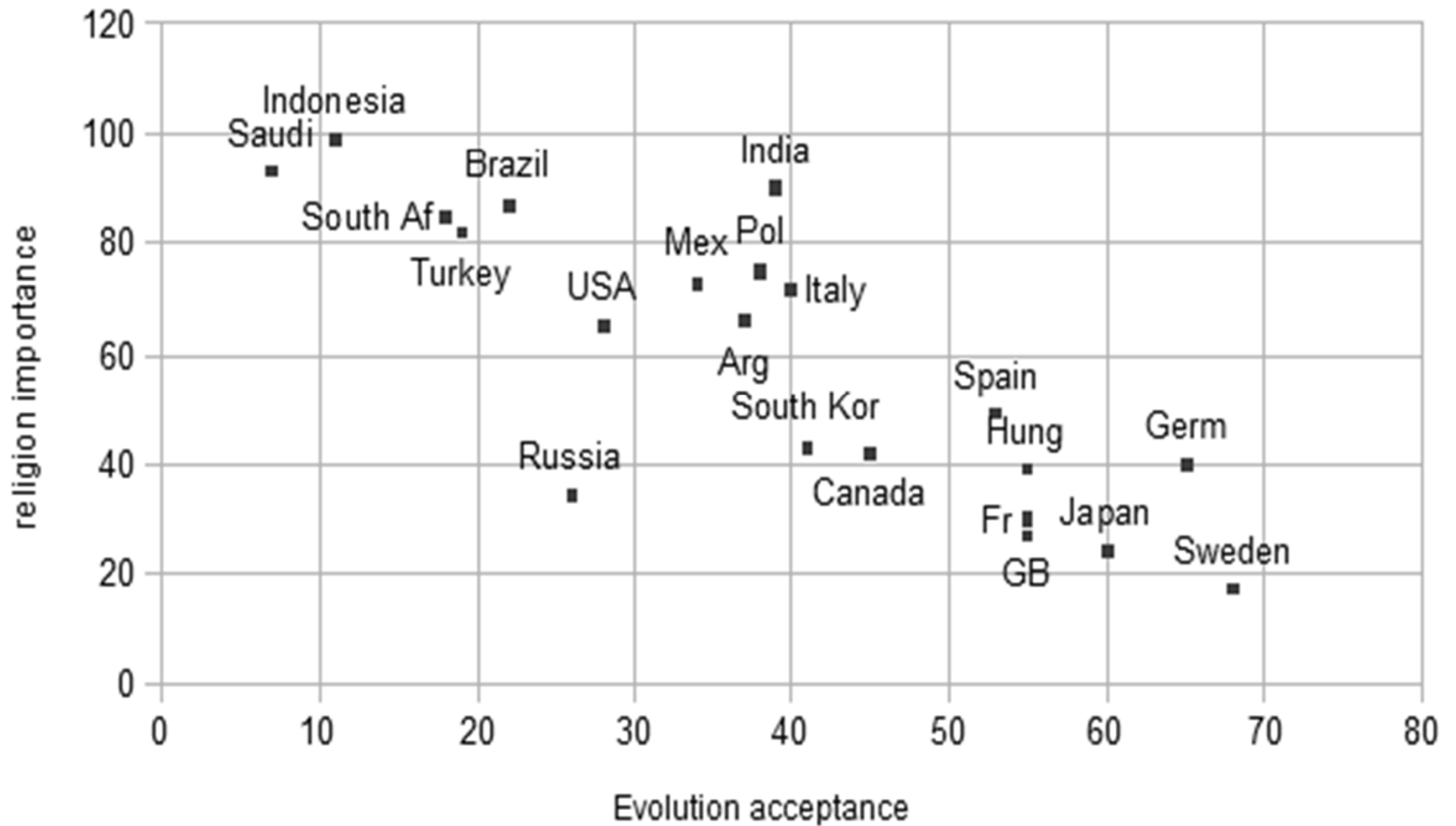
Scientific Consensus on Evolution Not Shared by Public

Humans and other living things have ...

- % Evolved over time due to natural processes
- % Evolved over time guided by a supreme being
- % Evolved over time, but don't know how
- % Existed in their present form since the beginning of time
- % Don't know/Refused (VOL.)



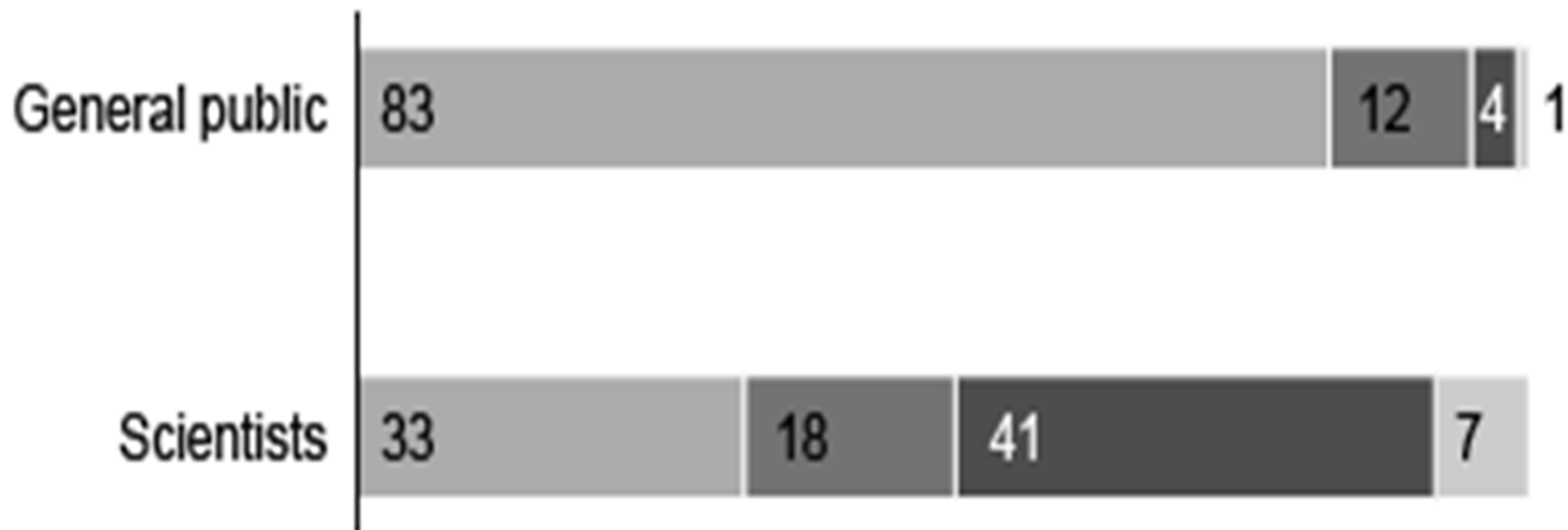
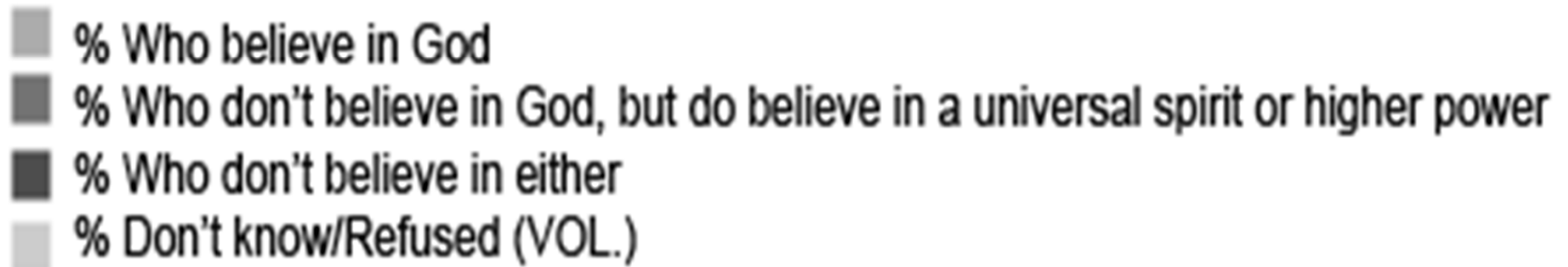
Nations



