

## CHALLENGES TO THE BASIS OF GIFTEDNESS AND TALENT EDUCATION

**Keynote address for the 25<sup>th</sup> year anniversary Round Table on Giftedness**  
Preschool Teacher Training College “Mihailo Palov”, Vrsac, Serbia, 28 June 2019

Roland S Persson, PhD  
Professor of Educational Psychology  
Jönköping University, Sweden

### **Abstract**

While the notion of someone being extraordinary in the most positive of terms is ancient, the more contemporary understanding of giftedness and talented is mainly American with roots in the 1970s Cold War United States. Since then, for good and for worse, American scholarship has dominated its research and practice. Although the study is now pursued globally, and for the same reasons which once triggered it in the United States, research follows, or is entirely built upon, American theories, models, practices, and more surprisingly, also American values. With the emergence of big data, however, behavioural genetics, epigenetics, the continued revelations of evolutionary research—all of which have emerged in the natural sciences after the launch of gifted American education—have left much, if not all, of the foundations on which giftedness and talent has so far been understood wanting. As much as there is a need to support gifted individuals in society by all means possible, few take into account that giftedness in the light of evolutionary dynamics is a dysfunctional social phenomenon. Scholars, practitioners and political leaders alike are often uninformed of, or even insensitive to, the consequences of solid recent findings in other disciplines than education and psychology. This keynote will address a few of the available evidence which are challenging both our current understanding of gifted education as well as the largely American cultural basis of how giftedness and talent have been defined to date. The general ambition of the world economy is to make every effort to harness talent worldwide for economic growth. However, this is an impossible objective with little or no support in objective empirical research if pursued in a large scale under a neoliberal ideology and its instruments of social and economic control.

## Introduction

Talent, meaning the ownership of something particularly precious, has been around since Antiquity, even though its original meaning is a measure of weight. Individuals with extraordinary abilities have been recognised, for good or for worse, just as long. It is only in modern times we have combined the two as a way of expressing one and the same: someone talented is in possession of something extraordinarily precious (cf., Grindler, 1985). What constitutes 'precious', however, varies considerably. This is in part the reason for the disparity that has always characterised the study of giftedness, its education and application in a variety of different contexts. Agreement is difficult to come by; a phenomenon which German researchers somewhat frustrated have termed 'the toothbrush concept;' that is, a great many scholars in the field have generated their own constructs or theories relating to talent and giftedness, but their effort remains their own and is often of little interest to anyone else, just like a toothbrush (Ziegler & Raul, 2000). This is a very astute observation, but it does not help resolving the lack of consensus in the field. One of the observers have, in fact, done much the same by proposing *The Actiotope Model of Giftedness* (Ziegler, 2005); a theoretical model as good as any other, but it has also not attracted much interest in the international research community. It has so far remained 'a toothbrush' for one or only few to consider. More importantly, like all other current models and definitions of giftedness and talent, the Actiotope Model also lacks a foundation in an evolutionary framework.

An understanding of human evolution is the *only* viable option by which to begin to understand any human behaviour irrespective of theoretical or practical preference. Bringing into the study of giftedness and talent the dynamics of phylogenetic development and the adaptive human nature which evolution has inevitably programmed us with, we stand a good chance of reaching a consensual understanding of extreme human ability and

its function in a social context. Introducing evolutionary dynamics, however, is *not* another alternative theory of giftedness and talent. It must be considered a meta-theory contributing a basis, or a framework, to which every other theory of human behaviour must relate to make sense (Buss, 2016; Persson, 2016; Pinker, 2002). Given such a common foundation it will challenge some current conceptions of talent and giftedness but also tie others more soundly construed together.

### **Why so many labels and definitions?**

The labels and their underlying assumptions used to define what giftedness or talent is are infamously numerous. This extraordinary group of people have been termed, apart from gifted or talented, also highly able, excellent, competent, eminent, genius, elite, high-achiever, prodigious, A-player, high-potential, cash cow, creative, brilliant and so on. The reason for such a plethora of names is largely one of different vested interests in not only describing who these individuals are but, in an era of a global knowledge economy, rather what to use them for (Persson, 2014). The dramatic change of world economy in recent decades has had a dramatic impact on giftedness and talent scholarship. Scholars were almost exclusively devoted to understanding extraordinary children and their needs in 1984, but thirty years later this focus had been almost entirely abandoned in favour of emphasising the usefulness of extraordinary individuals to provide an edge to the economy (Persson, 2015a). American researcher Pamela Clinkenbeard (2007) of University of Wisconsin, for example, even goes so far as to implore the community of scholars and educators in gifted education to advocate the significance of the highly able for future prosperity for community leaders and lawmakers.

