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RESEARCH ARTICLE

How the social brain hypothesis undermines hereditarianism

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Abstract

Hereditarianism is a pseudoscientific view relying on the assumption that varying environmental forces selected for intelligence differentially on ancestral populations. As human groups migrated to different areas worldwide, hereditarians argue, novel ecological pressures necessitated different degrees of innovation. Hereditarians use a mixture of genome-wide association studies, intelligence quotient metrics, and arguments stemming from evolutionary psychology to defend these positions. Yet despite evidence from population genetics refuting hereditarianism, these authors also fail to engage effectively with the social sciences. Specifically, hereditarians consistently ignore or misrepresent the social brain hypothesis, which proposes that sociality – and specifically, pressures to cooperate or compete in different circumstances with conspecifics – was the primary selective pressure for cultural innovation, brain size, and different forms of human intelligence more broadly. The purpose of this article is to evaluate hereditarianism from the views of human behavioural ecology, cultural evolutionary studies, and current understanding of the relationship between forms of capital and reproductive success to show that arguments for hereditarianism are poor and wilfully ignore established research in the social sciences. The pressure to succeed socially drives innovation, and refusal to confront this reality leads hereditarians to make both wrong and unethical claims about human nature.

Keywords: social brain hypothesis; hereditarianism; scientific racism; cognitive evolution

Social media summary: Hereditarianism is inferior to established theories of human cognitive evolution.

Introduction

Hereditarianism is a loosely connected set of pseudoscientific views, notably including the notion that there are genetically determined differences in intelligence between human populations, and that differing selective pressures on ancestral groups explain these differences (Cofnas, 2020b; Winegard et al., 2017, 2020). Researchers who defend hereditarianism, sometimes also called 'race realism' (Saini, 2019), claim that standard views in evolutionary psychology cannot account for variance in cognitive ability between populations (for example, Frost, 2011).

Though hereditarianism is a form of scientific racism, a minority of researchers in the humanities and social sciences argue that free inquiry necessitates empirical testing of its predictions (this is a common view among proponents of hereditarianism; see Cofnas, 2020b). Critics, which include philosophers, social and biological scientists, developmental psychologists, and ethicists (among many others), note that pursual of the hereditarian claims around group-level differences in intelligence is unlikely to be a valuable scientific endeavour (Gardner, 2006; Sternberg, 2005; see also Matthews et al., 2024); combined with the harm these works cause to society, we can diagnose them as abhorrent (Matthews et al., 2024).

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Furthermore, owing to work by Richard Lewontin (Lewontin, 1972, 1978), there is widespread doubt that it is possible to empirically evaluate claims about race and intelligence, owing to the broadness, if not meaninglessness, of these terms (Fuentes et al., 2019; Pigliucci, 2013; Lewontin, 1970; Shen & Feldman, 2022; Sussman, 2014; Wagner et al., 2017). Finally, research in genetics has established unequivocally that genetic heredity – the transmission of phenotypic predispositions from an organism's parents – does not imply between-group differences in traits: the possibility of a particular disposition for an ability, like analytic thinking, does not imply any expectations in group-level differences in that disposition (see Roseman & Bird, 2023).

Hereditarians continue to respond to (or ignore) these arguments with defences of the utility of the concepts of race and intelligence, and moreover the usefulness of the intelligence quotient (IQ) as a proxy for a person's overall intellectual capacity (Cofnas, 2020b). These debates have led to impasses at theoretical levels in philosophy, sociology, ethics, and the biological sciences, and are ongoing, with proponents of hereditarianism facing professional consequences for their positions (cf Larsen et al., 2020).

The purpose of this paper is to evaluate the claims made by hereditarians about the selective forces they argue produced the between-group differences in intelligence that they claim exist today from the perspective of the evolutionary social sciences. (Note that in this paper I use 'cognitive abilities' and 'intelligence' interchangeably to highlight the wide cognitive toolkit common to humans; 'intelligence' and IQ are by contrast terms often used incorrectly by hereditarians to refer to an undefinable quality of general intelligence [see Hampshire et al., 2012 for a discussion].)

While it is well-established in genetics that claims about group-level, genetically determined differences in intelligence are demonstrably false (see Roseman & Bird, 2023, inter alia), and further that concepts like ethnicity and race do not conform to data about genetic ancestry (Gouveia et al., 2025), there is no clear message from the social sciences regarding why established, evolutionarily driven hypotheses around the development of cognitive abilities across human populations undermine the between-group difference accounts defended by hereditarians. This article attempts to correct this gap by showing how one such established view – the social brain hypothesis – undermines hereditarianism by showing that social competition, which is ubiquitous in human groups, drove selection for intelligence across groups, rather than differentially between them. The need to build social capital is universal among humans, and consequently there is no expectation that differences in cognitive ability will appear between populations, even those that have been reproductively isolated for many generations.

This argument involves first an overview of the hereditarianism vs environmentalism debate and how it has developed over the past several decades; second, an overview of the premises of human behavioural ecology and cultural evolution relating to the social brain hypothesis; third, an argument showing that hereditarianism relies on a misunderstanding of contemporary work in human social evolution.

My goal is not to reject hereditarianism on ethical grounds, but rather to show that its proponents rely on a weak argument for their claims, which they use in turn to defend views that are unethical. The social brain hypothesis, and more broadly any theory in the human sciences that effectively captures the balance between cooperation, competition, and rule-following in humans, has greater explanatory power than the pseudoscientific views espoused by hereditarians.