Religious Belief of Scientists

43

Religious Belief Among the General Public and Scientists



Members of Royal Society of London ⁴⁴ (Stirat & Comwell, 2013)

God Exists

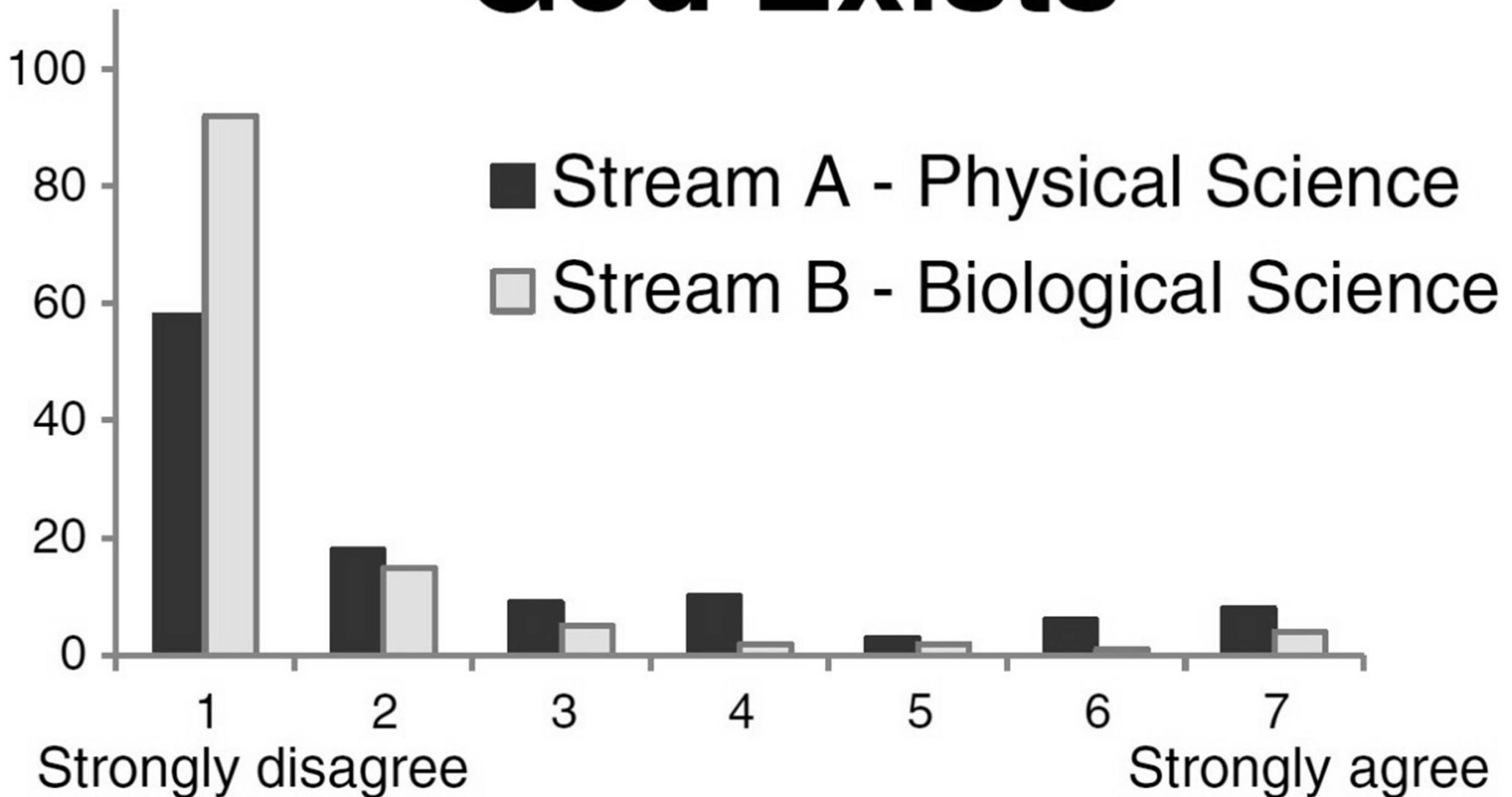
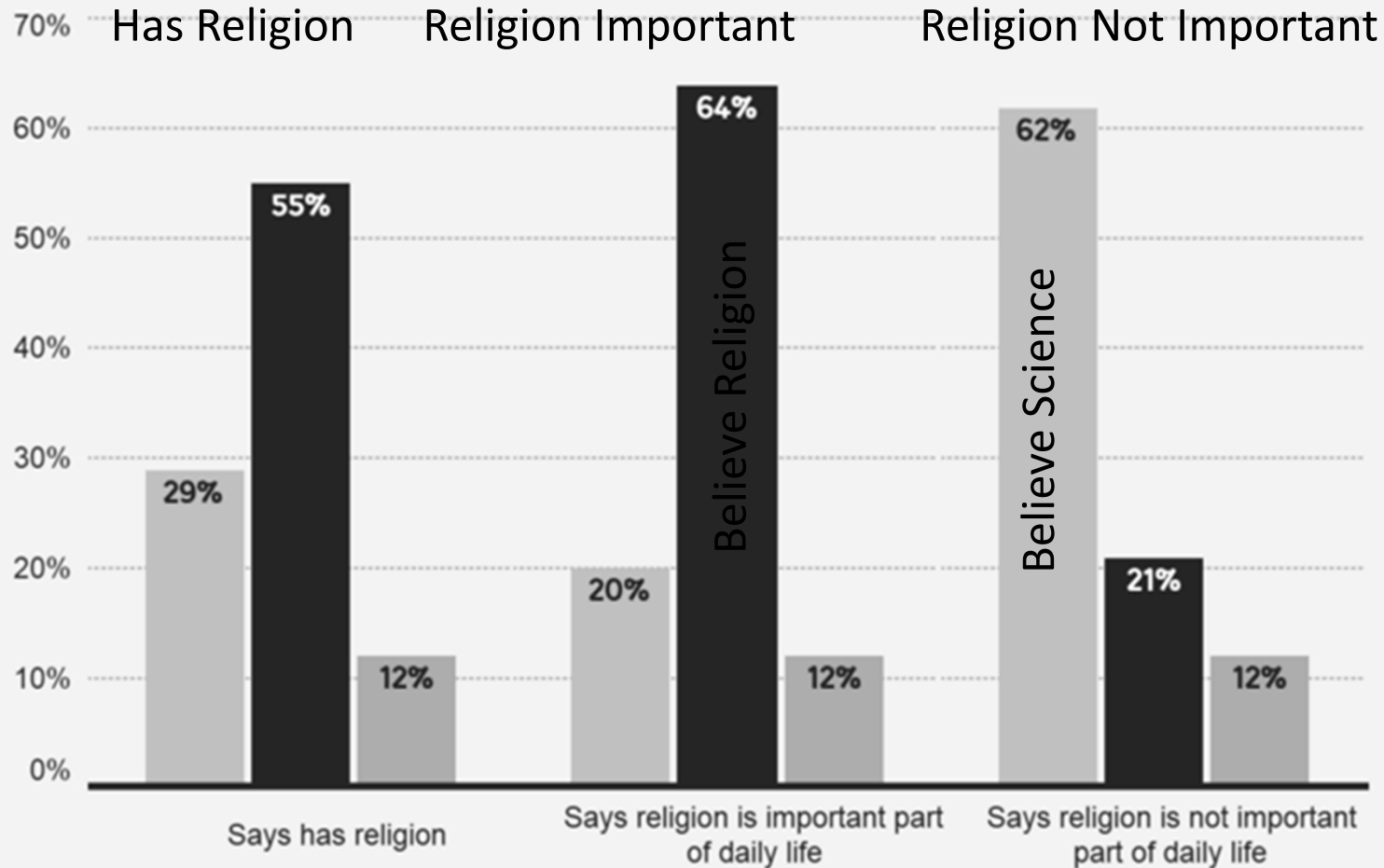


Chart 4.15: People with religious faith who believe science or religion when they disagree by religiosity

Percentage of people who believe 'science', 'the teachings of their religion' or 'it depends'

Generally speaking, when science disagrees with the teachings of your religion, which do you believe?