Labels used to describe this group of individuals come both from the academic world and from industry. The disagreements amongst academics are well-known and could perhaps be divided into two camps: The expertise orientation and the much larger psychometric orientation. The former largely argues that any skill can be developed to any level given a supportive environment, good instruction and at least 10 years of deliberate practice. Their most contentious argument is that the impact of genetics is minimal or non-existent (e.g., Ericsson, Krampe & Heizmann, 1993). The psychometric tradition soundly has normal distribution as basis for most theoretical thinking which means, even though implicit to arguments rather than explicit, that genetics does have a certain significance to any such model. But their main argument is that the measurement of human ability is the only scientific way forward (Robinson, 2005), quite oblivious to the fact that no-one really knows how many abilities there are, and often also of how they interplay with one another. This makes any theoretical model a mere assumption of number of constructs included in it. A good example is the DMGT Model by French-Canadian scholar François Gagné (2005), which is a scholarly *tour de force* but is simultaneously so complex in terms of number of variables and constructs that it is difficult, if not impossible, to operationalise in a meaningful way. Other scholars have felt frustrated by the disparity and have therefore tried to forge expertise and psychometric traditions together (Sternberg, 1998; Subotnik & Jarvin, 2005; Subotnik, Olszewski-Kubilius, & Worrell, 2011).

Meanwhile, markets and their management for work and professional life have grown weary of academic bickering and indecisiveness. Instead, most are considering talent in terms of achievement and profit only. 'Talent has little meaning in the abstract', Oxford management scholars Brown and Hesketh (2004) observed, '... organisations have become

impatient. They want more than someone with potential; they want people who can “hit the ground running”. They want people who can add immediate value’ (p. 195).

The result of vested interests and an increasing demand for extreme behaviour for profit and influence is an almost desperate effort of trying to resolve the conundrum of giftedness and talent, where each and everyone is trying to market their own perspective and solution. But, without getting much closer to a sustainable solution serving as a unifying force in a highly paradoxical field. Interestingly, such a foundation exists but it has been overlooked or, perhaps more accurately, ignored. Adopting it is not only a challenge to some academic ideas of human behaviour, but occasionally also to public appeal. For this reason, it is not usually palatable to political leaders or captains of industry. ‘Like it or not,’ Satoshi Kanazawa, an evolutionary psychologist of the London School of Economics, told *The Independent* in an interview (2010, 30 November), ‘nature is simply not politically correct’.

### **The missing link**

No scientist has ever ignored nature. On the contrary! Observing it has tickled imaginations and triggered studies into all the whys and hows for centuries. When conclusions go against current societal norms and beliefs, however, no matter how correct observations and conclusions are, they will be discredited and their authors challenged, sometimes even threatened. This is what happened to Edward O. Wilson of Harvard University, an eminent biologist with a penchant for studying ants and social creatures, as he started comparing his vast knowledge of social insects and mammals with the social life of Homo Sapiens. His suggestions were met by hostile and defiant rebukes. As Segerstråle (2000) has pointed out in studying the dynamics of the resulting controversy, while Wilson remained a poised and factual scholar in presenting his proposals, the reaction to them was seriously lacking in

scientific substance. The outrage was entirely *subjective*. Some 40 years or so later, Wilson has been thoroughly vindicated. An increasing number of scholars worldwide are now studying *sociobiology*. This group of scholars does *not* include education scholars and only a small number of psychologists with an interest in behavioural genetics or evolutionary psychology. Educational psychologists who are the ones usually devoted to human abilities both high and low, perhaps with a few exceptions, tend to remain 'die-hard conservative' and convinced of the virtues of psychometric magic. So, what is evolution and how does it directly relate to the study of human skills and abilities, which involves also any understanding of giftedness and talent?

All species change over time according to a specific pattern which starts by *mutation*. In any given population DNA-mutations will occur and, importantly, they occur at random. These mutations will *replicate* into the next generation given reproduction. Only mutations which somehow has survival value in a certain biotope will be transmitted to further generations thereby constituting *natural selection*. Hence, there is *genetic adaptation* taking place over very long periods of time. But, not all genetic blueprints for Homo Sapiens remain passive once we are born. As epigenetic research has demonstrated in recent years some remain active and react to environment as we lead our daily lives. Adaptation to the necessities of the social environment and its demands continues and will affect and, indeed, prompt changes in our behaviour (cf. Griffiths *et al.*, 2012; Plomin *et al.*, 2003).

