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**A GEOGRAPHICAL THEORY OF EXCEPTIONAL HUMAN
PERFORMANCE: ECONOMIC AND POLICY IMPLICATIONS
FROM THE STANDPOINT OF CONSEQUENTIALIST ETHICS**

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Abstract: *This paper introduces a four-step model for understanding exceptional human accomplishment, with each step occasioned by one of the paradigmatic geographical categories of distance, place, environment, and territory. The first step provides scientific evidence that winning distance from the pack at life's unfair genetic lottery means much more than simply having been blessed with a high IQ. The second step elaborates the argument that remarkable achievement emerges as one finds one's place in the world through meaning-making. The third step deduces that self-actualisation and consistently excellent performance in one's craft derive from the evolutionary adaptive and genetically-wired joy of mastering one's environment. The fourth step adopts the standpoint of consequentialist ethics and combines eye-opening quotes with very recent empirical evidence, to reason that the metaphor of cognitive territory is an epistemic gem for both understanding and stimulating the production of human capital and truly innovative contributions. The conclusion proposes that this four-step geographical theory might become a fertiliser of the non-geographical literature on excellence, to the extent that it yields a style of thinking that puts the flesh of deeper phenomenological understanding on the psychometric skeleton of conventional quantitative analyses.*

Keywords: human capital, consequentialism, genetics, distance, place, cognitive territory, environmental mastery.

1. Introduction

The academic year 2002-2003 was rather painful for me, as I had to read the rejection letters sent by some of the departments to which I had applied for an academic job. Ironically, that very year the journal *Area* published my paper 'On what it takes to be a good geographer'. The long string of rejections made it clear that I wasn't good enough and didn't really know what it takes to be a good geographer. So, with curiosity, desperation, and envy (Simandan, 2007), I began to pay more attention to the world-class geographers from my graduate school, trying to uncover the secrets of their success. Eventually, one department did hire me, but the interest in the secrets of extraordinary achievement has persisted beyond the specific instrumental motivation that originated it. Since 2003, I have spent most of my time reading the new kinds of knowledge coming from neuroscience, evolutionary theory, behavioral genetics, *g* theory, and neuropsychanalysis, partly because of some *ennui* with the geographical literature, partly because of my older passion for foresight, and partly because of an intense craving to understand the nature of human nature. This literature¹ demolished my older Marxist conviction that all people are in a fundamental sense biologically equal, and made me go beyond earlier social constructionist indoctrination, to try to pull out the implications of the massive biological differences among humans (see Hawks et al, 2008). This inferential exercise is at the root of the present paper, as it occasioned the deepening and refining of the initial insights about extraordinary achievement I had gained through participant observation in the geography department at Bristol.

My reading of the literature on extraordinary achievement has been shaped by two factors. One of them was the war among the contradictory positions taken by various schools of thought on the question of the genetic components of human extraordinariness. The second was my concern with detecting a geographical order of things within a literature that pays only inadvertent attention to geographical matters. I have played around with the pieces of the puzzle, until, eventually, a sense of geography emerged. The key strategy has been to read these non-geographical literatures with geographical glasses, i.e. with sensitivity to the implicit or explicit use of geographical metaphors in the explanation of peak achievement.

¹ For the readers who are not up-to-date with the massive progress in intelligence research since the earlier misguided critiques of Stephen Jay Gould and Richard Lewontin, there are two rigorous summaries that I highly recommend: the first is written by sociologist Linda Gottfredson (Gottfredson, 1997a) and is signed by 52 experts in intelligence; the second is written by neuroscientist Christopher Chabris (Chabris, 2007). Both can be downloaded for free (see web links given under references). In addition to these two summaries, see also Jung & Haier, 2007.

And so, this paper is in four parts, each centered on a paradigmatic geographical category. At the onset, I explain why winning unfair *distance* from the pack at the genetic lottery means much more than simply having been blessed with a high IQ. In the next section, I extend my geographical intervention by making the case that remarkable achievement emerges as one finds one's *place* in the world through meaning-making. Building on this observation, I then show how the genetically-wired joy of mastering one's *environment* can be cultivated to lead to consistently excellent performance in one's craft. I end up my geographical account of extraordinariness, by exploring the promise of the metaphor of cognitive *territory* for both understanding and stimulating the production of truly meaningful contributions. In the conclusion, the four foci on distance, place, environment, and territory will be brought together to propose that a geographical model of excellence might enrich the non-geographical literature on this topic with a style of thinking with powerful face validity.

2. Winning distance from the pack

“Unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath” Matthew 25:29

Intelligence has a normal distribution in the human population, with most people in the middle (50% of Caucasians have IQs between 90 and 110, and 90% between 75 and 125), and fewer people at the two tails of the bell curve (5% below IQ 75 and 5% above IQ 125). As I discussed the general significance of the geography of human intelligence elsewhere (Simandan, submitted), this paper is strictly concerned with zooming in at the far right end of the bell curve. This “far right end” includes only those approximately 2% individuals with two or more standard deviations above average intelligence (i.e. IQ above 130). This cut-off point is not arbitrary, but emerged from recent research (Simonton, 2003, 2005, 2007) that makes it clear that very high intelligence is a *necessary but not sufficient* condition for extraordinary human accomplishment, at least as far as the sciences are concerned.

Simonton (2005) introduced a sophisticated mathematical model to explain why intelligence is necessary but not sufficient for extreme achievement. His emergenic-epigenetic model divides human gifts such as creativity, leadership, genius, and intelligence, into four categories premised on two major distinctions. The first separates simple gifts (which result from possessing one or few particular genes) from complex gifts (which depend on having won at the genetic lottery *a large number* of needed genes). The second discriminates between additive gifts (if a gift is expressed through

several genes, the gift starts to kick in as soon as at least one of these genes expresses itself; with time, as new genes start expressing themselves, the amount of that gift increases in an additive manner) and multiplicative gifts (if a gift depends on a number of genes operating in concert, the gift will become apparent only after all these genes have started to express themselves; each gene has a veto power on the expression of the gift). The combination of the two criteria produces four types of gifts: simple additive (e.g. visual acuity or height), additive complex (e.g. intelligence), multiplicative simple (e.g. political acumen), and multiplicative complex (e.g. genius, extreme creativity and leadership). If additive gifts have a normal distribution and multiplicative simple gifts have a skewed distribution, multiplicative complex gifts have a loglinear (i.e. extremely skewed) distribution. In other words, of those 2% individuals with IQ above 130, very few would have inherited the exact constellation of genes that allows genius to emerge. Simonton calls his model emergenic-epigenetic to alert us to: (a) the fact that some of the most cherished gifts are emergenic (i.e. multiplicative; all component genes of a gift need to be present for the gift to emerge); (b) the fact that very complex types of gifts are likely to become manifest only in late adolescence and early adulthood (epigenesis; unfolding in time), which sets limits to the mythology of genius as prodigy; (c) the counter-intuitive fact that the older we grow the closer we get to fully express our genetic package (for example, the heritability of both intelligence and personality factors increases from about 20-40% in childhood, to 40-60% in early adulthood, and to 60-85% in late adulthood; Petrill, 2005, Deary et al, 2006), and (d) the anxiety-inducing fact that as we grow older we might actually lose some of our gifts, because of naughty genes with later-in-life expression, who undermine the initial gifts (e.g. early-onset Alzheimer, or the onset of schizophrenia in one's 30ies).