Hereditarianism and its assumptions

Proponents of hereditarianism claim there are measurable, group-level differences in intelligence owing to variations in selective forces from physical environments on ancestral groups (Frost, 2011, inter alia). While there has been some variation in premises, contemporary hereditarianism promotes 'cold winters theory', a pseudoscientific view suggesting colder environments necessitate a greater frequency of cultural innovation (see Anderson, 1991 for a critique of Rushton's arguments from an

ecological perspective; see also Livingstone's (2024) discussion of the history of using climate to justify racist beliefs). When I refer to hereditarianism in this paper, I am referring to the cold winters view, which is at present the most widely circulated view among race scientists.

This view is, however, only the latest form of race science. Precursors of hereditarianism pseudoscience, for example eugenics, have been popular among people with racist ideologies for at least the past century, and probably longer (Lala & Feldman, 2024). A more recent resurgence of these views followed the publication of Jensen's 1969 work suggesting a link between genetics and IQ (Cochran & Harpending, 2010; Herrnstein & Murray, 1996; Jensen, 1969). Following the appearance of this publication, academics advocating for eugenics made broad claims about links between genetics, IQ, and intelligence more broadly, using Darwinian selection to suggest that differing ecological pressures can predict for group-level differences in intelligence (Lynn, 2010; Rushton, 1999; Rushton & Jensen, 2005); see Sear (2022) for an analysis showing the misuse of IQ data for hereditarian claims.

This debate has continued, in differing forms, over the subsequent half century, with hereditarianism sometimes ostensibly intertwining with sociobiology and evolutionary psychology (Winegard et al., 2017). Proponents of hereditarianism rely on genetically predictable differences between ancestral groups of humans, and claim that the living descendants of these ancestral groups represent 'races' in ordinary language (Anomaly, 2017), which are categories often also used by media and textbook sources (Condit, 2007; Donovan, 2015).

These debates relied on a distinction between what hereditarians call genetic and environmentalist explanations for cognitive traits in humans (Rushton & Jensen, 2005), which also infects work blending psychology and genetics (Plomin, 2018; Plomin & Von Stumm, 2018; Wade, 2014; see also Marks, 2014). Yet following the controversies of Jensen's publication, early work by Cavalli-Sforza and Feldman (Cavalli-Sforza & Feldman, 1973; Feldman & Cavalli-Sforza, 1976) showed that gene-culture co-evolution renders this binary distinction false: the environment and genetics interact in ways not accounted for by hereditarian models (Cavalli-Sforza, 1981; Richerson & Boyd, 2005).

Hereditarianism nonetheless persists in academic discourse, with proponents using similar logic to that of Jensen's initial work (Lynn & Vanhanen, 2012). More recent works (for example, Frost, 2011; Winegard et al., 2020) focus on perceived shortcomings in the study of evolutionary psychology to defend group-level differences in complex traits, including intelligence, and use these claims to argue that more intelligent groups should act 'paternally' towards the less intelligent (Cofnas, 2020a). These arguments take a consistent form that appears valid, and are structured with the following premises:

1. Human populations are diverse morphologically and behaviourally.

Modern hereditarian arguments open with the innocuous and arguably trivial premise that *Homo sapiens* exemplify diversity owing to cultural evolutionary processes (Foley & Mirazón Lahr, 2011). Depending on the local ecological environment, cultural and biological adaptations permit persistence without speciation (Joseph Henrich, 2015; Henrich & McElreath, 2003). Both cultural (for example, wearing clothing for warmth or to signal information to others, Boyd et al., 2011; see also Buckner, 2021) and biological (for example, adaptation to high altitudes or against skin cancer, see Beall et al., 2012; Greaves, 2014, respectively) adaptations are accepted universally across fields as explanations for the uniquely human social conquest of the planet, so this is not a controversial claim.

2. Group-level diversity in humans is predictable based on the local environment.

Premise 2 may follow from 1 and assumes that we can predict human socioecological niches based on features of the environment. One example may be in the construction of homes: where weather is more likely to be severe, houses may be easily constructed using cheap materials to avoid the high costs of rebuilding with rare materials or in a time-consuming manner (Dunn et al., 2024). Similarly,

skin colour may be predictable depending on the local average level of vitamin D a person may take in through sunlight annually or the risk of skin cancer (Greaves, 2014; Yuen & Jablonski, 2010).

3. Diversity in human populations may include cognitive as well as physical traits.

Winegard et al. (2020) suggest that if we find diversity in human morphology and culture in patterned ways that depend on socioecological factors, there is no reason to assume cognitive traits should not show similar diversity. The foundational pseudoscientific hypothesis supporting modern hereditarianism, known as 'cold winters theory', consequently holds that colder environments require more cultural innovation for humans to survive and reproduce effectively – and therefore that these environments select for more innovative people (Frost, 2019; Lynn, 1987; Rushton, 2012).

4. (Conclusion) One causal pathway for group-level diversity in cognitive traits is genetics.

If natural selection exerts pressure for different cognitive traits depending on the local environment, we can assume that there will be group-level differences in cognitive abilities, and further that those differences are caused, at least in part, by genetic variation and inheritance. For hereditarianism to hold, according to these researchers, the proportion of a given person's intelligence that must be explained by the genome is 20% (Winegard et al., 2020).