This process is inescapable and has always been. It is only in our day and time it has become possible to interfere with human evolution by making intentional changes to DNA-sequences. While this raises an ethical dilemma for some it is also welcomed by others (Baylis & Scott Robert, 2004; Persson & Savulescu, 2012). Physics professor Stephen Hsu (2014), of Michigan State University, for example, has enthusiastically exclaimed that 'super-

Intelligent humans are coming. Genetic engineering will one day create the smartest humans who have ever lived’.

Generally, we do not like to be told that we have limitations. If someone reminds us, we agree that others may have such limitations, but we certainly do not. ‘Being everything that I can be’ or do everything possible to ‘achieve my potential’ are targets which typically Americans would impart to the younger generation teaching them that all things are possible for anyone with hard work and unwavering tenacity (Duina, 2011; Stewart & Bennet, 1991). This is unfortunately untrue. Research evidence to the contrary are overwhelming (Sternberg, 1996; Plomin, 2018). Even training to achieving any goal is itself subject to normally distributed heredity (Mosing, Madison, Pedersen *et al.*, 2014). However, an evolutionary quirk affecting our mind unaware is that that we simultaneously have a tendency to live by positive illusion rather than fact, *if* facts do not reinforce that which we want to happen. We much prefer to prepare for a happy ending rather than a calamitous disaster (Humphrey, 2011; Wuketits, 2008). While this makes perfect sense for maintaining mental health over time, it goes without saying that it is detrimental for research sworn to rely on neutral data and analysis rather than on self-fulfilling prophecies and wishful thinking (Andrews & Andersen-Thomsen, 2009; Irwin & Miller, 2007). I would argue that this is precisely why scholars of gifted and talented education generally view gifted and talented children as the saviours of tomorrow, and why research into this field has so far been predominantly American evoking the magnificence of the American Dream (e.g., Sternberg, 2017). The world has adopted this largely untrue American illusion of exceptionally gifted individuals little realising that evolutionary dynamics effectively makes saving the world largely impossible.

To reclaim social science in general and the study of giftedness and talent in particular, from ideology, dogmatism and often self-serving bias (cf., Persson, 2018), scholars must begin to understand the evolution of Homo Sapiens and the nature which evolution has provided us with. Human nature is reasonably defined as all aspects of human behaviour, culture-specific and universal, serving the purpose of evolutionary adaptation for inclusive fitness by developing specific functions in, and triggered by, a social context (Tooby & Cosmides, 1989; 1990). This basis for human existence is the reason that there are cultural universals. That is, irrespective of culture there exist behaviours common to all groups of people throughout history. A little over 400 such behaviours are currently known, some of which are group-orientation, altruism, competition, the importance of assigned gender, the significance of power and influence, poetry, divination, conflict and aggression, spirituality, aesthetics, leadership, hierarchy, social status and so on (Brown, 1990; Kappeler & Silk, 2010; Persson, 2016). While these behaviours differ in expression between cultures and also change over time, the genetic blueprint generating their function has remained unchanged for a very long time (Volland, 2007). All human behaviour has a *function* to, in one way or the other, serve the survival of the species. Importantly, we strive for such survival largely unaware (Sapolsky, 2017; Székely, More & Komdeur, 2010; Sumpter, 2010).

No educational research or practice is concerned with this social dynamic. The same is true also of much of psychology. This is alarming since its significance of how and why we behave the way we do is enormous! It is impossible to correctly understand ability, learning and social behaviour without not relating it to human evolution. Needless to say, this includes studying giftedness and talent as well as to implementing such research into educational practice.



### **Gifted Education and a few of its erroneous assumptions**

It is important to remember that that which we usually recognise as gifted and talented behaviour, irrespective of its theoretical or practical underpinnings, is often quite spectacular. These are individuals who know more, understand more and are able to do so much more than most others in any population (e.g., Ivancevich & Duening, 2001; Meissner, 1991; O'Boyle & Aguinis, 2012; Shakeshaft et al., 2013). However, this is most gifted educators and scholars make their first mistake. They will often assume that such extreme ability is always welcomed and must surely be acceptable anywhere and therefore constitute extreme and largely untapped assets for all of society. This is by and large wishful thinking. It is true that they could be a tremendous asset, but the problem is that extreme behaviour is usually socially dysfunctional. To be too different in any group, and it matters little how we are different, will trigger suspicion and demand conformity. Acceptance is only provided if an individual is like everyone else. Extreme abilities which somehow strengthens group cohesion and identity, or provide entertainment and thereby escaping reality for a while, are rewarded, but intellectually extreme individuals are usually a problem. Their level of abstraction makes it difficult for them to communicate. When they do very few others understand, hence group cohesion risks deteriorating (for a more thorough explanation, see Persson, 2009; 2015b). Intellectual giftedness in particular, understanding it on an evolutionary basis, is unavoidably *dysfunctional* since evolution always strives towards entire populations. A population consists of about 70% average abilities. It is well-established that the more extreme individuals are towards either end of the normal distribution curve the more complex and often difficult their social situation becomes.