Be that as it may, but the assessment of the validity of Simonton's mathematical model needs to be weighted against the work of those researchers who study profoundly gifted children². Let me pause to summarise two more recent samples of such work. The first of these is Rogers (1995), who analyzed 241 children with IQs ranging from 160 to 237 on the Stanford-Binet Intelligence Scale. She calculated that 99.4% learn rapidly, 99.4% have extensive vocabulary, 99.3% have excellent memory, 99.3% reason well, 97.9% are curious, 96.1% are mature for their age, 95.9% have an excellent sense of humor, 93.8% possess a keen sense of observation, 93.5% show compassion for others, 93.4% demonstrate a vivid imagination, 93.4% have a long attention span, 92.9% show facility with

² The development of intelligence from infancy to adult age has also been modelled mathematically by Van der Maas, 2006, and Demetriou et al, (in press).

numbers, 90.3% are concerned with justice and fairness, 90% were described by their parents as 'sensitive', 89.4% have facility with puzzles and legos, 88.4% demonstrate a high energy level, 88.3% are perfectionistic, 85.9% are perseverant in their areas of interest, 84.1% question authority, 83% like to concentrate on one activity at a time, and 80.3% are avid readers. In addition, 44% are sensitive to clothing tags and other tactile sensations, a percentage that gives some vindication to Galton's (1869) pioneering definition of intelligence as the product of mental energy and general sensitivity.

The second sample of work on extremely gifted children is Clark (1997), who synthesised a set of qualitative observations that converge with Rogers' aforementioned figures. According to her, the profoundly gifted have an extraordinarily high energy level, a long concentration span, and an amazing degree of intellectual curiosity, which expresses itself as a fascination with ideas and words. Their unusual degree of ability to think abstractly develops early and is expressed by a preference to think in metaphors and symbols, as well as by their extensive vocabulary. Benefiting from an extraordinary speed in processing information (for a genetic explanation see Manning, 2007), from a quick and thorough comprehension of whole ideas or concepts, and from the ability to learn in an integrative, nonlinear manner, the profoundly gifted learn in great intuitive leaps. Whilst acutely attentive to details and cherishing precision in thinking and expression, they also have the unusual ability to grasp essential elements and underlying patterns in relationships and ideas. Their ability to relate to a broad range of ideas and synthesize commonalities among them, together with the ability to perceive many sides of an issue, makes them appreciative of complexity and affords them the ease with which they find myriad alternative meanings in even the most simple matters. They have an enhanced ability to visualize models and systems, advanced motor skills, extraordinary memory, as well as an idiosyncratic interpretations of events, matched by their conviction of the correctness of those interpretations. Although usually argumentative, they actually demonstrate a high degree of emotional sensitivity and a startling intensity and depth of feeling, which allows them to empathetically understand other people and their thoughts. Their need for the world to be fair and the early concern for moral and existential issues take the expression of highly developed morality.

What is striking in the empirical data of both Rogers (1995) and Clark (1997) is that the genetic lottery seems to operate under a 'feast or famine' rule. The *distance* these profoundly gifted children have from their peers is not only in terms of exceptional IQ, but also in terms of motivation and drive for intellectual endeavours (and see Karolyi & Winner, 2005). Four observations about these latter concepts are in order. The first of them

is that we do know now that personality factors such as conscientiousness, drive, motivation, ambition, perfectionism, and zest are at up to 50% under genetic control (Luciano et al, 2006, Harris, 2006, Penke et al, 2007). The second, Freudian-style observation, is that, probably because of the recalcitrant illusion of free will (Blackmore, 2006), even academics and experts have a difficult time to let the reality of the partial genetic determination of the propensity for hard work sink into their worldviews. Renown neurologist Elkhonon Goldberg recounts this same shivering insight in the wake of his participation in an international symposium on the secrets of human accomplishment (Goldberg, 2005: 16-17; emphasis in original):

The symposium participants agreed that without a special talent there can be no significant achievement and that the special talent is something one is born with, the biological destiny of the few...But the other ingredients of extraordinary success, drive and ambition, were “up to the individual” the speakers maintained one after another, as if the person in question was a Platonic, extracorporeal entity. When it was my turn to speak, I tried to convey the idea that “drive” and “the ability to focus on a lofty goal” are also biologically-based attributes, at least in part, and that one of the reasons people vary in these attributes is because their *brains* are different. Personality, I maintained, as I had done in front of various audiences before, is not an extracranial attribute. It is a product of your brain. My admonition was met with a stone wall of silence...

The third observation is that the gifted children analysed by Clark and Rogers possess both very high intelligence and very high drive (e.g. 88.3% are perfectionistic, 85.9% are perseverant in their areas of interest). This fact seems to contradict Simonton’s model, since the vast majority of these very intelligent children (IQ above 160) are noted to be perseverant and perfectionistic as well. If genius is the product of sweat and inspiration, then the data presented would not support Simonton’s claim for a loglinear (extremely skewed) distribution of genius.

But here comes the fourth observation: Simonton’s model might be right, after all, if we remember that (a) he acknowledges the possibility that one’s early gifts can vanish because of the delayed expression of some nasty genes with later onset, and (b) the other half of the determination of drive and hard work is not genetic, but environmental (Harris, 2006).

To sum up, we have a puzzle: on one hand, profoundly gifted children seem to be both very intelligent and very motivated; on the other hand, most children who scored extremely high on IQ tests do not produce any work of genius in their life, limiting their ambition to the achievement of garden-variety success (i.e. a hefty income and a high status job). The puzzle might be explained genetically, by invoking the epigenesis of gene expression across the life span, but it might as well be explained by studying

the kinds of worlds in which these children grow up. It is this second route that appeals to my geographical instincts.

3. Finding one's place in the universe

Since man (sic) is directed by divine providence to a higher good than human frailty can attain in the present life...it was necessary for his mind to be bidden to something higher than those things to which our reason can reach in the present life, so that he might learn to aspire, and by his endeavours to tend to something surpassing the whole state of the present life...St. Thomas Aquinas, *Summa contra Gentiles* (vol. 1)

Murray's (2003) wide-ranging quantitative analysis of human accomplishment leads to four insights about the kinds of cultural geographies that foster excellence (cf. Hudson, 1999, Florida, 2002, Barnes, 2004). The first of them requires the presence of 'organising structures', and refers to the intuitive idea that growing up in a place rich in works of genius enhances the probability that one will, at her turn, create works of genius. Time-spaces like Freud's Vienna or Hemingway's Paris spring to mind. It becomes apparent to me that the neurological explanation of this phenomenon can be grasped by turning upside down the GIGO acronym ("Garbage in, garbage out") known to both computer scientists and to authors of meta-analyses. In the wake of this dislocation, GIGO becomes gIgO ("gems in, gems out"). Creativity is achieved by more or less random permutations of pre-existing ideas (Simonton, 2003, 2007). If the permutations are done with pre-existing gems, the ensuing results might have a better chance to be gems themselves. Excellence breeds excellence, mediocrity breeds mediocrity. And both types of breeding happen in *place*.