To defend this argument, summarized in Fig. 1a, contemporary hereditarians also suggest that genetically driven complex adaptations can evolve in short periods. This, in their view, contradicts claims in evolutionary psychology (for example, Cosmides & Tooby, 1992) that human cognitive faculties have not changed notably since the beginnings of agriculture, and consequently that some features of human minds are mismatched with modern socioecological environments (with relevance to the perception of race, see Cosmides et al., 2003). Evidence of fast evolution in other species (for example, lizards; Herrel et al., 2008, and other species that are notably much smaller than humans) is used by authors like Winegard et al. (2017) to substantiate this set of claims.

Finally, and as a corollary to point 4, these theorists borrow terminology from population genetics to claim that the heritability of cognitive traits within a given population translates to between-group heritability of the same traits (Jensen, 1975; Sesardic, 2000); see Roseman and Bird (2023) for a mathematical refutation. Positive selection for traits like innovativeness in a given environment, for example, implies greater average innovativeness than might be seen in other environments, according to these researchers (Lynn, 1987).

The principal target of this ostensibly innocuous syllogism leading to point 4 above is IQ differences in human groups based on ancestry. Contemporary hereditarians cite differences in IQ and educational attainment between ancestral human groups as evidence for their arguments. Given repeated IQ evaluations between groups, such as African Americans, Ashkenazi Jews, and White people of European descent, which suggest a measurable and consistent difference in scores, coupled with genome-wide association studies linking a proportion of educational attainment to genetics, we should, according to these theorists, accept a hereditarian explanation (Lynn, 2010; Winegard et al., 2017).

One example repeatedly evaluated in the literature is the Minnesota Transracial Adoption Study (TRA), which was first reported in 1976 and reanalysed more than a decade later (Scarr & Weinberg, 1976, 1983; Weinberg et al., 1992). As part of the TRA, researchers evaluated IQ outcomes following the adoption of 130 African American or mixed heritage children, White children, and Asian or Indian children to 101 host families in the US. At both evaluated time points, the adoptive parents' biological children had the highest mean IQ scores (109.4 in 1986), followed by adopted White children (105.6), adopted children with mixed heritage (98.5), and African American children (89.4).

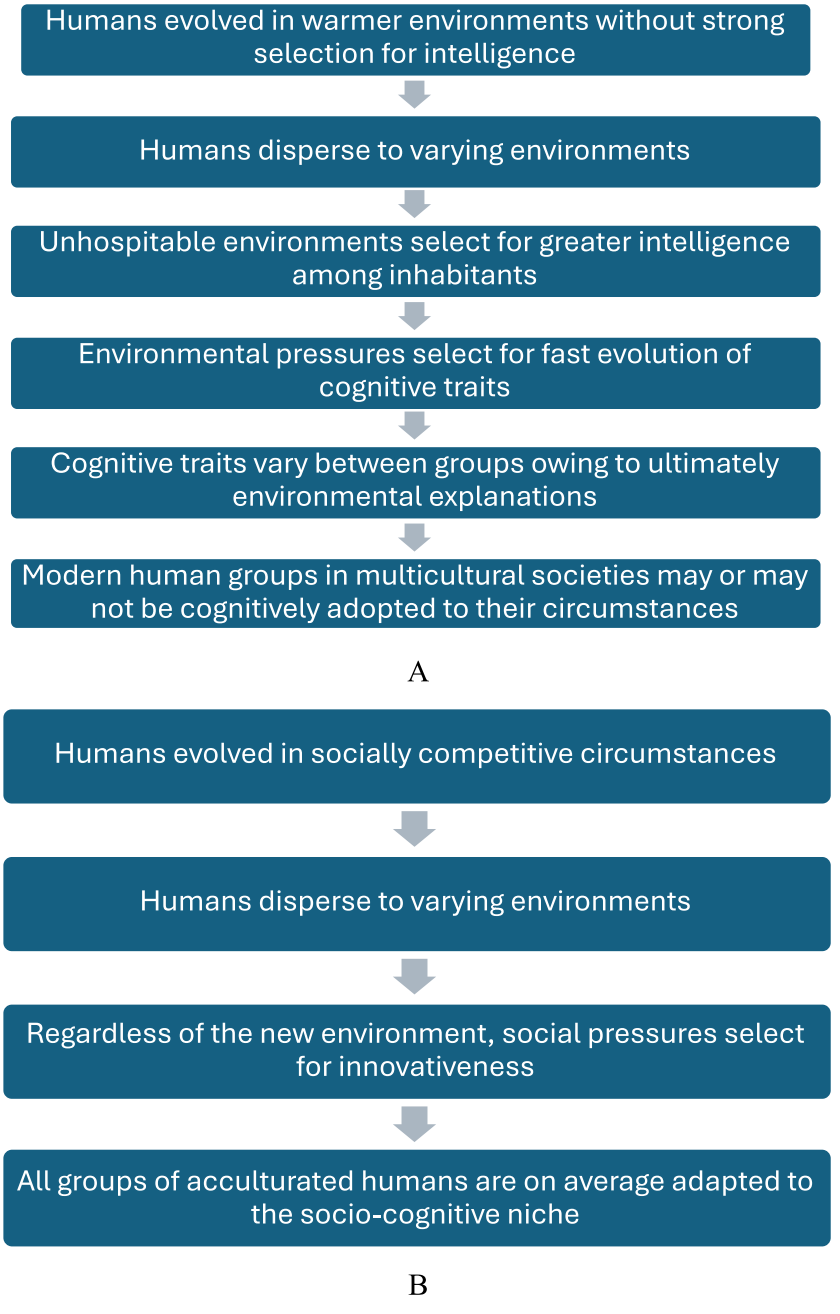


Figure 1. (a) The hereditarian account of human intelligence; (b) the social brain hypothesis. Hereditarianism focuses entirely on the physical environment as a selection pressure for innovation and intelligence; the social brain hypothesis assumes that intraspecific competition drives the evolution of the brain and intellect; both empirical and conceptual work supports only (b).