In this light, it is very unlikely that the gifted and talented will resolve the world's problems, but not because they are unable to. It will be because they are more likely to not

be allowed to! While they tend to be characterised by a profound sense of fairness and empathy (Lovecky, 1997; Schutte, Wolfensberger & Tirri, 2014), this does not guarantee that they would become equally virtuous leaders, especially not in groups of about 150 individuals or more. Power sadly corrupts, and great power corrupts greatly! This has been known for centuries by observation, but with modern research and computer power we now know that aiming for social status and influence in any social context prompts physiological changes impacting personal characteristics. The career-minded leader will invariably be subject to a transformation towards psychopathy and narcissism (see for a literature overview, Persson 2019). It follows that the existence of a gifted politician is unlikely. The prerequisites of political life and success are generally incompatible with gifted characteristics as we know them through research and study. Even if they were to embark on such a trajectory, with the very best of intentions, they would change and never for the better.

It is also important to point out that while expertise scholars have generated much valuable research into the understanding of skill development and the importance of social support particularly, it is far from true to simultaneously argue that such a formula will allow anyone to reach an expert level; or put differently, everyone can become 'gifted' by support, good instruction and a prolonged investment in grid-iron effort. Evolutionary dynamics undermines such an assumption completely. We cannot escape the workings of normal distribution and the genetic blueprint by which evolution functions.

### **Why is the Earth still flat?**

Needless to say, knowledge of evolution is anything but new. It was known and theorised about even before Charles Darwin. With time evidence of it have amassed and our

understanding has increased tremendously with the advent of computer simulations together with real-life studies in anthropology, paleontology, physiology, genetics and the natural sciences as a whole. Certain aspects of it are still up for discussion. We do not fully understand, for example, how Homo Sapiens became a social species (cf., Bowles & Gintis, 2011). But, importantly, there is consensus on the existence of phylogenetic evolution following identifiable recurring patterns. Why then, have the social sciences almost completely ignored such a mass of evidence, which clearly has a considerable impact on how to understand society and human behaviour in it? The short and simple answer is ideology generating group identity, social cohesion and wishful thinking to sustain a positive outlook on life beneficial to everyday life but not for scholarship.

We may certainly be unaware of certain knowledge because it was not required as a study during university training. Unless oriented towards biology a student teacher is not very likely to learn about the impact of evolution on their professional role. So, *isolationism* is an issue. Many practitioners and scholars alike have never acquainted themselves with other disciplines and their relevance to their own field.

Dogmatism also has a role to play. Having established status and identity on the basis of certain research and knowledge, many are reluctant to accept the threat that new knowledge might represent. A contrary theory or well-substantiated knowledge from an unexpected field is better argued against, or ignored completely, not because of its potential veracity, but because social status and influence are more important. Paradoxically, this behaviour is also evolutionary! Social status usually takes precedence over facts when they potentially could undermine social status.

Another dynamic handed to us by evolution is group identity and the dynamics of socio-cultural bias. Without much consideration our default position is that the group to

which we belong is always viewed in best possible way, whereas other groups might have certain merits at best, but we would usually think that it would be so much better if they adopted our perspective; our tradition or, indeed, our understanding. Scholars of cultural patterns know the phenomenon as *ethnocentrism*. It applies to any group and also factions within the academic world. Academic debates are rarely, if ever, a frank discussion of different perspectives. They are more likely to be duels of sought dominance.

Then there is behaviour as social function. Our choices, and perhaps our career choices in particular, reflect *ambition* towards power and influence. We are generally unaware of this hardwired motive. Some are more driven than others, but we all have these evolutionary and inherited algorithms to some degree. In our pursuit of status, we risk forfeiting neutral fact in favour of *strategic* fact (or opportune illusion) just to further our own position.

In a manner of speaking, it is not strange at all that to many social scientists 'the world is still flat' despite countless evidence that our planet is a sphere in mid-space. The search for success, however defined, results in physiological changes making an individual more risk-taking, geared towards conquering something and much less interested in facts and social graces. Importantly, the Earth will *remain* flat for as long as this offers a strategic social advantage. This too is prompted by evolutionary algorithms. Neutral knowledge has very little leverage in any social context unless it offers individual or group advantages towards a dominant position. Politically correct knowledge, on the other hand, will offer endless opportunities and probably a glorious career no matter how wrong its scholarly foundations are in terms of neutral accuracy (e.g., Bauer, 2012; Carlton, 2012; Resnick, 2007).