The second insight focuses on the link between creativity and individualism. Those cultures that are so collectivistic, that the individual is seen as merely a dutiful member of a family or clan encourage conformity, consensus, respect for authority, and self-effacement. We have to pause here and remember that we live in times when cultural relativism reigns. Labeling these behaviors as inferior to the Western value of individualism is unacceptable and may be plain wrong. But it must be said that research on the types of attitudes and behaviors that lead to creativity is unequivocal (Gardner, 1993, Simonton, 2003, 2007) in underlying the fact that dispositions such as rebelliousness, ambition, and self-confidence constitute necessary ingredients to all creative endeavours. To give just one such piece of scientific evidence, consider Gough (1960), who pioneered the method of the adjective check list in the study of exceptional talent. By giving to a

large sample a list of 300 descriptor words and asking each individual to check those words that are self-descriptive, he extracted a constellation of eighteen words that are typical of very creative individuals. These, are, in alphabetical order: capable, clever, confident, *egotistical*, humorous, *individualistic*, *informal*, insightful, intelligent, interests wide, inventive, *original*, reflective, resourceful, self-confident, sexy, snobbish, and *unconventional*.

The third insight is about the three transcendental goods of ‘truth’, ‘beauty’, and ‘the good’. What great creators have in common is a visceral belief in their objective reality and a reverent commitment to working towards achieving them. This insight, one cannot not see, has a naughty corollary: he who takes the poststructuralist worldview too seriously is doomed.

Finally, exceptional human accomplishment occurs especially among those individuals who have found their *place* in the universe. If one believes that life has no meaning and purpose, and one reads enough astrophysics to know that everything will eventually turn into dust, one will not bother to strive for excellence and lasting contributions. Meaninglessness and futility dis-*place*. Meaning and purpose make *place* (Tuan, 2004, Sack, 2004). One’s work grows from one’s *place* (see also Norcliffe, 2005 and Livingstone, 2005, 2006).

Murray’s work is congruent with Howard Gardner’s studies of extraordinariness among humans (Gardner, 1993, 1994, 1997). The latter author shows the same concern with how one’s work grows from one’s place, but instead of taking an eye-bird view of the cultural landscape, he proceeds to paint the rich canvass of how particular lives unfold unto particular places. This geographical phenomenology of human excellence pulls us into the magic of those places that yielded a Mozart, a Freud, a Gandhi, or a Virginia Wolf. In his most recent work on the subject, Gardner (1997) reached the conclusion that there are three practices of excellence and four types of extraordinariness. The first practice that distinguishes major achievers from lay individuals is the systematic reflection on one’s personal and professional trajectory, with the goal of learning from mistakes. The second practice is framing, and refers to the story one tells oneself about one’s failures: if lay people frequently see failure as fate (bad luck or bad genes), overachievers see failure as feedback, in line with Nietzsche’s dictum ‘What does not kill me, strengthens me’. The third practice is leveraging, i.e. learning through experience what are one’s strengths and one’s weaknesses and arranging one’s goals and activities in such a way so as to maximise the exercise of one’s strengths and to minimise the potential negative impact of one’s weaknesses. In light of Gardner’s theory of multiple intelligences, it is easily observable that all

these three practices require a high level of intrapersonal intelligence, or, in psychoanalytical parlance, a high level of ego strength. Aside from the emphasis on these three distinctive practices of extraordinary individuals, Gardner insists on the usefulness of understanding outstanding individuals as particular combinations of four ideal-types: the master, the inventor, the introspector, and the communicator. The master, exemplified by Mozart, refers to an individual achieving supreme knowledge and skill within an already existing domain of expression (e.g. Mozart created first class pieces of music, but he did not invent new genres of musical expression). What we call an expert in a field would then be somebody closer to a master, than to a novice. However, not all experts are masters in the way Gardner proposes the concept – as a descriptor only for truly outstanding human performance. The second ideal type is the inventor, exemplified by Freud, and includes those great names that have invented from scratch a new field of enquiry or a new means of expression (e.g. there was nothing even remotely close to the psychoanalytical method before Freud's discovery of the interpretation of dreams, of the method of free association, and of the couch). The third type of extraordinariness is the introspector, illustrated by Virginia Wolf, and refers to those writers or scholars who have enhanced our understanding of human nature by having the rare ability, disposition, and willingness to descend in the recesses of their own minds and to struggle to make sense of what it means to be human. Finally, the fourth type is the communicator, exemplified by Mahatma Gandhi. Communicators are those individuals who have made history by exploring their uncanny ability to connect to, and to move the masses. At first it is tempting to equate communicators with leaders, but Gardner cautions that while all communicators are leaders, not all leaders are communicators. Highly creative individuals, for example, provide intellectual leadership even if their people's skills are anything but honed.

As we have seen, Murray's quantitative analysis of human accomplishment led him to infer that one has to find one's place in the world if one is to achieve excellent performance. More specifically, he underlined the importance of transcendence, either in the form of having a religious answer to the question of the purpose of life, or in the form of subscribing to the strive for the objective values of truth, beauty, and the good. Unlike him, Gardner endorsed a much less grandiose understanding of what it means to find one's place. This humble understanding is premised on engaging one's surroundings in a reflective way, by weaving everyday experiences into an ever richer life story, by extracting patterns from that story, and by placing oneself in place in a style that harmonizes one's strengths with the affordances of that particular setting.

And yet, despite the intuitive appeal of Murray's and Gardner's arguments, the case can still be made that even an atheist poststructuralist with no sense of place whatsoever might attain exceptional levels of achievement. And this leads me to take the next step down the page.

4. Mastering environments

There is another aspect that I would add...and that is...taste. Taste in almost the artistic sense. Certain individuals see art in some undefinable way, can put together something which has a certain style, or a certain class to it. A certain rightness to it. Paul Berg, Nobel laureate, quoted in Shavinina, 2004: 249

In 1959, Robert White published 'Motivation reconsidered: the concept of competence', the landmark paper that introduced in the vocabulary of the scientific community the concept of effectance motivation. The concept summarises the fact that all humans take great pleasure when they feel in control of their environment, when they master something and exercise power. This explains the joy of driving a car, the pleasure to rework one's paragraph, the satisfaction to achieve even trivial goals. Sigmund Freud studied the same problem under the heading *anality* (Freud, 1940), and noticed that in the psychodynamic trajectory of the child, the oral stage is followed by the anal stage (2nd and 3rd year of life). In this latter stage, the child discovers the pleasure to control one's bowels and one's jet of urine and, at a higher level, becomes dimly aware of his potential power, and hence, of his potential for independence. More recently, theorists of human evolution (Pinker, 2002; Tooby & Cosmides, 2005; Dunbar & Barrett, 2007) have made a convincing case that the joy we derive from mastering our environment has the same origin as the joy we feel when having sex. The joy that summons us in both situations is the signal with which our genetic code reminds us that these activities are evolutionary adaptive: the more we control our environment, the longer and better we can live and the more offspring we can produce. Self-actualisation and consistently excellent performance in one's craft derive from the evolutionary adaptive and genetically-wired joy of mastering one's *environment*. The connection between everyday effectance motivation and extraordinary accomplishment has not gone unnoticed to the great minds of history. Aristotle's writings on the concept of *eudaimonia* (the good life) immediately spring to mind. Honouring Aristotle's timely account, John Rawls proposed in his *A Theory of Justice* (1973) an Aristotelian principle of human activity that reminds us that (Rawls, cited in Murray, 2003: 385-386):

Other things equal, human beings enjoy the exercise of their realized capacities (their innate or trained abilities), and this enjoyment increases the more the capacity is realized, or the greater its complexity...human beings take more pleasure in doing something as they become more proficient at it, and of two activities they do equally well, they prefer the one calling on a larger repertoire of more intricate and subtle discriminations. For example, chess is more complicated and subtle game than checkers, and algebra is more intricate than elementary arithmetic. Thus the principle says that someone who can do both generally prefers playing chess to playing checkers, and that he would rather study algebra than arithmetic.