Proponents of hereditarianism claim the results from the TRA in both 1975 and 1986 support their suppositions (Levin, 1994; Lynn, 1994). This is despite further stipulations from Weinberg et al. (1992) that African American children in the TRA were adopted later in life, had a greater number

of placements prior to adoption, and were more likely to be placed in socioeconomically deprived homes. Hereditarians writing both presently and at the time of the TRA's publications miss or ignore these factors in their interpretations.

The broader question implied by the TRA is whether, if the TRA were expanded to a much larger cohort and adoption occurred at birth, outcomes at the group level would resemble those at the individual level – a claim for which there is no evidence. If two infants were switched at birth, we could expect some differences in their success in education, accomplishment, and so forth to result partly from genetic predispositions; yet if we switched 10,000 infants, hereditarians would expect parallel, group-level differences.

Modern population genetics provides a clear and irrefutable rejection of this hereditarian claim, owing to the fact that between-individual genetically determined differences in cognition do not imply between-group differences, and further that these differences rest on a mistaken assumption applying biology to a socially constructed term ('race'; see Roseman, 2018). The social brain hypothesis, by contrast, is consistent with established work in population genetics and makes predictions based on social, rather than physical, pressures. Contra hereditarianism, legitimate work in the evolutionary sciences suggests that humans' behavioural flexibility allows for the transmission of social norms and cultural traits that make us able to navigate our local social and physical environments. In the following sections, I present an argument showing why this view is superior to hereditarianism.

The evolution of the socio-cognitive niche

In the years following Jensen's early claims about race and IQ, researchers across the biological, social, and medical sciences have criticized the tenets of hereditarianism (for example, Guevara et al., 2023; Ivey Henry et al., 2023; Lala & Feldman, 2024). These include models in gene-culture co-evolutionary studies showing that cultural transmission, particularly vertical transmission, makes it impossible to determine the degree to which genetics affect complex traits like intellectual capacity (Cavalli-Sforza & Feldman, 1973; Feldman et al., 2013; Shen & Feldman, 2021). Other common strategies involve dismissing the concepts of 'race' or 'intelligence' altogether, and suggesting that analysis based on these concepts is unlikely to be scientifically useful (Fuentes et al., 2019, inter alia). Social scientists also argue that it is implausible that any complex cognitive trait can be explained only through genetics (Charney, 2012; Fuentes, 2016, though see Roseman, 2018). And more recently, biologists have attacked the mathematics – or lack thereof – in hereditarian work supporting any link between within-group and between-group heritability (Roseman & Bird, 2023).

Moreover, the cold winters view has repeatedly been shown to rest on false assumptions and mischaracterizations of evolutionary ecology and archaeology (Anderson, 1991; MacEachern, 2006; for a discussion of how misunderstandings around human reproductive strategies arise, see Sear, 2020). Anderson (1991) notes that Rushton's (1990) defences of differing 'racial strategies' based on environmental factors rest on a misconception of important concepts in ecology, specifically r vs K selection, which require a consideration of density-dependent or -independent agents of selection, rather than strategies for maximizing fitness in different ecological environments, as Rushton claims. Anderson (1991) also notes that the entire notion of environmental predictability is vague, owing to the complexity of measuring predictability in a complex system – another critical detail that Rushton's work ignores.

I am not here concerned with these arguments, or with the validity of IQ tests more broadly (see, for example, Hampshire et al., 2012), but rather the explanatory power of hereditarianism (see Fig. 1) from the perspective of the social sciences. By compounding refutations of hereditarianism by geneticists and biological anthropologists with a clear message around established views from the social sciences, it will become clear that there is no backing, conceptual or empirical, for the claims made by this group of people.

In their central defence of hereditarianism, Winegard et al. (2020) give a misleading consideration of social pressures in the evolution of cognition, writing:

> … many theories of human intelligence posit that social competition was a chief driver … These theories appear limited and unable to grapple with some data …
> … Culture, a human niche, creates selective pressures on human intelligence because it rewards those who are cognitively sophisticated enough to learn rapidly and to innovate … From this perspective, cold winters may have selected for human intelligence, but then culture, especially after the invention of agriculture, did as well …

Here, they summarize about 50 years of work that, following the writing of N. K. Humphrey (1976), suggests the importance of sociality in the evolution of human cognition. An implicit assumption of this extract, however, is that human cultural niches are likely to vary owing to environmental circumstances, and therefore the selective pressures on the faculties underpinning cognitive ability are likely to vary between cultural groups. This implies a misunderstanding of the central tenets of modern human behavioural ecology, cultural evolutionary studies, and the social brain hypothesis, the last of which claims that human cognitive abilities are a consequence of the need to navigate the increasingly complex norms, institutions, and interpersonal relationships that characterized human and pre-human societies throughout history as groups grew in size, with established direct correlations between average group sizes and the neocortex (for a review, see Dunbar, 2024). This is conspicuously absent, moreover, in Rushton's defences of the cold winters view: while he mischaracterized r and K selection, he ignores entirely alpha selection (Krebs, 1978), which favours successfully competitive individuals in both a density-dependent and -independent fashion (Anderson, 1991).