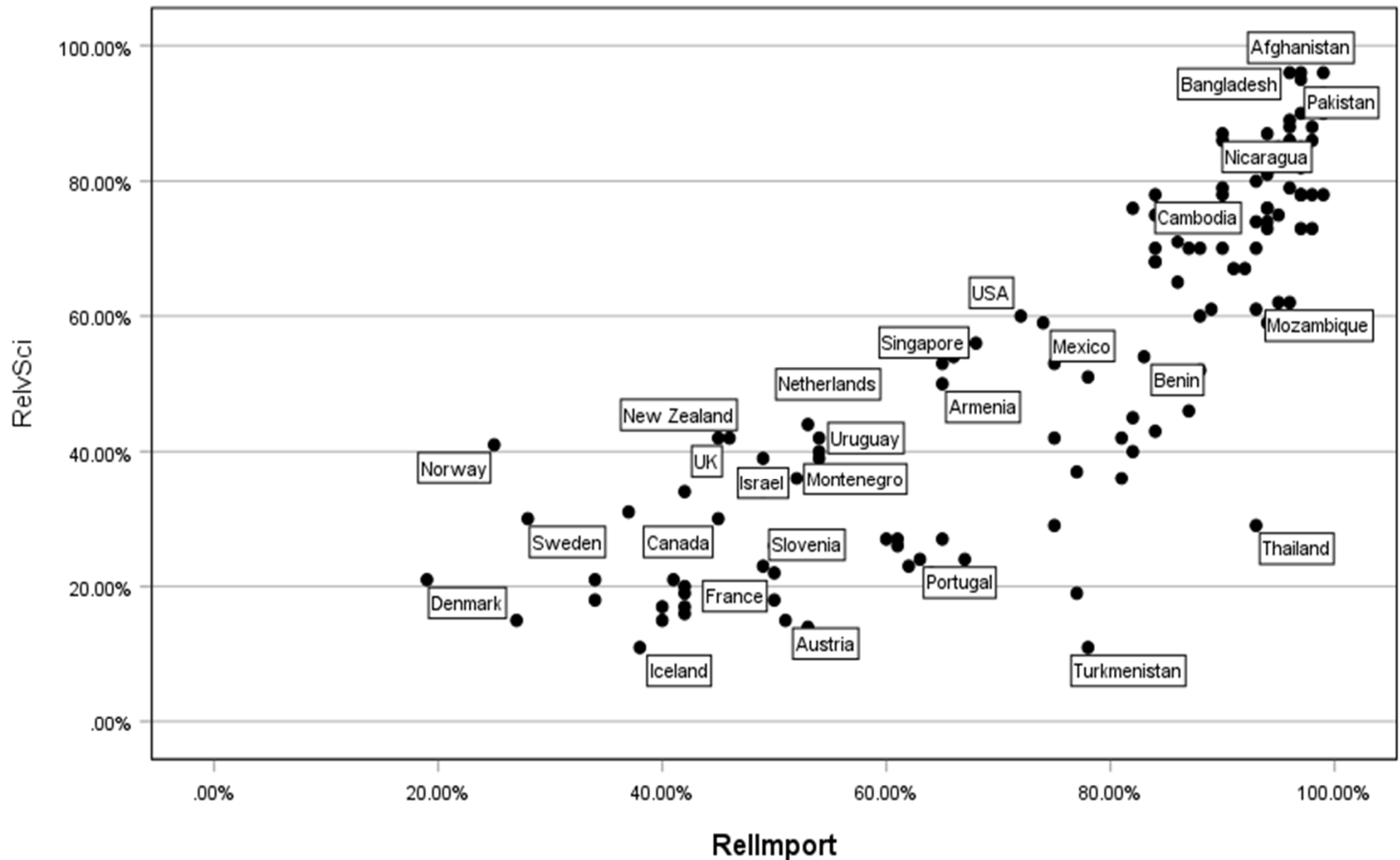
- Believe science when science and religion disagree
- Believe religion when science and religion disagree
- Say 'it depends' when science and religion disagree



Source: Wellcome Global Monitor, part of the Gallup World Poll 2018

Choose Religion if Conflict

46



Tradition vs Science?

47

- Even some tribal archeologists say they doubt the ability of science to tell them new things about their origins. "There's a real feeling that we've been here forever," said Larry Benallie, an archeologist for the Navajo Nation. "The Bering Strait theory makes logical sense, but it doesn't override the traditional belief at all. That comes first." (Johnson, 1996)

SCIENCE IS NOT EUROCENTRIC

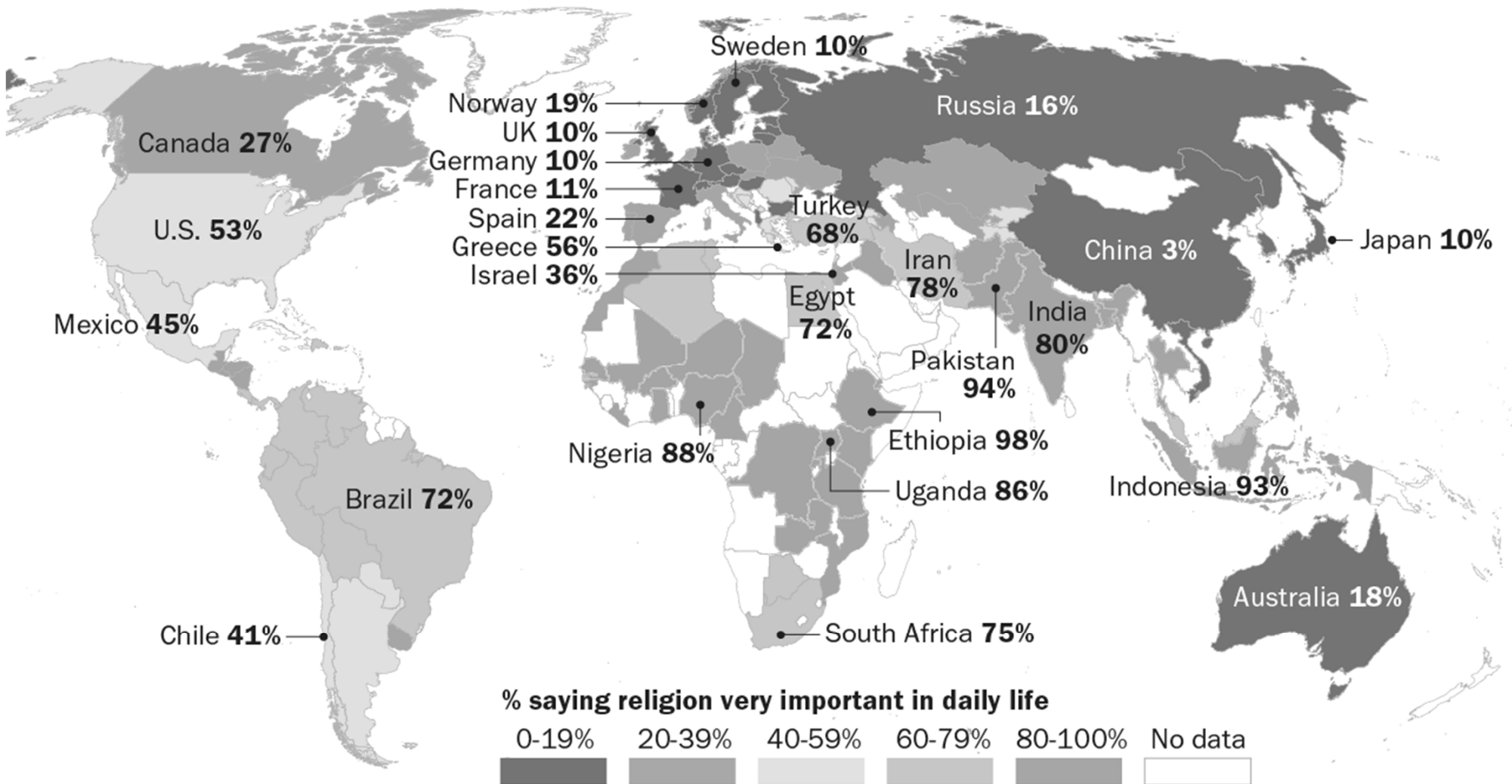
- Science Challenges Tradition
- Early History of Science
- Internationalization of Science
- Acceptance of Benefits “Universal”
- Support Global but Qualified, Including in West