We need to pause here for a moment and try to see through the implications. I, for one, see three things. Firstly, this passion and pleasure for attaining ever higher proficiency and for stretching oneself with challenging activities is also one of the ingredients that explain Peter's Principle (Peter & Hull, 1969), which says that people in an organisation tend to rise to their level of incompetence. What might be good for the individual's development might not be quite as good for the quality and quantity of that organisation's output, at least in the short-term. Secondly, if all people had the same level of effectance motivation, then the only two individual factors that would determine the level of one's achievement would be natural talent (e.g. intelligence, voice, athleticism) and amount of experience (all experts are former novices). Thirdly, the psychologists of individual differences have noticed that although humans possess universal attributes (intelligence, capacity for language, musical ability, etc), they vary widely in the amount they possess (Petrill, 2005, Harris, 2006, Park et al, 2007). It therefore appears justified to infer from this general observation that overachievers might have not only higher talents and more experience, but also higher levels of effectance motivation (Nietzsche's will to power). To reduce the noise of these uncertainties, we can remind ourselves that Galton (quoted in Murray, 2003: 93) defined the secret of excellence as 'the concrete triple event, of ability combined with zeal and with capacity for hard labour' and that Lykken (2005: 331) preferred to highlight mental energy and not effectance motivation in his search for the formula of extreme achievement:

Mental energy (e) – the ability to persist for long periods thinking productively about a problem, the ability to focus attention, to shut out distractions, to persist in search of a solution – is perhaps as important as general intelligence (g) in determining both successful performance and constructive achievement and the product of these two variables $g \cdot e$, provides the most valid predictor of success and achievement.

At present, there is a gap in the literature between the concept of mental energy and the concept of effectance motivation. I hypothesise that effectance motivation stands in relation to natural talents in the same way a shoe does with a foot. If the foot is big, the shoe will have to be big. In other

words, a person born with exceptional talent for singing will have a tremendous amount of effectance motivation from singing, but not necessarily from running or thinking. An extremely intelligent individual will derive immense amounts of effectance motivation from thinking things through, but not necessarily from running or singing. If this set of inferences is correct, an individual will be able to foster high levels of mental energy only on those areas of excellence that truly and passionately interest her. The singer will be obsessed with improving the variation of her voice, the extremely intelligent individual will be enraptured by a long and multi-layered set of inferences, and so on and so forth. Achievement, then, is a function of niche. If we take Marie Curie in physics, Maria Callas in opera, and Maria Mutola in the 800 m race, it becomes apparent that none of them would have been able to achieve what the other two had.

But the problem with niches is that they are not ready made. One has to carve one's niche and this takes time. Experts are different from novices in several significant ways (Phillips et al, 2004, Chi, 2006). They have a wide-span expert working memory, which enables quick access to the relevant declarative and procedural knowledge in their field and superior analysis of various problems. Novices, instead, are dependent primarily on their ability to make sense of new situations and to learn from their mistakes. They do not possess, yet, a vast repertoire of patterns of actions and have to grapple with problems through inductive reasoning. Experts 'have seen it all' and rely on the so-called expert deductive reasoning. Apart from wide-span expert working memory and expert deductive reasoning, people with superior mastery of their field stand out in their ability to quickly spot anomalies when inspecting a given professional circumstance. They ask more yielding questions, have a clearer sense of the relevant issues, see to the bottom of things, and know what to overlook in order to pierce at the heart of a problem. Consider the case of legendary scientist Enrico Fermi. Jacob Bronowski (quoted in Strogatz, 2002: 114) portrays him vividly:

He struck me as the cleverest man I had ever set eyes on...he was compact, small, powerful, penetrating, very sporty, and always with the direction in which he was going as clear in his mind as if he could see to the very bottom of things.

Against this backdrop, we can now introduce Wilson's memorable encounter (quoted by Shavinina, 2004: 251) with the *modus operandi* of Fermi's expert deductive reasoning and the lessons he learned from it:

I was present at a three-way argument between Rabi, Szilard, and Fermi. Szilard took a position and mathematically stated it on the blackboard. Rabi disagreed and rearranged the equations to the form he would accept. All the while Fermi was shaking his head. "You're

both wrong”, he said. They demanded proof. Smiling a little he shrugged his shoulders as if proof weren’t needed. “My intuition tells me so”, he said. I had never heard a scientist refer to his intuition, and I expected Rabi and Szilard to laugh. They didn’t. The man of science, I soon found, works with the procedures of logic so much more than anyone else that he, more than anyone else, is aware of logic’s limitations. Beyond logic there is intuition...

As can be learned from this example, when confronted with a problem, experts immediately match what they see with the relevant pattern of similar problems encountered in their years of practice and are able to swiftly offer a solution that is of superior quality. It is worth insisting here on the fact that an expert’s solution is different from a novice’s solution in three essential ways: (a) it is of better quality; (b) it is arrived at much faster; and (c) the process of reaching a solution seems effortless, as if relying on hunches, rather than serious, painstaking thinking. The latter point has been the subject of significant public misunderstanding, as dubious books like Malcolm Gladwell’s “Blink” (2005) have reached best seller status and large media coverage. It is not that raw uneducated intuition is superior to proper, effortful thinking. Quite on the contrary. The quick intuitive system in humans has lately been labeled system 1 or the hot system and researchers such as Tversky, Kahneman, and Gilovitch have corroborated the fact that it produces solutions to problems via a set of heuristics that are very coarse and often lead to nefarious consequences (for an excellent review of dual systems models of thinking, see Evans, 2008). Expert deductive reasoning or expert intuition shares with system 1 its effortless and quick quality of decision-making, but the two processes part company when the quality and adequacy of the solutions proposed starts to be analysed. Expert intuition is better conceived of as condensed analytical thinking, as the fruit of years of solving problems with the help of careful, meticulous reasoning. In other words, human memory conserves not only facts and events, but also traces of previous lines of thought. If, for example, in ten years of practice, an expert has to solve two hundred similar or related problems, the cumulating in memory of the traces of two hundred lines of problem-solving leads to the formation of a pattern of problem-solving for that class of problems. When the problem #201 needs solving, the expert does not reach a solution from scratch, as if she had never seen that type of problem before. Instead, after a quick glance, she recognises that problem as a variant of the other two hundred similar problems she solved before. She sees through the clutter of information those elements that are definitory or essential to that problem, and matches those definitory aspects with the pattern accrued in her brain as she went on to solve her earlier two hundred similar problems. Standard novice cognition is therefore replaced with superior expert re-cognition. The ‘new’ is not novel anymore; the expert feels at home in his field, as she ‘has seen it all before’. Neurologist