### How will gifted education change with a different basis?

Incorporating human evolution as a basis for the study and education of human abilities and characteristics as adaptive behaviour, with an evolutionary function, will impact the study and practice of gifted education. It will doubtlessly place boundaries on envisioned developments and objectives. As phrased by German human ethologist Irenaeus Eibl-Eibesfeldt (1989, p. 3):

We are [now] aware of the more primitive action and reaction patterns that determine our behaviour, and [we cannot] pretend as if they did not exist. It is especially in the area of social behaviour that we are less free to act than we generally assume (p. 3).

Inherited genetic algorithms provide both possibilities and limitations. Thus far, however, scholarship in almost every social science discipline has, for increasingly ideological reasons, been preoccupied with studying only potential. But by ignoring apparent limitations they unwittingly have also undermined the validity of their claims of what is actually possible.

Being oblivious to human behaviour as functional and adaptive is not to say that all research done to date is necessarily invalid. But, the following statement would invariably be true, and all scholarship *must* be considered in the light of it:

The greater the ideological bias in pursued research and education, the greater also the error in assumptions made and research results arrived at. In consequence, the more impossible the targets and methods in education relying on such biased assumptions.

With a basis in human universal behaviour recognising and relating to human nature there would be no room for wishful thinking and political correctness when the latter is contrary to neutral fact. I would imagine that quite a few grand schemes, recognised and supported by both governments and markets, would fall flat if we were to discount political

opportunism. Consider for example this vision for the future as based on gifted and talented education (Sever, 2011; p. 454):

[The talented would] ... guarantee a constant reservoir of individuals who will later lead both ... research and development, and education, thus continuing to propel recruitment of the community, the State, and humanity at large toward a knowledge-based economy.

The operative word in his visionary statement is *guarantee*. The enthusiastic scholar, carried by the opportune wings of illusion, gives a promise that no-one can deliver. Hard work, support and good instruction stand quite helpless in the face of evolutionary dynamics, survival algorithms, adaptive behaviour and the power of chance.

Our genetic blueprint has prompted a number of behavioural universals, which all have in common that they manifest themselves unaware, in one way or another, in all cultures irrespective of historical area. This suggests that studying individuals rather than groups is far from as suitable as, above all, American psychologists have so far argued for almost a century. French psychologists, however, have been much more inclined to focus on groups and populations in close co-operation with sociologists. The French have been correct all along! Evolution deals with populations, and heritability is indeed defined as probabilistic propensities of inherited human characteristics in a population. It describes what is rather than what could be (Plomin, 1994). The poor predictability of many a psychometric instrument, especially those measuring personality characteristics, is feasible evidence of humans being adaptive rather than stable over long periods of time. Hence, to describe who the gifted and talented are is, in fact, even more difficult than we have hitherto imagined. They do not constitute a large group and their diversity is considerable.

A blow to any enthusiastic teacher or education scholar wishing the gifted and talented to have a successful career in contemporary society is, somewhat contrary to

popular belief, that average is more valuable than uniqueness. In the world of Homo Sapiens individuals *never* rule and set the standards for others to follow. Change is always random, and change proving to provide group advantage will eventually spread to everyone. Hence, anything individually unique will, if advantageous, turn into average over time and become a characteristic of every member of the species. Evolution is only oriented to generate a normally distributed average and uniqueness by whatever description is a random occurrence which may or may not be an advantage.

For much the same reason, the gifted can, as a rule, never be thought of as the 'leaders of tomorrow'. They most certainly have formidable skills, and some are no doubt more suited than others to lead and do so very well. However, if this is the case the only setting in which they can pursue leadership with skills and characteristics relatively intact is in a local setting with a relatively small group with no more than about 150 members (Dunbar, 1992). The larger the group, and presumably the higher the status of leading it, the greater the risk of changing towards psychopathic and narcissistic behaviours from which no-one is immune (for an overview, see Persson, 2019).

It is also not uncommon in education, and particularly in Gifted Education in North America, Russia and Continental Europe to view competitions (or 'Olympiads') as a means to both develop pupils and to identify talent (e.g., Bingwanger, 2010; Tallent-Runnels & Candler-Lotven, 2008; Wagner & Weber, 2007). This, too, is doubtful practice in view of evolutionary dynamics. The potentially detrimental aspects of competition are well known already, also by some educators and psychologists, but competition is the engine of the world economy and the negative effects of competition are therefore often overlooked (cf. Duina, 2011). While group-to-group contests are less of a problem person-to-person battle is usually a problem; especially so if intellectual abilities are the focus of the contest. In such a

context there are physiological changes which prompt increased risk-taking and lessened intellectual acuity. Winning, quite in line with ancient survival algorithms, are triggered and motivates the competitor to win at almost any cost. This affects some more than others, but no-one is immune to these physiological changes. There is also no difference between men and women. The consequence for using contests as means for talent identification is that that which is identified is more likely to be the degree of survival instinct rather than a certain proclivity for an academic subject (Persson, in preparation).