Science Challenges Tradition

- Ethno Epistemics designed to preserve and enhance traditional beliefs
- Conversely, Science puts societal beliefs to empirical test, rejecting those that fail
- Manifested notably in “Europeans” by loss of religion
- “... the historical period and the protagonists of the traditional idea of a “Scientific Revolution” are all marked by a profound spirituality. The idea that the 16th and 17th centuries witnessed the consolidation of a new rational philosophy as opposed to faith and belief is unsustainable.” (Nieto et al., 2015)

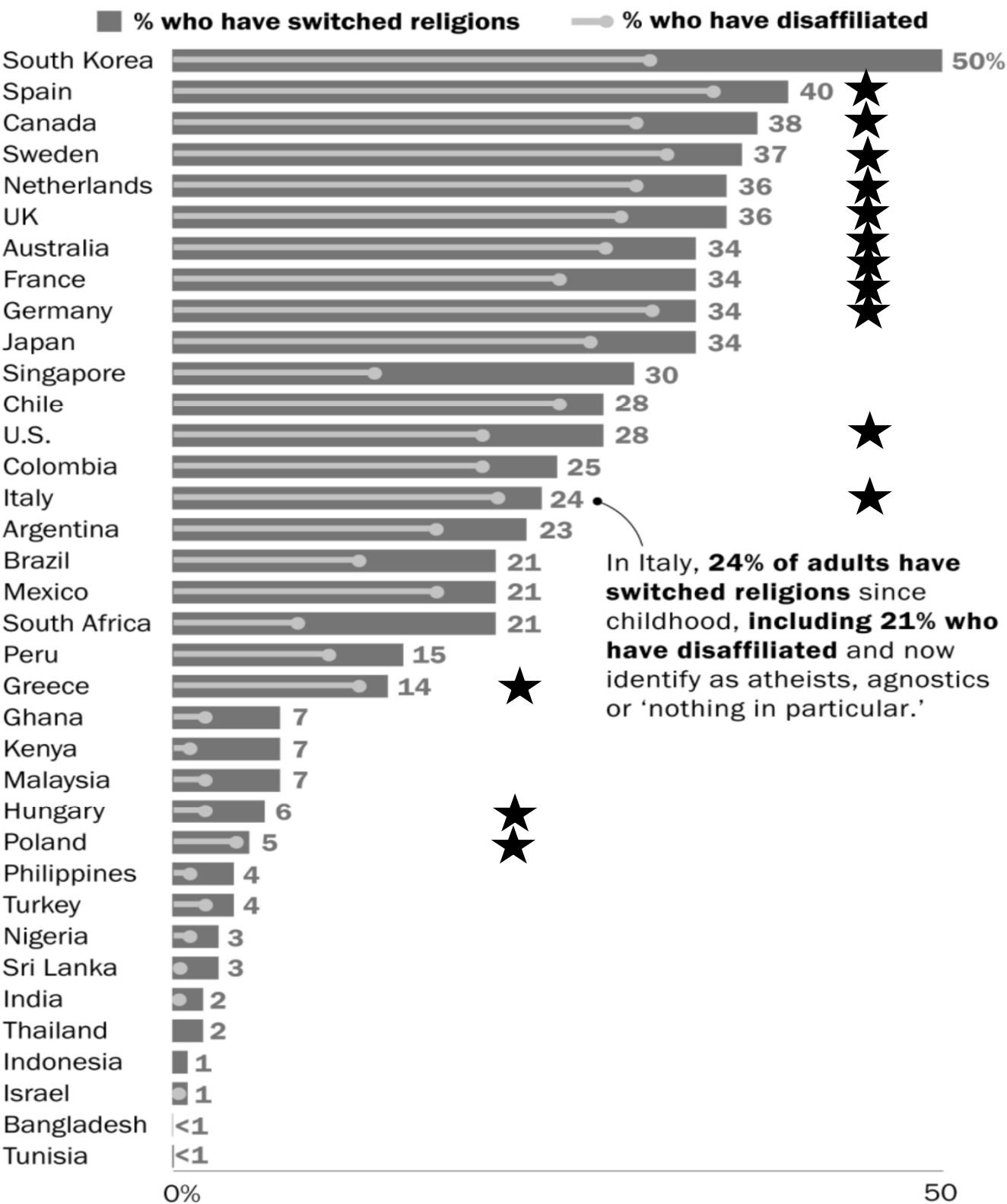
Religion is very important to people in Africa, the Middle East, South Asia, Latin America

% who say religion is very important in their lives



"The Age Gap in Religion Around the World"

PEW RESEARCH CENTER

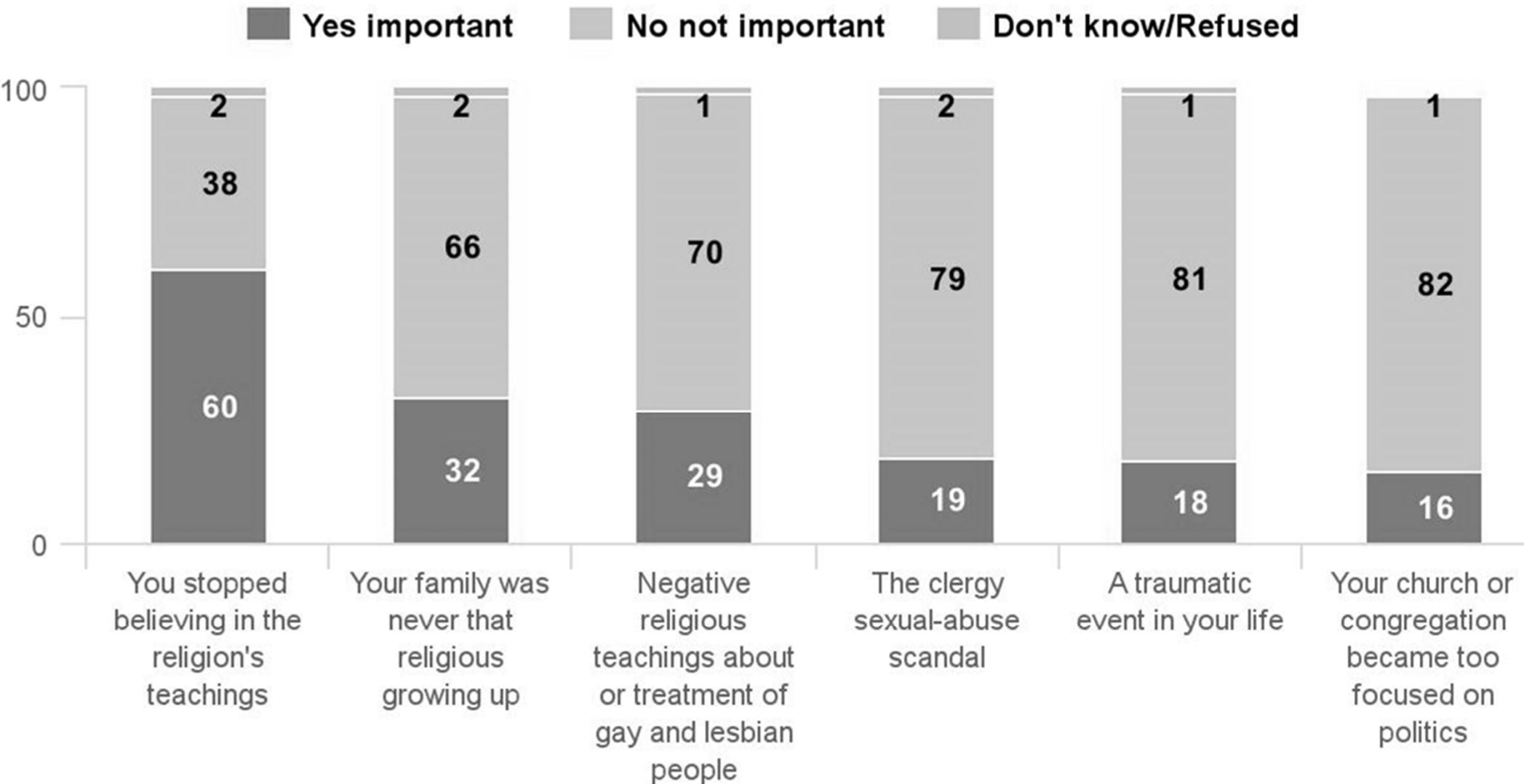


51

Pew Research
Center (2025)

Loss of religion
continues to
present
generations

Reasons for Leaving Religion



Source: PRRI/RNS August 2016 Survey.