The premises of the social brain hypothesis are as follows:

> Human intellect is a socially derived trait that enables effective operation within a cultural group.

Humphrey's seminal work on the social function of the intellect illustrated the importance of manoeuvring within populations for evolutionary success (Humphrey, 1976). This insight has since been labelled (I think wrongly) 'Machiavellian intelligence' (Gavrilets & Vose, 2006; Byrne & Whiten, 1988), owing to the emphasis on individuals who effectively predict how others will behave, much as a good chess player does (McNally et al., 2012). Yet Humphrey's broader insight is that social interactions, which necessarily require planning and prediction about others, are more difficult to navigate than environmental interactions and require not only knowledge about the world, but about how people are likely to behave within the world – even years into the future.

There has since been a huge amount of research in primatology and psychology that broadly forms the social brain hypothesis: the need to effectively navigate society implies positive selection for intelligence, defined broadly or narrowly (Dunbar, 1993; Dunbar & Shultz, 2017; Shultz & Dunbar, 2007; Tomasello et al., 2005; von Hippel & Trivers, 2011; see also Bailey & Geary, 2009 for an analysis suggesting that social competition best explains the evolution of hominin brain size). For example, individuals who could effectively predict reciprocity in dyadic relationships (Cosmides et al., 2010; Trivers, 1971), make predictions about others based on information received from third parties (Alexander, 1987; Leimar & Hammerstein, 2001; Nowak & Sigmund, 1998, 2005), or use gossip to drive preferential treatment that maximizes benefits towards themselves and their kind (Giardini & Wittek, 2019) would be likely to have higher inclusive fitness than others without these skillsets. There is also the possibility that selection against reactive aggression over our evolutionary history has led to an increase in tendencies towards proactive aggression, which involves planning (Wrangham, 2021). Similarly, defecting in dyadic relationships or from public goods investment when recognition or sanctions against cheating are low is likely to be beneficial and cognitively costly to execute effectively (Goodman, 2023, 2025).

The complex relationship between cooperation and defection in social networks has repeatedly been shown to be an essential element of the evolution of intelligence, for example in mathematical models aiming to explain facets of cognition including deception and trust (Gavrilets & Vose, 2006; McNally et al., 2012; Panchanathan & Boyd, 2003), and in primatology (Shultz & Dunbar, 2007; Byrne & Whiten, 1992). Accordingly, scholars in cultural evolutionary studies, anthropology, and economics emphasize that social norms and markers evolve in part to maximize cooperation within groups through processes including cultural transmission and internalization (Archetti et al., 2011; Fehr et al., 2002; Fehr & Schmidt, 1999; Henrich et al., 2001; McElreath et al., 2003; Nettle & Dunbar, 1997; Ostrom & Gardner, 1993).

The increasingly complex social, linguistic, and moral frameworks of human societies, on this view, places intense selection pressure on individuals to navigate them effectively (Alexander, 1987; Flinn et al., 2005; Dunbar, 2022; Crespi et al., 2022; Townsend et al.,); moreover, every element of human cognition is assumed to have social utility, including consciousness (Lahr & Foley, 2020; Humphrey, 2022). The emergence of ethics is in particular both a hurdle for exploitation within society (Goodman & Ewald, 2021; Alexander, 1987) and a product of the need to maintain cohesion for increasingly large groups to function (Ostrom, 2000). Machiavellian – or more simply, just social – intelligence is therefore a fundamental feature of *Homo sapiens*, universal to all cultural groups, rather than a mismatched module left over in a 'stone age brain', which is how hereditarians prefer to understand evolutionary psychology, despite obvious evidence otherwise (for example, Cosmides et al., 2010).

Humans evolved to maximize relative embodied, resource, and social capital.

Like any organism, humans aim to maximize capital relative to unrelated others, which in turn maximizes inclusive fitness (Kaplan et al., 2000, 2003; Kordsmeyer, 2022); a basic tenet of human behavioural ecology is, relatedly, that humans are on average adapted to their local sociocultural environments (Smith, 2017). Embodied, resource, and social capital are, however, intertwined in human groups, and are each partially heritable (Mulder et al., 2009). While body size (Mook-kanamori et al., 2012) and intellectual ability (Sauce & Matzel, 2017) have genetic and environmental components, the inheritance of resource and social capital accords with local cultural norms.

Obvious cases of resource capital inheritance include land and finances, which vary according to, for example, whether transmission between generations is determined maternally or paternally. Less obvious cases, representing the inheritance of social capital, are the transmission of relational wealth, reputation, and commitments like debt (Graeber, 2013). Evidence from work with the Maasai, for example, suggests that need-based transfer bonds between individuals are often transmitted from parent to child (Aktipis et al., 2011).

Anthropological work has also conclusively demonstrated relationships among these three forms of capital. Successful turtle hunters among the Meriam, for example, maintain high social capital through generosity rather than high resource and embodied capital only through a greater intake of energy (Smith et al., 2003). Among BaYaka hunter-gatherers, whether someone is liked within a camp is also predictive of whether others will donate excess resources to that person, and this relational wealth also positively correlates with body mass index and female fertility (Chaudhary et al., 2016).