In conclusion, in my view, the credibility of behavioural research, and the study and practice of giftedness and talent education, stands or falls with its acceptance of relating both research and practice to the natural sciences. While physics, mathematics, biology, anthropology, genetic, chemistry and so on have increasingly approached an understanding of the human social world, paradoxically, psychology, education, political science, sociology, gender studies and management, with a few notable exceptions, have not approached the knowledge base of the natural sciences. No natural scientist denounces human evolution, but they all relate to it differently. Their findings are increasingly creating a common understanding of the larger and complex patterns of human species everyday life. With the arrival of Big Data mathematicians have often become the new behavioural scientists (cf. O'Neil, 2017; West, 2018). On the other hand, denouncing the biological impact on human behaviour and our daily life is frequently denied, or even completely ignored, in the social sciences. The fields of scholarship most prone to such detrimental bias and ignorance are likely to be gender studies, education as well as talent and giftedness scholarship.

*Consilience* is the only way forward to regain credibility and validity in modern research of the extraordinary children and adults in our midst. That is, we cannot continue to be scholars and educators in splendid disciplinary isolation. We must find out, and take



seriously, what researchers in other disciplines have to say about our knowledge base (cf. Ambrose & Sternberg, 2016; Wilson, 1998). As I have demonstrated above, they have a lot to say and we had better listen!

## References

- Ambrose, D., & Sternberg, R. J. (Eds.). (2016). *Giftedness and talent in the 21<sup>st</sup> century: Adapting to the turbulence of globalization*. Rotterdam, NL: Sense Publishers.
- Andrews, P. W., & Andersen-Thomsen, J., Jr. (2009). The bright side of being blue: depression as an adaptation for analyzing complex problems. *Psychological Review*, 116(3), 620-654.
- Bauer, H. H. (2012). *Dogmatism in science and medicine. How dominant theories monopolize research and stifle the search for truth*. Jefferson, NC: McFarland & Company, Inc.
- Baylis, F., & Scott Robert, J. (2004). The inevitability of genetic enhancement technologies. *Bioethics*, 18(1), 1-25.
- Binwanger, A. (2010). Sinnlose Wettbewerbe. Warum wir immer mehr Unsinn produzieren [Senseless competition: Why we keep on producing nonsense]. Freiburg, DE: Derder Verlag.
- Bowles, S. & Gintis, H. (2011). *A cooperative species: human reciprocity and its evolution*. Princeton, NJ: Princeton University Press.
- Brown, D. E. (1990). *Human universals*. New York: McGraw-Hill.
- Brown, P., & Hesketh, A. (2004). *The mismanagement of talent. Employability and jobs in the knowledge economy*. Oxford, UK: Oxford University Press.
- Buss, D. M. (2016). Introduction. In D. M. Buss (Ed.), *The handbook of evolutionary psychology: volume one* (2<sup>nd</sup> ed., pp. xxiii-xxvi). Hoboken, NJ: John Wiley & Sons.
- Charlton, B. G. (2012). *Not even trying ... The corruption of real science*. Buckingham, UK: University of Buckingham Press.
- Clinkenbeard, P. R. (2007). Economic arguments for gifted education. *Gifted Children*, 2(1), 5-9.
- Duina, F. (2011). *Winning: reflections on an American obsession*. Princeton, NJ: Princeton University Press.

Dunbar, R. I. M. (1992). Neocortex size as a constraint on group size in primates. *Journal of Human Evolution*, 22(6), 469–493.

Eibl-Eibesfeldt, I. (1989). *Human ethology*. New York: Aldine de Gruyter.

Ericsson, K. A., Krampe, R. T., & Heizmann, S. (1993). Can we create gifted people. In *The origins and development of high ability* (Proceedings Ciba Foundations Symposium 178; pp. 222-249), Chichester, UK: Wiley.

Gagné, F. (2005). From gifts to talents: the DMGT as a developmental model. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2<sup>nd</sup> ed., 98-119). New York: Cambridge University Press.

Griffiths, A. J. F., Wessler, S. R., Carroll, S. B., & Doebly, J. (2012). *Introduction to genetic analysis* (International edition). New York: W. H. Freeman and Company.