- Models for history of science Eurocentric
 - “Scientific Revolution”
- Revised history: Long evolutionary period with roots in many cultures (Montgomery & Kumar, 2016; Poskett, 2023)
- “Scholars now see the European breakthrough to modernity as the last decisive development in a long series of advances that stretch far back in time and cover much of Eurasia.” (Dawson, 2003)

- Science and an Emerging Europe
- “Europe” not a coherent entity, fragmented
 - “Nations”, Languages, Religions, ...
 - In transition from Feudal System to modern idea of Nation-States
 - Numerous conflicts and changes in national boundaries
 - Germany lost almost half its population in 30 Years War (1618-1648)

- Science as unifying force
 - Science → Europe rather than Europe → Science
- Scientific “international” correspondence
 - Kepler letters to scientists in Germany, Italy (including several to Galileo), Austria, Czech Republic, Netherlands, UK, France, Belgium, and Poland.
 - Latin emerged as a lingua franca, Latinus Scientificus
- Philosophical Transactions published by The Royal Society of England (1665 to today)
 - Henry Oldenburg, Editor & Publisher: multilingual German, personal contacts in multiple countries
- Tradition carried on much later by Charles Darwin
 - 15,000 letters “with around 2,000 people from all around the world and all walks of life” (Cambridge Digital Library).

Internationalization

56

- In subsequent years, science has served similar unifying framework more globally
 - Publications
 - Access to Scientific Literature
 - Desire for benefits (products) of science

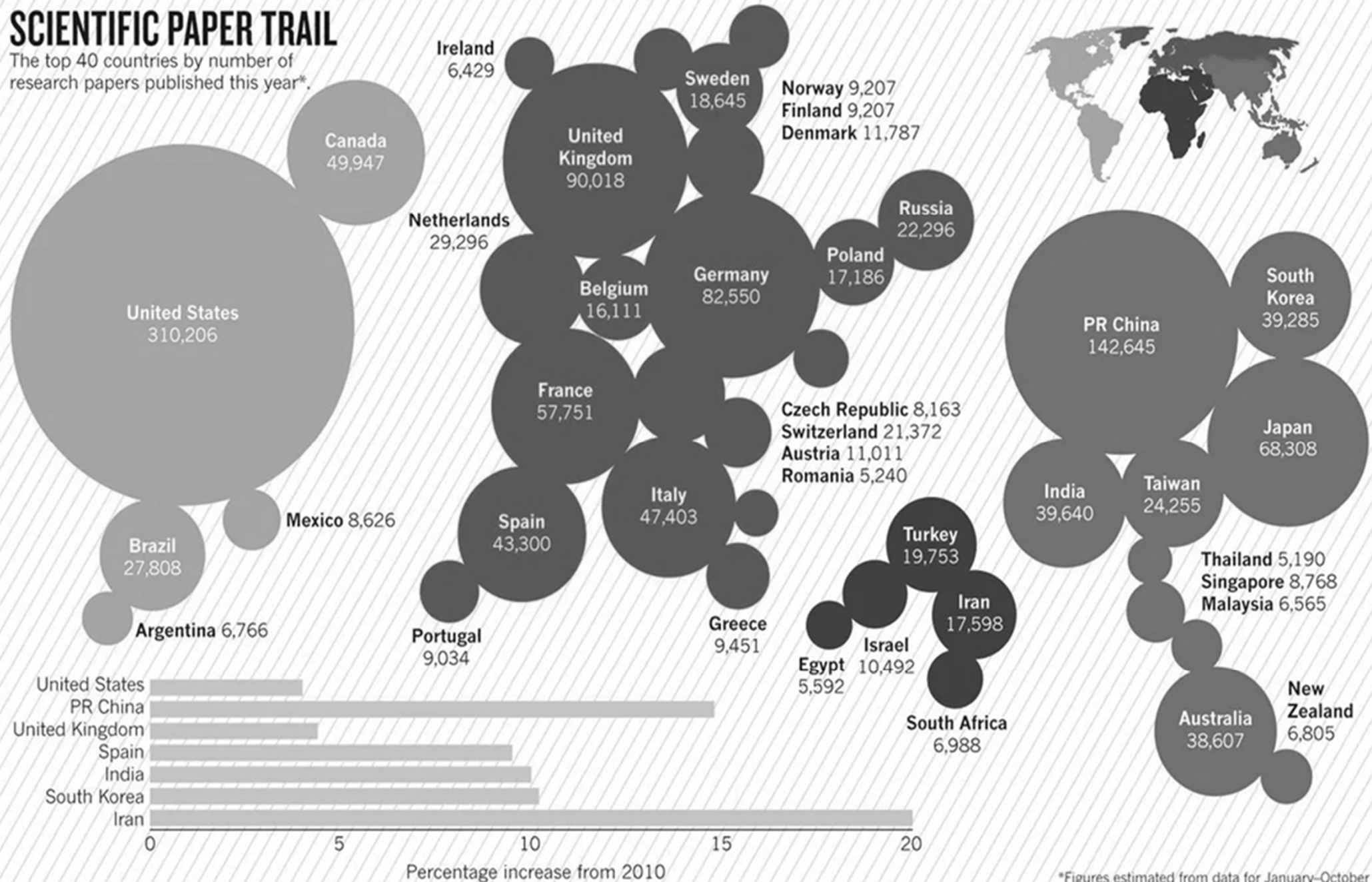


Publications

57

SCIENTIFIC PAPER TRAIL

The top 40 countries by number of research papers published this year*.



Highly cited scientific papers country rankings

1998-2000 (average) No. of papers		2008-2010 (average) No. of papers		2018-2020 (average) No. of papers	
1. U.S.	30,710	1. U.S.	36,910	1. China	46,352
2. Britain	6,071	2. China	9,011	2. U.S.	36,680
3. Germany	4,991	3. Britain	7,420	3. Britain	8,772
4. Japan	4,369	4. Germany	6,477	4. Germany	7,246
5. France	3,609	5. France	4,568	5. Italy	6,073
6. Canada	2,842	6. Japan	4,369	6. Australia	5,099
7. Italy	2,128	7. Canada	4,078	7. India	4,926
8. Netherlands	1,814	8. Italy	3,450	8. Canada	4,509
9. Australia	1,687	9. Australia	2,941	9. France	4,231
10. Spain	1,398	10. Spain	2,903	10. Spain	3,845
⋮				11. South Korea	3,798
13. China	1,217			12. Japan	3,780