Elkhonon Goldberg (Goldberg, 2005: 9) provides the most eloquent description of what it feels like to be an expert that I encountered in the vast literature on extraordinary achievement:

In my early twenties, I took pride (somewhat flippantly) in being able to follow a lecture on an arcane topic in advanced mathematics without taking notes, and to pass a test a few months later. I will not even attempt this feat at my ripe age of fifty-seven. It's simply too hard! But other things have become easier. Something rather intriguing is happening in my mind that did not happen in the past. Frequently, when I am faced with what would appear from the outside to be a challenging problem, the grinding mental computation is somehow circumvented, rendered, as if by magic, unnecessary. The solution comes effortlessly, seamlessly, seemingly by itself. What I have lost with age in my capacity for hard mental work, I seem to have gained in my capacity for instantaneous, almost unfairly easy insight. And another interesting bit of introspection: as I am trying to solve a thorny problem, a seemingly distant association often pops up like a *deus ex machina*, unrelated at first glance but in the end offering a marvelously effective solution to the problem at hand. Things that in the past were separate now reveal their connections. This, too, happens effortlessly, by itself, while I experience myself more as a passive recipient of a mental windfall than as an active, straining agent of my mental life. I have always strived to reach across the boundaries of professional and intellectual domains, but now, as this "pop-up" phenomenon is happening more often, I am finding this "mental magic" productive and incredibly satisfying – like a kid who finds a hidden cookie jar and helps himself with impunity and glee.

I hope that the fellow novices who read this paper will find it worthy to labour towards excellence, but before they start salivating about the cookies in the jar, they would be better off remembering the ten-year rule. Indeed, Ericsson (2006) provided evidence from various fields of human excellence that it takes at least ten years of deliberate practice in order to become expert in a given field. He insists especially on the connotations implied by the term "deliberate". To become an expert, one needs more than merely going through the motions of doing one's job. The essential element that leads to expertise is the deliberate effort to improve one's performance each and every day, by attending to yet more difficult tasks, and by spending considerable time to reflect on one's performance. The latter component (encountered earlier in Gardner's research), leads to the systematic extraction of the relevant lessons afforded by one's experience. Experience unreflected upon is close to useless. It is the willingness and commitment to learn methodically all that can be learned from one's mistakes, errors, or triumphs that pave the way to superior performance.

5. Exploring territories

To some degree his independence of mind probably flows from the sheer power of his intellect. The radius of his sight seems much longer than most of ours, allowing him to scan and integrate far vaster *territories* of evidence. This would allow him to see emerging patterns of evidence sooner and more clearly, and to suggest hypotheses that startled or unsettled the less prepared but that eventually became mainstream. (Linda Gottfredson, 1998: 292-293; *emph. added*)

This final step in my geographical account of exceptional human performance might act as a needed counter-part to the previous step. I mentioned there that the essence of expertise is carving one's niche through deliberate practice. The metaphor of niche, however, has a misleading side to it, because it evokes a mental landscape in which the idea of narrow specialisation appears as the epitome of niche. And this is to a large extent wrong. If we evoke again Howard Gardner's typology of extraordinariness, the individual who carves for herself a narrow specialisation can aspire to become at most a master of that specialisation, but never a true innovator. When we speak of innovation we think about creativity and recent research of the creative process (Simonton, 2003, 2007) found that a prerequisite to creativity is the priming of one's mind with extremely unrelated and diverse facts and ideas. But to prime one's mind in such a way, one needs to have vast cognitive resources. One needs not only to master one's field, but also to have the sheer mental capacity and energy to venture in areas far away from one's specialism, to learn quickly about them, and to be able to use the new information to improve one's way of thinking and one's undertaking of one's niche (see Bunge, 2006, an example of a mind that moves easily from relativistic quantum mechanics to political philosophy; or the edited volume dedicated to Herbert Simon's legacy by Augier and March, 2004).

At the beginning of this section I quoted Linda Gottfredson's account of Arthur Jensen, the foremost expert in the study of human intelligence. But we need not go that far. If we look at the various lists with the most cited geographers in the last decades, and then read their papers, we can easily observe that Gottfredson's quote applies to them as well. They read widely outside geography and, within geography, it becomes cumbersome to try to stick a sub-specialism label to them. It is tempting to give names and go to specifics, but it is probably wiser to do this exercise in the privacy of our offices. The point I am trying to make is that one's level of creativity, as well as the significance of one's work are in direct proportion with the size of one's cognitive territory ('how many areas and how far away can she travel from her niche?'), but the size of one's

cognitive territory is under the tight control of one's IQ. In a recent overview of advances in the study of the g factor, Douglas Detterman emphasised that (Detterman, 2005: 5):

It is...surprising how much a person high in general intelligence knows about even in areas outside those to which they have devoted themselves.

And he went on to quote a passage from Francis Galton's (1869) 'Hereditary Genius' that he takes to be the best description of what intelligence is all about (Galton, quoted in Detterman, 2005: 4-5; note the appalling sexism and elitism of the time):

People lay too much stress on apparent specialties, thinking over rashly that because a man is devoted to some pursuit, he could not possibly have succeeded in anything else...A gifted man is often capricious and fickle before he selects his occupation, but when it has been chosen he devotes himself to it with a truly passionate ardour. After a man of genius has selected his hobby, and so adapted himself to it as to seem unfitted for any other occupation in life and to be possessed of but one special aptitude, I often notice, with admiration, how well he bears himself when circumstances suddenly thrust him into a strange position. He will display an insight into new conditions, and a power of dealing with them, with which even his most intimate friends were unprepared to accredit him. Many a presumptuous fool has mistaken indifference and neglect for incapacity; and in trying to throw a man of genius on ground where he was unprepared for attack, has himself received a most severe and unexpected fall. I am sure that no one who has had the privilege of mixing in the society of the abler men of any great capital...can doubt the existence of grand human animals, of nature's pre-eminently noble, of individuals born to be kings of men.

The quote alerts us to our underestimation of the role of intellect because the smartest persons that we each know seem so embedded in their particular area, that we ascribe their successes to their passion for that area, and not to the general intellect which has afforded them excellence in that area.