This universal need to maintain high social capital – which appears to broadly be predictive of reproductive success, though not independently of the other forms (Hill, 1984) – accords with the social brain hypothesis and suggests that social intelligence may be linked with social capital. While local inheritance patterns will almost certainly affect a given person's ability to develop a prominent reputation, high relational wealth, and so forth, the ability to navigate local social norms effectively must play an important, if not primary role.

Finally, the relationship between social capital and resource capital, and social capital and embodied capital, suggests that those best equipped to navigate local norms are also the most likely to

know the most about their own cultural and social environments, or otherwise put to maintain a high amount of cultural information internally, to use the language of cultural evolutionary studies (Henrich & Muthukrishna, 2021; Henrich, 2015), and to be able to maximize economic payoffs in social relationships. Each relies on a high degree of social intelligence – and unlike the premises of the cold winters hypothesis, where natural phenomena are purportedly the driving selective forces for intelligence, social competition is universal in human groups and does not vary greatly depending on environmental considerations.

Humans evolved specialized kinds of intelligence to match needs in a socio-cognitive niche.

Tooby and DeVore (1987) originally formulated the concept of a cognitive niche to account for the human propensity for using information to exploit the environment. Pinker (2010) builds on this concept to claim that the co-evolution of language, sociality, and intelligence explains the rapid evolution of each of these qualities: the needs of cooperation and problem solving created a pressure for greater intelligence, which brought with it more complex sociality and grammatical language (see also arguments in Dor et al., 2014). This triad is specific to a given local ecological circumstance: the tools and cooperative behaviours humans develop to exploit the environment are consequences of features of that environment (Herzog & Demps, 2025). A further implication of the formation of the human cognitive niche is specialization in local socioecological circumstances: individuals maximize capital through local knowledge of both the environment and others around them, or what is called the socio-cognitive niche (Whiten & Erdal, 2012).

Fundamental elements of the socio-cognitive niche, such as partner choice (Noë & Hammerstein, 1995), understood within social and sexual selection frameworks (see West-Eberhard, 1983), place a high cognitive burden on individuals in knowing how and with whom to form cooperative bonds, and when to leave them (Aktipis, 2004). Trust, a cognitive trait unique among all known species to humans, requires a theory of mind, the ability to predict a partner's future behaviours, and the ability to deceive or convince others about one's own trustworthiness (Goodman, 2025).

Relatedly, given that the success of cooperative groups depends on specialization – we do not all perform the same tasks in societies – a hypothesis about multiple intelligences (Gardner, 2006) is more plausible than is the view that humans evolved generalized intelligence to solve local ecological problems. Differences in cognitive abilities may have allowed and selected for specialization in different kinds of tasks, though the greatest pressures will still be on social ability (Herrmann et al., 2007). (There is, moreover, no reason to assume that specialized cognitive traits are not heritable, though this is a distinct claim from saying that general intelligence is heritable.) What matters from a Darwinian perspective is only that individuals maximized some form of capital through specialization, which in turn helps to maximize inclusive fitness.

Cumulative cultural transmission and behavioural flexibility negate the need for local cognitive adaptations.

A fundamental claim underlying cultural evolutionary models is that the gene/environment distinction misses the co-evolutionary relationship between genes and culture (Cavalli-Sforza & Feldman, 1973; Lala & Feldman, 2024, inter alia). Models from this field of study suggest, for example, that humans evolved biases around what cultural traits to internalize, which include conformity, prestige, and even homophily (Boyd & Richerson, 1987; Cavalli-Sforza, 1981; Henrich, 2001; Henrich & Henrich, 2007; Richerson & Boyd, 2005).

The need to absorb large amounts of information through cultural transmission necessitated first a change in life history patterns, notably a longer childhood and adolescence, and second larger, more costly brains for retaining and synthesizing this information (Herrmann et al., 2007; Muthukrishna et al., 2018). The complexity of cumulative culture in human groups precludes the possibility that

this information can be processed in any other way, and implies group-wide specialization in local culture (Muthukrishna et al., 2018).

The established genetic diversity within groups (Lewontin, 1972) further supports the notion that collective knowledge and aptitude-based divisions of labour maximize the potential any given group has to survive in varying and changing local environments (see Potts, 1998). Behavioural flexibility – another fundamental attribute of *H. sapiens* entirely ignored by proponents of hereditarianism – precludes the need for anything but simple genetic adaptations to the local environment. Instead, by obtaining local knowledge through cultural transmission and canalizing behavioural flexibility towards local needs, human groups can maintain high average fitness even in unfavourable or unpredictable environmental circumstances (Flinn et al., 2005). Diversity in genetics, cognitive attributes, and behavioural strategies within groups favours individual-level success through interdependence (Roberts, 2005).

All socioecological environments impose a selection pressure for cultural innovation.