Source: Education ministry

Note: Number of papers in top 10% of most-cited papers in each research field

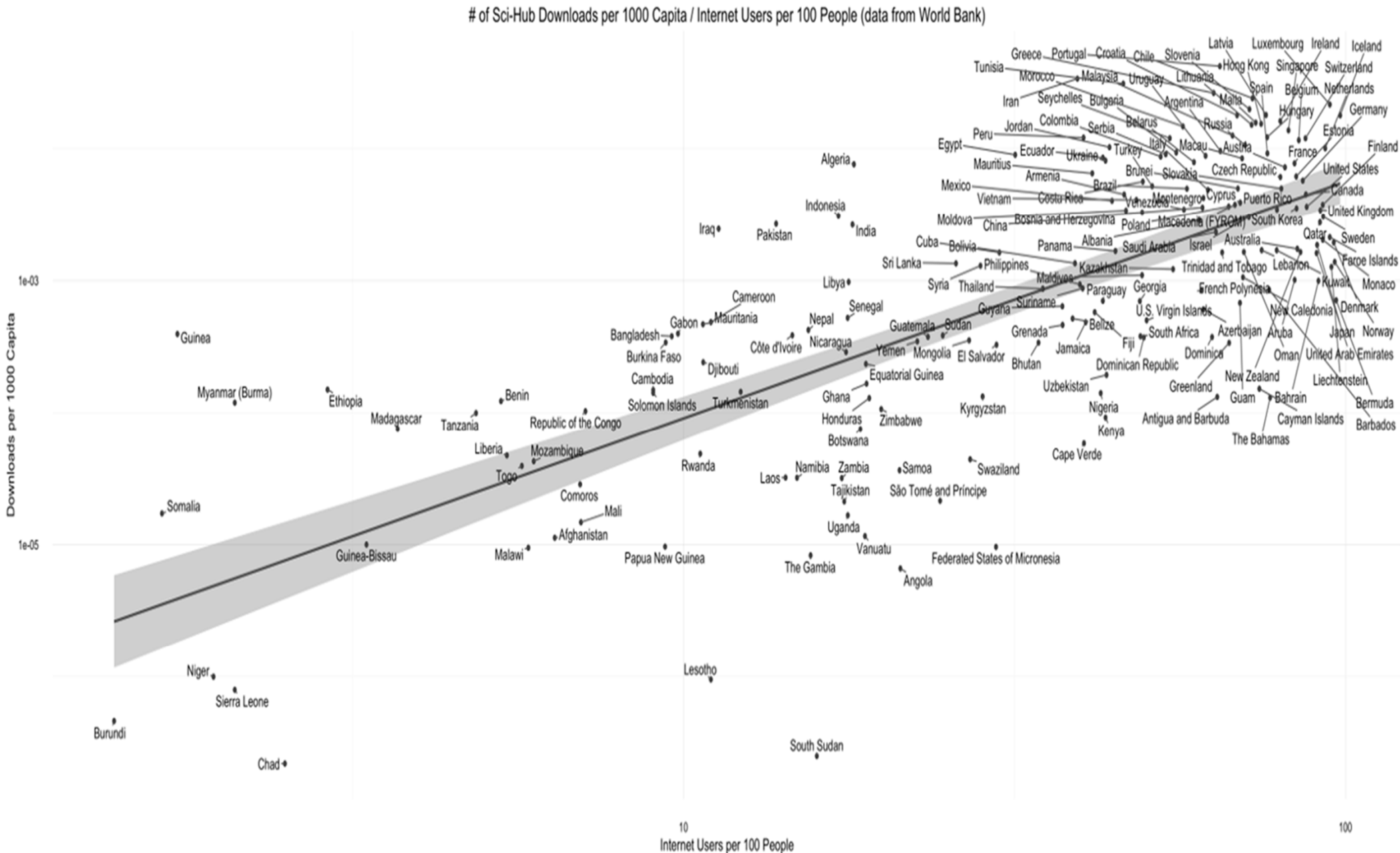
Sci-Hub Use

59

country		number of articles			
1	 China	<u>22,233,980</u>	11	 Mexico	<u>592,096</u>
2	 Russia	<u>18,213,408</u>	12	 South Korea	<u>553,882</u>
3	 United States	<u>9,252,020</u>	13	 Netherlands	<u>534,312</u>
4	 Brazil	<u>4,430,611</u>	14	 Singapore	<u>506,227</u>
5	 India	<u>1,931,254</u>	15	 Canada	<u>411,308</u>
6	 Indonesia	<u>1,031,144</u>	16	 Turkey	<u>410,188</u>
7	 Germany	<u>992,052</u>	17	 Malaysia	<u>406,724</u>
8	 France	<u>852,438</u>	18	 Japan	<u>384,975</u>
9	 United Kingdom	<u>754,163</u>	19	 Vietnam	<u>377,675</u>
10	 Iran	<u>638,497</u>	20	 Philippines	<u>290,846</u>

Sci-Hub & Internet Access

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Wish for Benefits “Universal”

61



- Paradoxical?
 - Use computers, internet, ... to criticize science
- Indigenous Populations
 - Modern “tools”
 - High speed internet
 - Access to healthcare
 - ...
- World access to benefits!!
 - Healthcare



Life expectancy

The period life expectancy at birth, in a given year.

Our World
in Data

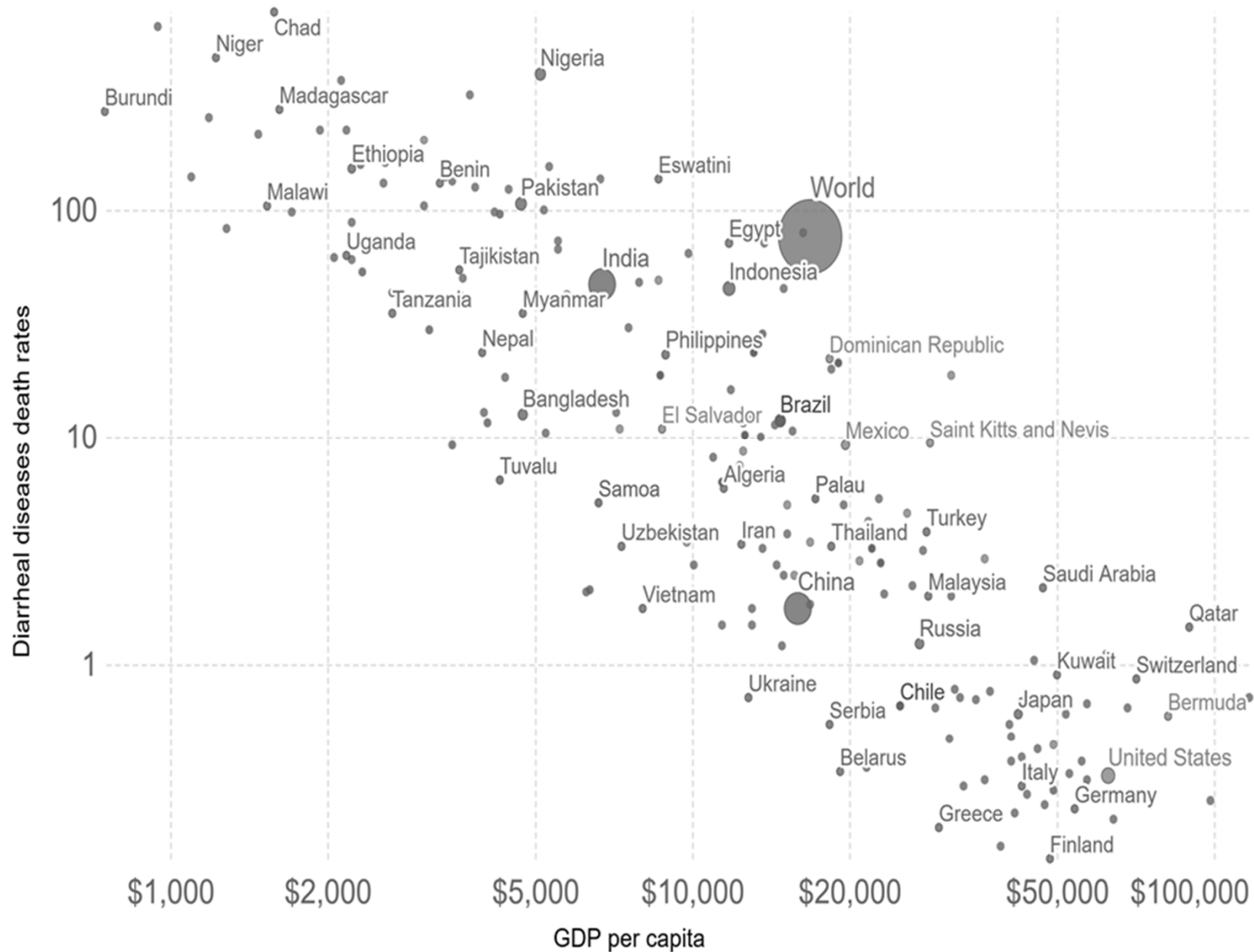


Data source: UN WPP (2024); HMD (2024); Zijdemann et al. (2015); Riley (2005)