I have made the connection between creativity and intellect, by noticing how the impact of the latter on the former is mediated by the size of one's cognitive territory. But the connection can be made in an even more straightforward manner, by simply remembering that creativity is the production of novelty and pure, 'fluid', intelligence is defined as the ability to deal with novelty (Gottfredson, 2007; see also Salthouse et al, in press). I have also made the connection between the size of one's cognitive territory and the likely significance of one's work, and this connection is counter-intuitive. As PhD students, we have all been warned of the danger of spreading ourselves too thin. No one wants to be labeled a dilettante, with shallow and ever-changing research interests. The wise thing to do is to choose one or two areas of focus and to stick to one's turf. This mythology

is built on ignorance about what intelligence can do. To be sure, PhD students are already a highly selected group for IQ (average 125; Gottfredson, 1997b), but within every profession, despite the restriction of range for intelligence, the best individuals are still 3.29 to 10 times more productive and efficient than the mentally slowest individuals. What one learns in one year, another learns in ten years, and this happens within the same job (Schmidt, 2002). This means that the apparent dilettante might know everything that the specialist does and much more.

There are two distinct reasons for the correlation between the size of one's cognitive territory and the likely significance of one's work. The first reason is the enhanced likelihood of creativity: other things being equal, a work that brings something new is more likely to have significance over and above that of a rather redundant contribution. The second reason is the enhanced likelihood of having a correct reading of reality. If Susan is born in Iceland and never leaves the country, and Dorothy is born in Iceland and visits every country in the world, Dorothy's mental map of the world will be much more accurate than Susan's. And the same goes for academic disciplines. Most PhD supervisors and most subdisciplines try, at least unconsciously and indirectly, to indoctrinate their students with the accepted paradigm in that corner of the scientific wood (Simandan, 2005a-b). From within human geography, the debate might be framed in terms of whether Marxism or poststructuralism is right. It does not occur to that student that outside geography there might be vast territories of knowledge where both of those discourses have long been discarded. She will laugh at lay people for being under the veil of indoctrination or maybe try to open their eyes, without the vaguest idea that an even thicker veil of indoctrination mediates her own access to the world.

The above observations dovetail with one of the most beautiful findings in the history of intelligence research. Thorndike (1924) seized the fact that, against intuitive wisdom, the altitude of one's intellect (i.e. the depth of one's cognitive penetration of a material) is in direct proportion with the breadth of intellect (i.e. the cognitive territory: how many and how widely apart things an individual knows). I often like to think of this finding by drawing a parallel with a quantitative analysis. The quality of a statistical finding is a function of both the size of the sample (i.e. the breadth of intellect; how many items are processed determines the reliability and significance of that analysis) and the power of the methodology applied to the analysis of data (i.e. the altitude of intellect; the inferential statistics operating on the descriptive statistics).

With these thoughts in mind, we can now move on, to produce the argument that the truly interesting things appear when we look at the concept of cognitive territory from a relational, *place*-based perspective (see

also Thrift, 1999, Florida, 2002, Barnes, 2004, Norcliffe, 2005, Massey, 2005, Murdoch, 2006, Jones III et al, 2007). Geography is essential to the formation of expertise and excellence in several ways (Florida, 2002, Barnes, 2004; Thrift, 2006). Thus, from the point of view of place, how much one learns and how much output one produces depend on the geographical proximity of people who can profit from learning (cf. Hudson, 1999, Florida, 2002). A recent study published in *Intelligence* (Day et al, 2005; see also Jeong and Chi, 2007) has clarified the interactions between the place of one's learning and working and the level of performance attained by those involved. The researchers have created three types of dyadic teams: HH (composed of two highly intelligent individuals), HL (composed of one highly intelligent person and one person of relatively low intelligence), and LL (composed of two persons of relatively low intelligence). The teams had to work on a project the outcome of which could be easily quantified. As expected, there was a substantive additive effect to collective performance induced by the level of intelligence of each team member. HH teams scored on average 2925.17 points, HL teams scored 1905.28 points, whereas LL teams scored only 1243.80 points. But the significant finding was that HH teams produced a non-negligible nonadditive effect, i.e. the total score obtained exceeded the score that could have been predicted from the sum of the intelligences of the two team members. There was no additive effect whatsoever for HL teams and the LL teams showed a negligible nonadditive effect. I have proposed to name these nonadditive effects *the geographical law of place-induced cognitive emergence* (Simandan, 2006; see also Harrison et al, 2006, and Bunge, 2006, for a treatment of the concept of emergence).

Following closely Day et al's (2005) empirical findings, let me draw together the threads that make this research so symptomatic of the geographical determination of outstanding performance. Let us think cognition spatially and for the sake of clarity let us imagine the cognitive capacity of an H individual as being a circular area of 2 sq.m, and that of an L individual as being a circular area of 1 sq.m. When two L individuals are working together they can hardly benefit from each other's company because their two circular areas tend to extensively overlap, i.e. they both know the same elementary things (how to open a computer or how to send an email or how to save a document). Because of the overlap, the sum total of their cognitive surface barely exceeds 1 sq.m (small additive effect). When two H individuals are put together, their cognitive areas will only partly overlap, and, more specifically, they will tend to overlap on those elementary things that everybody (i.e. L individuals) knows. Because they are highly intelligent, they will know a great deal more than elementary things and because each of them was driven to learn those issues relevant to

their highly specific passions and interests, those non-elementary things they each know will rarely overlap. The sum total of their cognitive area will be 5 sq.m: 1 sq.m overlap, plus 1 sq.m non-overlapped cognition from each of them, plus 2 sq.m of place-induced cognitive emergence. The latter component can easily be understood by grasping the fact that when two individuals have both shared knowledge and unique knowledge, they will develop through interaction in place additional knowledge at the intersection of their two “unique knowledge” components. Through dialogue and exchange of ideas and skills, they will not only learn from each other but they will also figure out together new knowledge emerging from the bits and pieces that each of them brings to the debate. To exemplify, if you put together on a project a highly gifted economic geographer and a highly gifted cultural geographer, they will not only learn from each other non-elementary things (they would both know from the beginning how to open the computer and how to save a document), but they will probably produce some new knowledge as they draw the connections between hitherto disconnected bodies of information.

When we put together a L individual and a H individual, the sum total of their cognitive areas will tend to be 2 sq.m and not 3 sq.m, because the highly intelligent individual will already know the elementary things that the L individual can contribute. Place-induced cognitive emergence is a function of the cognitive ability of those who interact in a particular place. Day et al’s observations of their research subjects fully support the spatial metaphor of cognitive surfaces I introduced in the preceding paragraph.

It remains important to underline not only the place-related performance of the teams, but also how differently L and H individuals can learn from being a part of different places of interaction. H individuals learn only when paired with other H individuals. When they are paired with L individuals, there is nothing they can seize from their less gifted partners, and the total score of the LH team is determined almost completely by the intellectual level of the H individual. As far as L individuals are concerned, Day et al found that they learn almost nothing, regardless of whom they are partnering with. If she is in a LL team, both individuals tend to know the same basic things. If she is in a LH team, she cannot learn much from the H individual because she does not understand her sophisticated way of thinking.