Multiple papers in cultural evolutionary theory highlight the critical difference between individual and social learning (Mesoudi et al., 2016, inter alia), a distinction also notably absent from works published defending hereditarianism. The distinction has the consequence that individuals cannot develop complex technologies or cultural traits more broadly in a single lifetime from nothing; they must start with innovations already in use. Critically, in games of humans vs the environment, individual learning only is not a reliable strategy (Henrich, 2015). Instead, individuals must rely on cultural transmission of local knowledge to interact successfully with the environment, innovating on top of cumulative cultural traits (Henrich, 2015, inter alia). By contrast, in competitive social games, humans must not only rely on cultural transmission of cultural traits and norms, but effectively predict how others will behave – employing competitive or cooperative strategies as necessary in a given setting (Goodman, 2025).

Consequently, it is the balance between cooperation and competition, both within and between groups and across the socio-cognitive niche, that creates a consistent need to innovate in social games, through (for example) biased transformation (see Mesoudi, 2021) of existing traits, for cultural evolution to result in the advent of large-scale, stratified societies (Henrich, 2015). To the degree that humans differentially work with or against one another with the aim of maximizing capital and as specialists at local tasks, there will continue to be this need.

The local context in which people subsist is therefore the landscape on which different types of human cognitive ability are tested (Roseman, 2018). Environmental unpredictability – rather than the predictability of cold winters – is one factor that may have necessitated greater innovative abilities among early humans (Lahr & Foley, 2020), but the relative need to maximize capital of any form in increasingly competitive social environments was not a greater driver of brain size (Bailey & Geary, 2009) and diversity in cognitive abilities (Flinn et al., 2005; Townsend et al., 2023; Flinn, 2021). Understanding how to create clothing or new tools for cooking must require the ability to innovate, whether defined as building on previous cultural traits or as a driving psychological act of creativity, but the need to tell cooperator from defector (Cosmides et al., 2010), liar from truth-teller (Fonseca & Peters, 2021), member of one's own cultural group or an invader (Cohen, 2012; Goodman et al., 2024; Goodman & Foley, 2025; McElreath et al., 2003; Nettle & Dunbar, 1997; Goodman et al., 2023) in a social environment where deception will evolve culturally, rather than genetically, will create a strong selection pressure to innovate defences against deception and exploitation, both at the individual and group levels (Alexander, 1990; Flinn et al., 2005; Flinn, 2021).

Importantly, finally, the strong selection pressure implied by the social brain hypothesis – alpha selection, which favours competitive ability (Krebs, 1978) – does not preclude the possibility of local, genetic adaptations to the environment where traits are simple, for example skin pigmentation or differential abilities for processing oxygen. No such differences are necessary for cultural transmission of

local norms, or for playing social games: complex cognitive traits are always under strong selection for navigating local social norms, and by consequence the social brain hypothesis makes no claim that any differences should be expected in competitive ability across groups. Disputing the universality of alpha selection on human populations requires a comparative socioecological analysis of the circumstances in which human groups have lived over the last 10,000 years – data which are probably impossible to obtain, and which hereditarians have not attempted to collect (Anderson, 1991).

The models' relative explanatory power

We now have two potential models (Fig. 1) that purportedly explain the evolution of the cognitive suite unique to humans. The first (hereditarian) model presupposes an ongoing difference in cognitive abilities resulting from a combination of historic divergences in ancestral lineages and local environmental pressures, ostensibly paired with cultural evolution.

The second maintains that human groups face internal social pressures that select for cultural innovations that allow for exploiting others or promoting social cohesion; this requires not only a theory of mind but the ability to effectively predict how others will behave in a signalling framework characterized by flexible behavioural strategies and the ubiquitous importance of cultural transmission.

Here I review the models' relative explanatory power for studies such as the TRA. Both models also offer explanations for the study's findings, and make predictions about what would happen if infants born within cultural groups were exchanged at a small or large scale. Hereditarians claim that IQ average–differences by group are in line with predictions from their model, but ignore the cultural factors that the study's authors note played a role during the adoption process, such as later adoption – and adoption into more deprived households – of Black children (see Weinberg et al., 1992 for a discussion of these points, which were not quantified).

By contrast, the social brain hypothesis admits the heritability of cognitive traits but also assumes that gene-culture co-evolution, coupled with behavioural flexibility and unyielding social competition, predicts an environment-attenuated signal in differences in subjective measures like IQ following adoption, but with decreasing loudness as the cohorts become larger – and moreover with the understanding that cultural factors must be removed entirely for empirical work to show any signal at all. The social brain hypothesis accounts for individual-level differences while recognizing the critical role that the social environment plays in canalization. Hereditarianism lacks this flexibility.

Winegard et al.'s (2020) claim that

> The claim that Blacks face ubiquitous prejudice and discrimination in the contemporary United States is more often repeated then experimentally demonstrated. Blacks certainly might face *some* discrimination, but we are skeptical that it is as pervasive as is often claimed …

is evidence that they believe the statistical signal seen in the TRA reflects the notion that the groups evaluated were each adopted to identical (or close enough) cultural circumstances. Yet this reflects a bias in premise, rather than a rigorous empirical evaluation of their claims. Any experiment aiming to effectively test hereditarianism, instead, would need to have the following qualities:

- Sample sizes for each group large enough to remove any signal of individual-level variation in intelligence (the TRA included only 143 biological children from 101 participating families spread across 3 groups);
- Similar adoptive circumstances such that the experimenters could realistically assume no divergence in cultural norms or traits transferred between the groups being investigated;
- Evidence of group-level differences in capital maximization past what can be predicted by IQ alone;

- Evidence that individuals composing groups are not differentially prejudiced against, in any way, in their adoptive circumstances.