OurWorldinData.org/life-expectancy | CC BY

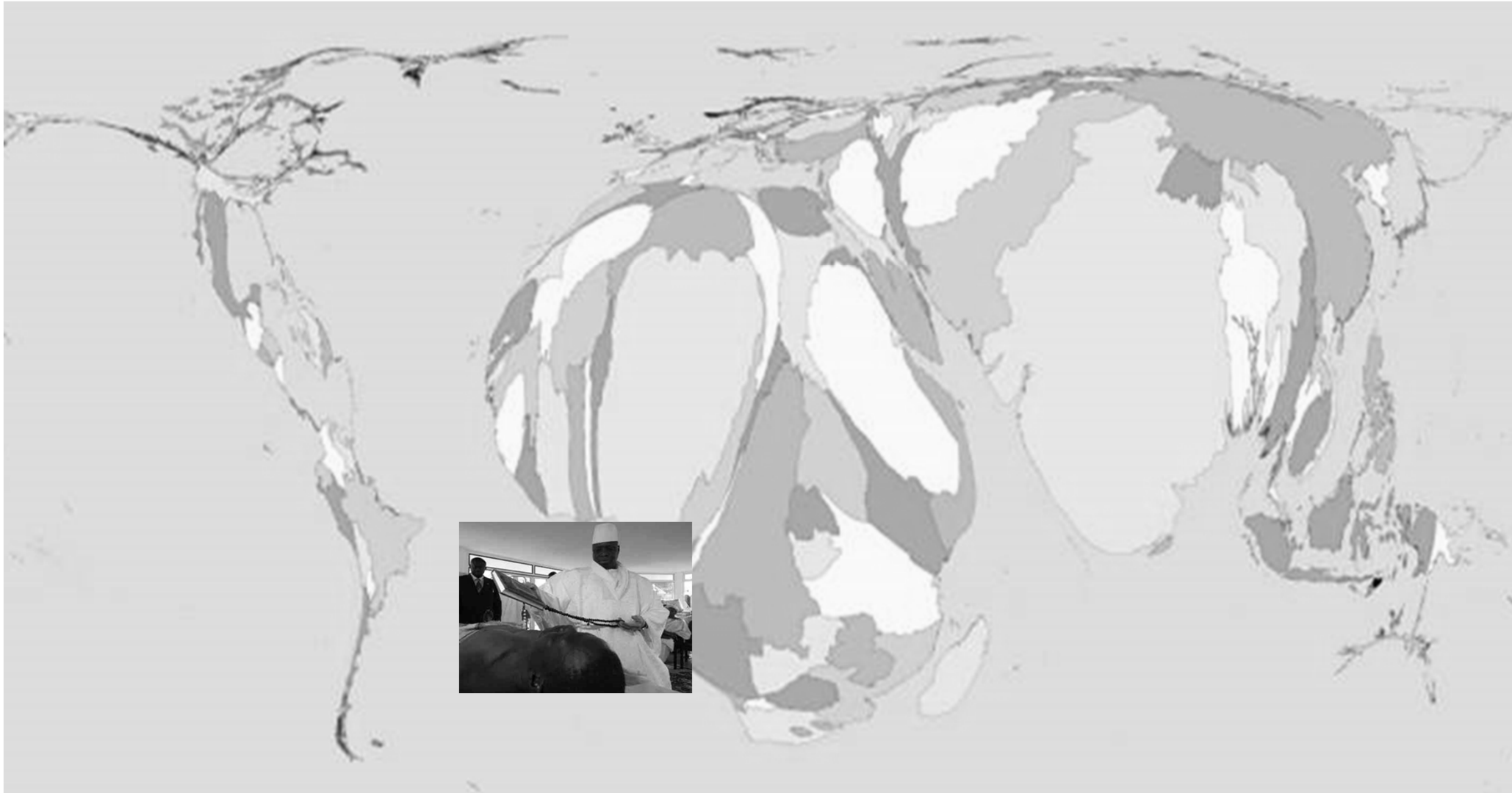
Death rate from diarrheal disease in children vs. GDP per capita, 2019

The annual number of deaths from diarrheal diseases in children under-5 per 100,000 individuals. Gross domestic product (GDP) per capita is measured in constant international-\$.