In terms of consequentialist ethics (Darwall, 2002, Portmore, 2007), the greatest good for the greatest number at the general level of analysis would be achieved if societies, professions, and institutions would find ways to segregate the highly gifted from the rest and to put them to work together. This strategy would be not only undamaging for the learning of L individuals, but it would also be very favourable for the cognitive growth of

the H individuals (who could profit from learning from one another) and would increase the overall level of new knowledge in that society, profession, or institution. The historical effect of these laws of place-based cognitive interactions has become manifest in distinctive geographies of excellence that anybody can perceive: the appeal of the Ivy League universities for both faculty and students in North America, the RAE-induced migration of faculty in the UK (with the best of the best seeking or being sought by the 5* departments; for recent developments see Johnston, 2006), the quick promotion of intelligent people within multinational corporations, and so on and so forth. Cognitive excellence generates places of excellence (because, as Leo Rosten noted, ‘First-rate people hire first-rate people; second-rate people hire third-rate people.’), which in turn enhance the cognitive excellence of their privileged inhabitants (through what I called ‘place-induced cognitive emergence’).

6. Conclusions

The idea of a finished human product not only appears presumptuous but even, in my opinion, lacks any strong appeal. Life is struggle and striving, development and growth [and] the striving itself is of intrinsic value. As Goethe said in *Faust*:

Whoe'er aspires unweariedly,
Is not beyond redeeming.

(Karen Horney, 1942: 276)

Life is short, one's cognitive capacity limited, and the amount of information in the world overwhelming. These three realities made me promise to myself that I will never start writing a paper if I were to privately believe from the onset that those who read it would be better off by reading something else or nothing at all. So the paper you have just finished is the kind of thing I would have liked to read in that year when rejection letters started to pour in my graduate mailbox and to pierce my ego. It would have taught me the virtue of patience, the pleasure to be found in working and reworking that paragraph, the importance of sublimating envy into admiration and emulation (Simandan, 2007), the better appreciation of those from whose cognitive territories one's own cognitive territory ultimately grows. It would have also taught me that to know if you have the “right” genes you need to challenge yourself and see if you can handle it . We might well be (to some extent; Johnson, 2007, Kagan, 2007) genetically determined but we do not know, individually, how. And this type of uncertainty is pure wealth (Stanovich, 2004). In other words, only by exploring one's potentialities against the real world, one can learn the things

one is good at. Paradoxically, genetic determinism itself is geographically determined. It is through geography, through exfoliating ourselves in place, that we become more of our genes as we grow older (Petrill, 2005, Deary et al, 2006, Flynn, 2007). And hence my four-step geographical model of exceptional human performance. Whilst it starts by acknowledging the role of one's (genetically determined) cognitive *distance* from the pack, it then unfolds the story of how we grow in *place*, of how we find the joy of mastering our *environments*, and of how cognitive *territories* become enhanced through a relational engagement with like-minded individuals in the phenomenology of space. Two geographers who have read an earlier version of this paper have suggested that this model might be useful not only for the newcomers in our discipline (graduate students and junior faculty aiming for excellence) but also for their own work. One of them is a historian of geography and was inspired by this paper to think in a new light the history of our discipline; the other one is an economic geographer who saw potential in this model for the analysis of human resources in general, and of global brain drain in particular. I am therefore optimistic about the uses of this paper in geography, even though I expect that those who endorse the social constructionist paradigm will find it uncomfortable at first. And outside geography, in the fields of economics and public policy? To the extent that the model wields a geographical style of thinking that puts the flesh of deeper understanding on the skeleton of conventional quantitative analyses, there remains hope for it to become a fertiliser of the non-geographical literature on excellence and a thing to read for those who strive.

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References & Bibliography

1. **Aquinas St. Thomas** (1924-1928). *Summa contra Gentiles*, London, vol. 1.
2. **Augier M. and March J.G.** (eds) (2004): *Models of a Man: Essays in Memory of Herbert Simon*. Cambridge: M.I.T. Press.
3. **Barnes T.** (2004). Placing ideas: *Genius Loci*, heterotopia, and geography's quantitative revolution. *Progress in Human Geography*, 29, 565-95.
4. **Blackmore S.** (ed. 2006) *Conversations on consciousness*, New York: Oxford University Press.
5. **Bunge M.** (2006) *Chasing reality: Strife over realism* Toronto: University of Toronto.
6. **Chabris C. F.** (2007). *Cognitive and neurobiological mechanisms of the Law of General Intelligence*, In Roberts M J, Ed, Integrating the mind. Hove, UK: Psychology Press, available online at <http://www.wjh.harvard.edu/~cfc/Publications.html> (accessed July 11, 2006).
7. **Chi, M.T.H.** (2006). *Methods to assess the representations of experts' and novices' Knowledge* . In K.A. Ericsson, N. Charness, P. Feltovich, & R. Hoffman (Eds.), *Cambridge Handbook of Expertise and Expert Performance*. (Pp. 167-184), Cambridge University Press.
8. **Clark B.** (1997). *Growing Up Gifted: Developing the Potential of Children at Home and at School*, Prentice Hall (5th Edition).
9. **Darwall, Stephen.** (Ed. 2002) *Consequentialism*. Oxford: Blackwell.
10. **Day E. A., Arthur W. Jr., Edwards B. D., Bell S. T., Bennett W. Jr., Tubre T. C., & Mendoza J. L.** (2005) *Ability-based pairing strategies in the team-based training of a complex skill: Does the cognitive ability of your training partner matter?*, *Intelligence*, 33: 39-65.
11. **Deary I., Spinath F. M., Bates T. C.** (2006) *Genetics of Intelligence*. *European Journal of Human Genetics* 14, 690–700.
12. **Demetriou A., Mouyi A., Spanoudis G.** (in press) Modeling the structure and development of g. *Intelligence*, Available online 19 November 2007.
13. **Detterman D. K.** (2005) *Spearman's g: past, present, and future*, in R. A. Peel & M. Zeki, eds, *Human Ability: Genetic and Environmental Influences*, London: Galton Institute.

14. **Dunbar, R., & Barrett, L.** (Eds. 2007) *The Oxford Handbook of Evolutionary Psychology*. Oxford: University Press.
15. **Ericsson A.** (2006) *The influence of experience and deliberate practice in the development of superior expert performance*, in N Charness, P. J. Feltovich, R. R. Hoffman, and K. Anders Ericsson, eds, *The Cambridge Handbook of Expertise and Expert Performance* Cambridge: Cambridge University Press, 683-704.
16. **Evans J.** (2008), *Dual processing accounts of reasoning, judgement, and social cognition*. Annual Review of Psychology vol. 59.
17. **Florida, R.** (2002). *The rise of the creative class*. New York: Basic Books.
18. **Flynn, J. R.** (2007). *What is intelligence? Beyond the Flynn effect*. Cambridge: Cambridge University Press.
19. **Freud S.** (1940/1979) *An Outline of Psychoanalysis*, London: Hogarth Press.
20. **Galton F.** (2006/1869) *Hereditary Genius an Inquiry into Its Laws and Consequences*. New York: Prometheus Press.
21. **Gardner H.** (1993), *Creating Minds*, New York: Basic Books.
22. **Gardner H.** (1995), *Leading Minds*, New York: Basic Books.
23. **Gardner H.** (1997), *Extraordinary Minds: Portraits of exceptional individuals and an examination of our extraordinariness*, New York: Basic Books.
24. **Gladwell M.** (2005), *Blink: The Power of Thinking without Thinking*, New York: Little, Brown & Company.
25. **Gottfredson L. S.** (1997a) *Mainstream science on intelligence: An editorial with 52 signatories, history, and bibliography*, *Intelligence* 24(1): 13-23 available online at <http://www.udel.edu/educ/gottfredson/reprints/index.html> (accessed March 11, 2007)
26. **Gottfredson L. S.** (1997b), *Why g matters: The complexity of everyday life*, *Intelligence*, 24(1): 79–132.
27. **Gottfredson L. S.** (1998), *Jensen, Jensenism, and the sociology of intelligence*, *Intelligence*, 26(3): 291-299.
28. **Gottfredson L. S.** (2007), *Innovation, fatal accidents, and the evolution of general intelligence*, In M. J. Roberts, Ed, *Integrating the mind*, Hove, UK: Psychology Press.
29. **Goldberg E.** (2005) *The Wisdom Paradox: How Your Mind can Grow Stronger as Your Brain Grows Older*, New York: Gotham Books.
30. **Gough H. G.** (1960) *The Adjective Check List in Personality Assessment*, *Psychological Reports*, 58: 108-122.