Grinder, R. E. (1985). The gifted in our midst: by their divine deeds, neuroses and mental test scores we have known them. In F. Degen-Horowitz & M. O'Brien (Eds.), *The gifted and talented: developmental perspectives* (pp. 5-36). Washington, D. C.: American Psychological Association.

Hsu, S. (2014, 16 October). Super-intelligent humans are coming. Genetic engineering will one day create the smartest humans who have ever lived. *Nautilus*, 18, <https://nautil.us/> (Accessed 12 April 2018).

Humphrey, N. (2011). *Soul dust. The magic of consciousness*. Princeton, NJ: Princeton University Press.

Irwin, M. R., & Miller, A. H. (2007). Depressive disorders and immunity: 20 years of progress and discovery, *Brain, Behavior, and Immunity*, 21, 374-383.

Ivancevich, J. M., & Duening, T. N. (2001). *Managing Einsteins: leading high-tech workers in the digital age*. New York: McGraw-Hill.

Kappeler, P. M., & Silk, J. B. (Eds.). (2010). *Mind the gap: tracing the origins of universals*. Dordrecht, NL: Springer-

Lovecky, D. V. (1997). Identity development in gifted children: moral sensitivity, *Roeper Review*, 20(2), 90-94.

Meissner, T. (1991). *Wunderkinder: Schicksal und Chance Hochbegabter* [Child prodigies: the fate and chance of the gifted]. Berlin: Ullstein.

Mosing, M. A., Madison, G., Pedersen, N. L., Kuja-Halkola, & Ullén, F. (2014). Practice does not make perfect: no causal effect of music practice on music ability. *Psychological Science*, 25(9), 1795-1803.

O'Boyle, E., & Aguinis, H. (2012). The best and the rest: Revisiting the norm of normality of individual performance. *Personnel Psychology*, 65(1), 79—119.

- O'Neil, C. (2016). *Weapons of math destruction: how big data increases inequality and threatens democracy*. London: Allen Lane.
- Persson, R. S. (in preparation). *Human ambition: the uses and abuses of competition*. Ulm, DE: ICIE.
- Persson, R. S. (2009). The unwanted gifted and talented: a sociobiological perspective of the societal functions of giftedness. In L. V. Shavinina (Ed.), *International handbook of giftedness. Part One* (pp. 913-924). Dordrecht, NL: Springer Science.
- Persson, R. S. (2014). The needs of the highly able and the needs of society: a multidisciplinary analysis of talent differentiation and its significance to gifted education and issues of societal inequality. *Roeper Review*, 36, 1-17.
- Persson, R. S. (2015a). High ability and dreams of innovation and prosperity in the emerging global knowledge economy: A critical analysis of changing orientations in research and *International Journal for Talent Development and Creativity*, 2(2), 15-34.
- Persson, R. S. (2015b). Through the looking-glass: understanding the social dynamics of human nature and gifted identity. In R. Klingner (Ed), *Make them shine. Identification and understanding of gifted children and consideration of their social and emotional needs* (pp. 37-76). Zürich, CH: LIT Verlag.
- Persson, R. S. (2016). Human Nature: The unpredictable variable in engineering the future. In D. Ambrose & R. J. Sternberg (Eds.), *Creative intelligence in the 21<sup>st</sup> Century. Grappling with enormous problems and huge opportunities*. Rotterdam, NL: Sense Publishers.
- Persson, R. S. (2018). *Evolved human giftedness: reclaiming science from ideology, dogmatism, and self-serving bias*. Ulm, DE: ICIE.
- Persson, R. S. (2019). Destined to lead the World? On great leaders, fashionable nonsense, and the origins and possible future of leadership. In R. Klingner (Ed.), *Leadership in gifted education* (pp.1-48). New York: NOVA Science Publishers.
- Persson, I., & Savulescu, J. (2012). *Unfit for the future: the need for moral enhancement*. Oxford, UK: Oxford University Press.
- Pinker, S. (2002). *The blank slate: The modern denial of human nature*. New York: Penguin.
- Plomin, R. (1994). *Genetics and experience: the interplay between nature and nurture*. London: Sage Publications.
- Plomin, R. (2018). *Blueprint: how DNA makes who we are*. London: Allen Lane
- Plomin, R., Defries, J. D., Craig, I. W., & McGuffin, P. (Eds.). (2003). *Behavioral genetics in the postgenomic era*. Washington, D. C.: American Psychological Association.

Resnick, D. B. (2007). *The price of truth: how money affects the norms of science*. New York: Oxford University Press.