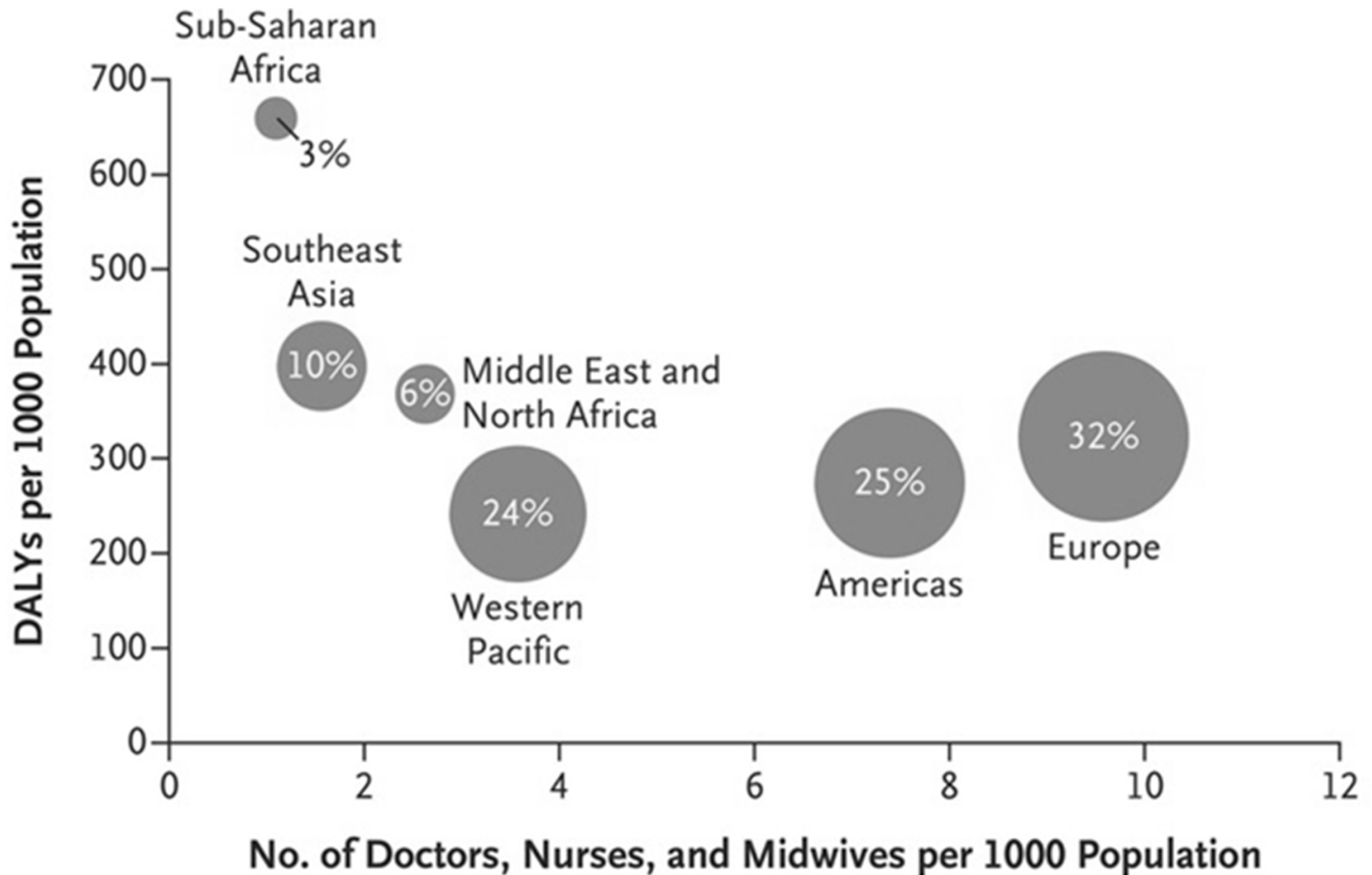
Child Mortality Map

64



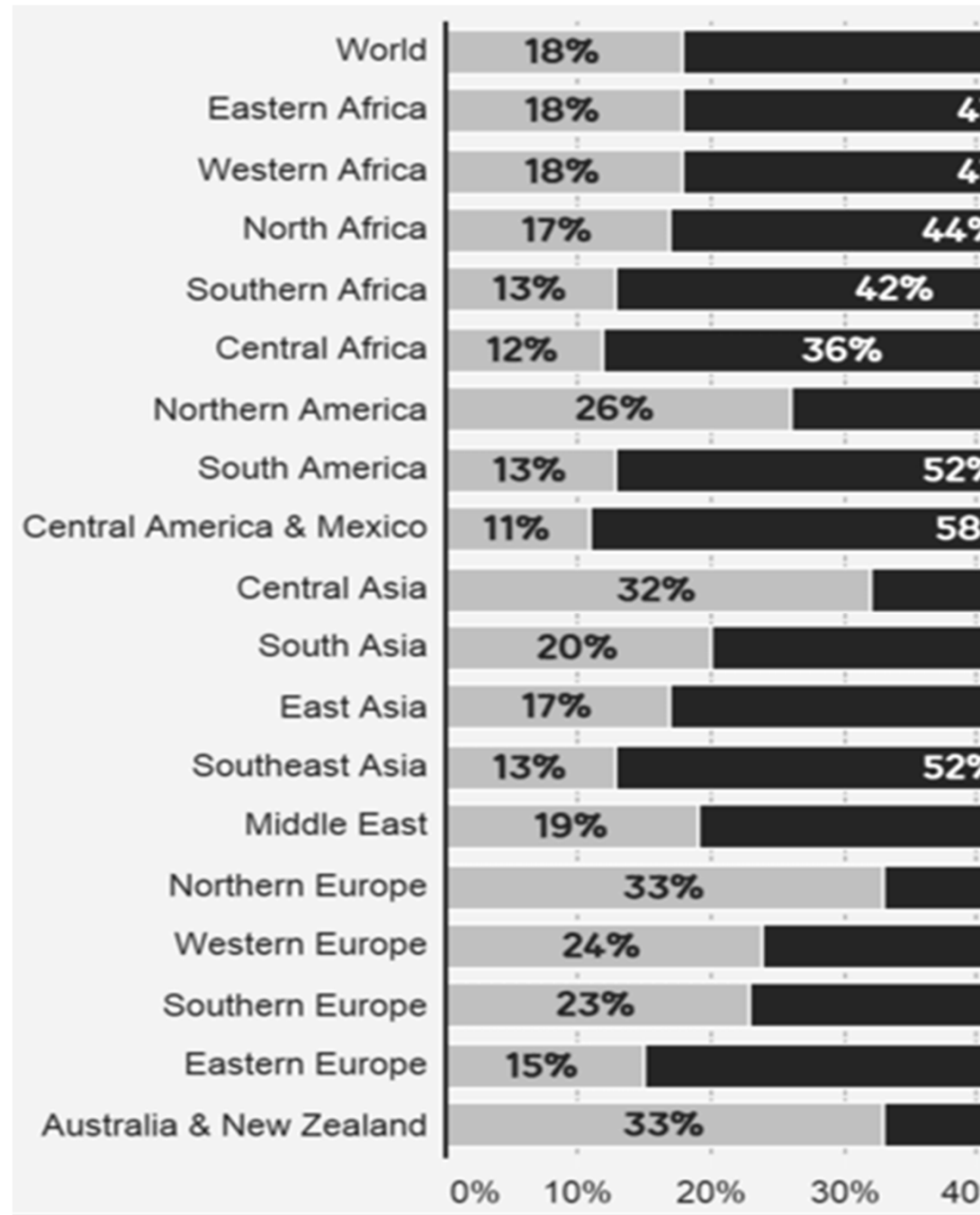
Disability Adjusted Life Years

65



Qualified Support for Science in West

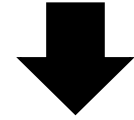
- Science NOT universally valued, including in west
- Minority have high level of trust in scientists



Trust Science vs Feelings & Faith

67

People trust too much in science and not enough in their feelings and faith.



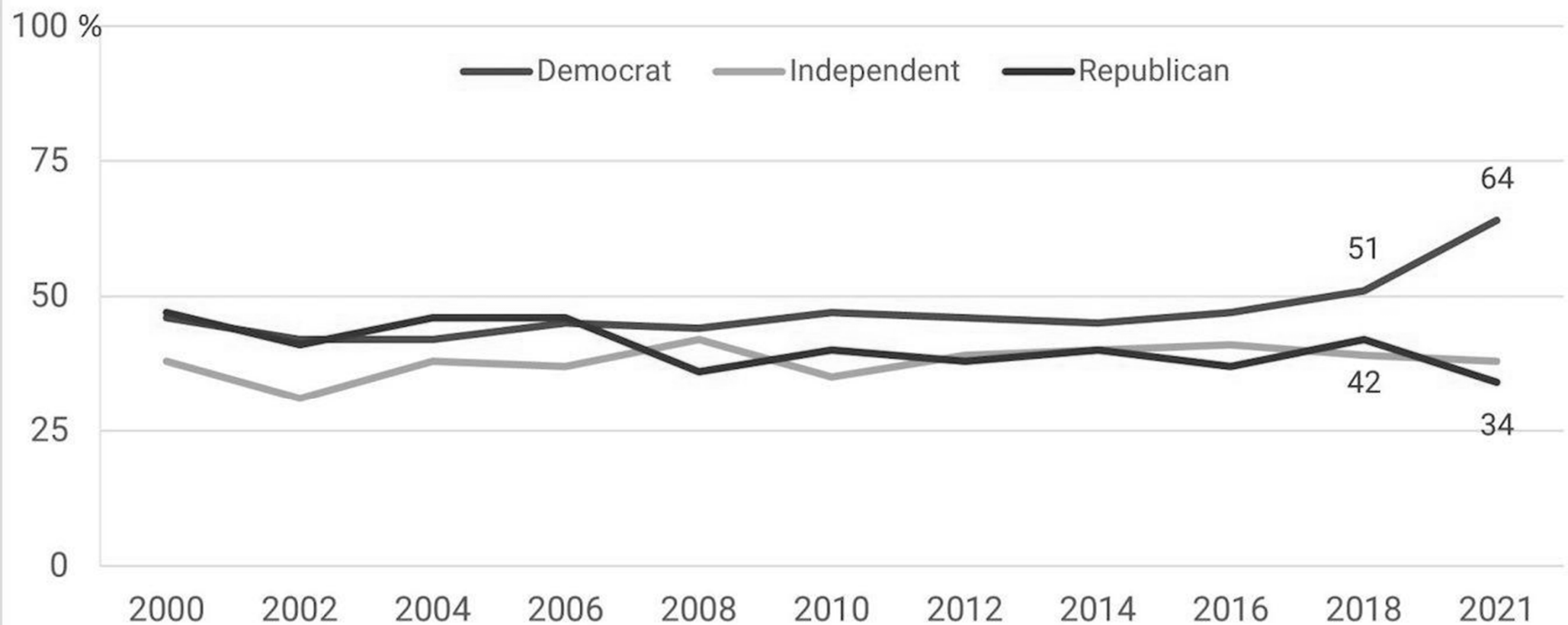
● completely agree ● somewhat agree ● undecided ● somewhat disagree
● completely disagree ● don't know, missing answer

Politics & Confidence in Science

68

Large partisan gap on confidence in the scientific community.

Percent of adults who have a great deal of confidence



Question: [Scientific community] I am going to name some institutions in this country. As far as the people running these institutions are concerned, would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?

Source: General Social Survey, the latest conducted December 1, 2020-May 3, 2021

- Questions for self-reflection
- For people who endorse Ethno Epistemics
 - Are we willing to grant to all ethnic groups the same epistemological liberties we want to enjoy?
 - How do we reconcile conflicting or incompatible beliefs?
 - Do we accept every belief and bit of knowledge promoted by Ethno Epistemics? If not, how do we choose what to believe?
- For people who endorse the Universality of Science
 - Can Ethno Epistemics be integrated with science?
 - Can science accommodate the many possible Ethno Epistemics that exist or could exist in the future? If not, how to choose which to accept.
 - Again, how do we decide what Ethno beliefs to accept?

Thanks for Listening!