These are obviously unrealistic expectations of any experiment, and the conclusions drawn by hereditarians from the TRA data reveal obvious preferences in interpretation (see Roseman, 2018). By contrast, the social brain hypothesis makes no predictions about outcomes like IQ, but rather how individuals will use varying qualities to exploit their local circumstances, which may or may not translate into differences in subjective measurements like IQ, depending on the cultural traits, such as social norms, transmitted to them during their upbringing. Human behavioural ecology and the social brain hypothesis make the simple assumption that humans are adapted to their circumstances, though success in capital maximization depends on luck and any match, or lack thereof, between abilities and locality. Group-level differences, on this view, will disappear for any outcome with a sufficiently large sample – or in other words, greater statistical power than would be convenient for hereditarianism. Hereditarianism is consequently a weak, biased pseudo-hypothesis that cannot capture statistical inconveniences such as the flexibility of human behaviour and development. The social brain hypothesis – a widely accepted view in the social sciences – by contrast, can.

Other considerations

The social brain hypothesis, while established and influential in the evolutionary sciences, is not the only popular candidate aiming to explain the evolution of human cognitive ability (see Lahr & Foley, 2020; Dunbar & Shultz, 2017). For this reason, it is worth considering whether others, stemming from research into cultural evolution and human mating and rearing practices, show any compatibility with hereditarian pseudoscience. In this final section, I consider two of these hypotheses and also briefly discuss the human capacity for morality. (For a more detailed discussion of these candidate hypotheses for primate brain evolution, and their potential compatibility, see Dunbar & Shultz, 2017.)

The cultural brain hypothesis

One candidate for explaining human brain size and, accordingly, cognitive evolution is the cultural brain hypothesis (Muthukrishna et al., 2018). This hypothesis places emphasis on the need for hominids to have greater capacity for storing cultural information, creating a selection pressure for larger brains functioning as cognitive storage vehicles. A high capacity for social learning has, accordingly, repeatedly been shown to demarcate human from non-human learning strategies (Henrich, 2020).

There is, however, no evidence for any difference in social learning capacities among human groups, and the selection pressures, as with the social brain hypothesis, would not differ between groups for the ability to store cultural information about social norms, rituals, and so on (see Lala et al., 2025 for a broader discussion of the incompatibility of cultural evolutionary theory and hereditarianism). Accordingly, hereditarianism faces a similar incompatibility with the cultural brain hypothesis as it does with the social brain hypothesis.

Cooperative breeding/pair bonding

Pair bonding, mating, and rearing strategies, similarly, are candidates for explaining brain size evolution (Roberts et al., 2022; Shultz & Dunbar, 2007). For example, birds who display pair-bonded monogamy have larger brains than the average noted in their orders (Shultz & Dunbar, 2007). Dunbar and Shultz (2017) suggest that pair-bonded monogamy, following a broader interdependency framework (Roberts, 2005), may best explain the complex coordination considerations between partners that consequently constitute a selection pressure for cognitive evolution. The demands of mate choice, investment decisions, and rearing considerations in increasingly large social groups characterized by

cooperative breeding and/or alloparenting may have created the conditions necessary for a larger brain in hominids.

Again, this emphasis on mating, rearing, and investment patterns is incompatible with hereditarianism: there is no evidence in these studies that non-social environmental pressures would have created variable selection pressures on cognitive evolution. Flinn et al. (2005), drawing on Richard Alexander's (1990) work, moreover, claim that an intragroup competition model stemming from human ecological dominance best explains the available data from across anthropology and biology. Notably, Flinn and colleagues argue that pair bonding accords with this model.

Moral capacities

Finally, Darwin claimed in *The Descent of Man* that the moral sense follows from the development of greater cognitive power (Darwin, 1871). The capacity for morality, and relatedly ethical debate, is therefore an integral quality of the human intellect, though it is not a quality that a crude metric like IQ is likely to capture effectively, owing to the fact that – among other problems with this measurement – there are only rarely clear solutions to ethical problems, and further that ethical debate can be used to justify unfair practices just as it can promote fairness (Dana et al., 2007). It is ironic that this quality of the intellect is not discussed by hereditarians, who instead claim that their realistic views about race should inform policy around major issues like inclusivity and globalization (Cofnas, 2024).

Because the social brain hypothesis is agnostic about how individuals maximize capital, it is left to policies within a given society to help individuals develop their own set of abilities (see, for example, Harden, 2021). Whether this translates into a high IQ is irrelevant: what matters is that societies have the tools and knowledge necessary for the development of a range of types of cognitive potential.

Concluding remarks

The aim of this paper was to show that established theories for the evolution of human cognition are superior to hereditarian pseudoscience, and specifically 'cold winters theory'. Despite widespread condemnation of this view from academics and clear refutations of race science from population genetics, social scientists have not given a cohesive view for why hereditarianism is pseudoscientific from an evolutionary point of view. This article offers a path for addressing this gap. It should, however, be noted that hereditarian publications are not just pseudoscientific defences of an indefensible view, but rather shrouds offering legitimacy to a group of people engaging in illegitimate work. Hereditarianism offers people with racist views tools for promoting their views across the digital sphere (Panofsky et al., 2024; Rodriguez-Louette, 2026). Confronting these views and delegitimizing them from a scientific point of view is therefore a pressing issue and will help to slow a growing resurgence of scientific racism across the world (Sear, 2025).

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