Robinson, N. M. (2005). In defense of a psychometric approach to the definition of academic giftedness: a conservative view from a die-hard liberal. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2<sup>nd</sup> ed., 280-294). New York: Cambridge University Press.

Schutte, I., Wolfensberger, M., & Tirri, K. (2014). The relationship between ethical sensitivity, high ability and gender in higher education students. *Gifted and Talented International*, 29(1/2), 39-48.

Segerstråle, U. (2000). *Defenders of the truth. The battle for science in the sociobiology debate and beyond*. New York: Oxford University Press.

Sever, Z. (2011). Nurturing gifted and talented pupils as leverage towards a knowledge-based economy. In Q. Zhou (Ed.), *Applied Social Science—ICASS 2011. Volume One* (pp. 454-458). Newark, DE: IERI Press.

Shakeshaft NG, Trzaskowski M, McMillan A, Rimfeld K, Krapohl E, et al. (2013) Strong Genetic Influence on a UK Nationwide Test of Educational Achievement at the End of Compulsory Education at Age 16. *PLoS ONE* 8(12): e80341. doi:10.1371/journal.pone.0080341

Székely, T., Moore, A. J. & Komdeur, J. (2010). *Social behaviour: genes, ecology and evolution*. Cambridge, UK: Cambridge University Press.

Sapolsky, R. (2017). *Behave: The biology of humans at our best and worst*. London: Bodley Head.

Sternberg, R. J. (1996). Costs of expertise. In K. Anders Ericsson (Ed.). *The road to excellence. The acquisition of expert performance in the arts and sciences, sports and games* (pp. 347-348). Mahwah, NJ: Lawrence Erlbaum.

Sternberg, R. J. (1998). Abilities are forms of developing expertise. *Educational Researcher*, 27, 11-20.

Sternberg, R. J. (2017). ACCEL—a new model for identifying the gifted. *Roeper Review*, 39(3), 152-169.

Stewart, E. C., & Bennet, M. J. (1991). *American cultural patterns. A cross-cultural perspective*. Boston, MA: Intercultural Press.

Subotnik, R. F., & Jarvin, L. (2005). Conceptions of giftedness as great performance. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2<sup>nd</sup> ed., 343-357). New York: Cambridge University Press.

- Subotnik, R. F., Olszewski-Kubilius, P., & Worrell, F. C. (2011). Rethinking giftedness and gifted education: a proposed direction forward based on psychological science. *Psychological Science in the Public Interest*, 12(1), 3-54.
- Sumpter, D. J. T. (2010). *Collective animal behaviour*. Princeton, NJ: Princeton University Press.
- Tallent-Runnels, M. K., & Candler-Lotven, A. C. (2008). *Academic competitions for gifted students* (2<sup>nd</sup> Ed.). Thousand Oaks, CA: Corwin Press.
- The Independent (2010, 30 November). Inconvenient truths about our evolution? *The Independent Online*, [www.independent.co.uk](http://www.independent.co.uk) (Accessed 3 April 2018).
- Tooby, J., & Cosmides, L. (1989). Adaption versus phylogeny: the role of animal psychology in the study of human behaviour. *International Journal of Comparative Psychology*, 2(3), 175-188.
- Tooby, J., & Cosmides, L. (1990). On the universality of human nature and the uniqueness of the individual: the role of genetics and adaptation. *Journal of Personality*, 58(1), 17-67.
- Voland, E. (2007). *Die Natur des Menschen. Grundkurs Soziobiologie* [Human nature. An introductory course in sociobiology]. Munich, Germany: Verlag C. H. Beck.
- Wagner, H., & Neber, H. (2007). Nationale und international Leistungswettbewerbe im Kontext [National and international achievement contests in context]. In K. A. Heller & A. Ziegler (Eds.), *Begabt sein in Deutschland* (pp. 209-232). Berlin, DE: LIT Verlag.
- West, G. (2018). *Scale: the universal laws of growth, innovation, sustainability, and the pace of life in organisms, cities, economies, and companies*. New York: Penguin Press.
- Wilson, E. O. (1998). *Consilience. The unity of knowledge*. London: Abacus.
- Wuketits, F. M. (2008). *Der freie Wille. Die Evolution einer Illusion* [The free will. The evolution of an illusion]. Stuttgart, DE: S. Hirzel Verlag
- Ziegler, A., & Raul, T. (2000). Myth and reality: a review of empirical studies on giftedness. *High Ability Studies*, 11(2), 113-136.
- Ziegler, A. (2005). The actiotope model of giftedness. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2<sup>nd</sup> ed., 411-436). New York: Cambridge University Press.