31. **Harris J. R.** (2006) *No two alike. Human nature and human individuality*, New York: W. W. Norton & Company.
32. **Harrison S., Massey D., and Richards K.,** (2006), *Complexity and emergence (another conversation)*. *Area* 38:4, 465–471.
33. **Hawks J, Eric T. Wang, Gregory M. Cochran, Henry C. Harpending, and Robert K. Moyzis** (2008) *Recent acceleration of human adaptive evolution*. *Proceedings of the National Academy of Sciences of the United States of America* (in press).
34. **Horney K.** (1942), *Self-analysis*, New York: W. W. Norton & Company.
35. **Hudson R.,** (1999) *The learning economy, the learning firm and the learning region': a sympathetic critique of the limits to learning*, *European Urban and Regional Studies*, 6: 59-72.
36. **Jeong H. & Chi M. T. H.** (2007), *Knowledge convergence during collaborative learning*. *Instructional Science*, 35, 287–315.
37. **Johnson, W.** (2007), *Genetic and environmental influences on behavior: Capturing all the interplay*. *Psychological Review* 114 (2): 423-440.
38. **Johnston, R. J.** (2006), The death - or dumbing-down - of the RAE?, *Environment and Planning B: Planning and Design*, 33 (3): 321-324.
39. **Jones III J. P., Woodward K., Marston S. A.** (2007) Situating Flatness *Transactions of the Institute of British Geographers* 32:2 264-280.
40. **Jung, R. E. & Haier, R. J.** (2007) The parieto-frontal integration theory (P-FIT) of intelligence: converging neuroimaging evidence. *Behavioral and Brain Sciences* 30:135-154.
41. **Kagan J.** (2007) *A Trio of Concerns*. *Perspectives on Psychological Science* 2 (4): 361-376.
42. **Karolyi K., Winner E.** (2005) *Extreme giftedness*, in R Sternberg & J E Davidson, eds, *Conceptions of giftedness* Cambridge: Cambridge University Press, 2nd edition.
43. **Livingstone D. N.** (2005), *Science text and space: thoughts on the geography of reading*. *Transactions of the Institute of British Geographers* NS 30 391–401.
44. **Livingstone D. N.** (2006), *Putting progress in its place*. *Progress in Human Geography*, 10; vol. 30: 559 – 587.
45. **Luciano M., Wainwright M. A., Wright M. J., and Martin N. G.** (2006), *The heritability of conscientiousness facets and their relationship to IQ and academic achievement*, *Personality and Individual Differences*, 40 (6): 1189-1199.
46. **Lykken D. T.,** (2005), *Mental energy*, *Intelligence* 33: 331-335.

47. **Manning J.** (2007), *The androgen receptor gene: A major modifier of speed of neuronal transmission and intelligence?*, *Medical Hypotheses*, 68 (4): 802-804.
48. **Massey D.** (2005), *For Space* Sage, London.
49. **Murdoch J.** (2006), *Post-structuralist geography: a guide to relational space*, London: Sage.
50. **Murray C.**, (2003), *Human Accomplishment: The Pursuit of Excellence in the Arts and Sciences, 800 B.C. to 1950* New York: HarperCollins.
51. **Norcliffe G.** (2005), *The geographical construction of technology and the rise of the Coventry bicycle industry 1869-1880*, *Cycle History: Proceedings of the Fifteenth International Cycle History Conference* San Francisco: van der Plas Press, 41-58.
52. **Park, G., Lubinski, D., & Benbow, C. P.** (2007), *Contrasting intellectual patterns for creativity in the arts and sciences: Tracking intellectually precocious youth over 25 years.* *Psychological Science* 18(11): 948-952.
53. **Penke, L., Denissen, J. J. A., & Miller, G. F.** (2007), *The evolutionary genetics of personality* (target article). *European Journal of Personality*. 21 (5): 549-587.
54. **Peter L. J., Hull R.** (1969), *The Peter Principle*, New York: Bantam Books.
55. **Petrill S. A.** (2005) *Behavioral genetics and intelligence*, in O Wilhelm & R Engle, eds, *Handbook of understanding and measuring intelligence* London: Sage, 165-176.
56. **Phillips J. K., Klein G., Sieck W. R.** (2004), *Expertise in judgment and decision making: a case for training intuitive decision skills*, in D J Koehler & N Harvey, eds, *Blackwell Handbook of Judgment and Decision Making*, Oxford: Blackwell, 297-315.
57. **Pinker S.** (2002) *The blank slate: the modern denial of human nature*, New York: Viking Penguin.
58. **Portmore D. W.** (2007), *Consequentializing Moral Theories.* *Pacific Philosophical Quarterly* 88: 39-73.
59. **Rawls J.** (1973), *A Theory of Justice*, Oxford: Oxford University Press.
60. **Rogers K.** (1995), *Exceptionally and Profoundly Gifted Children*, www.gifteddevelopment.com, accessed February, 2007.
61. **Sack R. D.** (2004), *Place-making and time*, In Tom Mels, ed, *Reanimating places* Burlington: Ashgate 243-254.
62. **Salthouse T., Pink J., Tucker-Drob E.**, (in press), *Contextual analysis of fluid intelligence.* *Intelligence* vol. 36.

63. **Schmidt F.** (2002), *The Role of General Cognitive Ability and Job Performance: Why There Cannot Be a Debate Human Performance* 15 (1-2): 187-210.
64. **Shavinina L. V.** (2004), *Explaining high abilities of Nobel laureates*, High Ability Studies, 15 (2): 243-254.
65. **Simandan D.** (2002), *On what it takes to be a good geographer*, Area 34 (3): 284 – 293.
66. **Simandan D.** (2005a), *Pragmatic scepticism and the possibilities of knowledge*, Timișoara, West University Press, ISBN 973-7608-22-4.
67. **Simandan D.** (2005b), *New Ways in Geography*, Timișoara, West University Press, ISBN 973-7608-23-2.
68. **Simandan D.** (2006), 'The g factor and the geographical law of place-induced cognitive emergence' In *Economic Science in a Knowledge Society, Proceedings of the International Conference 'Research and Education in the Innovation Era'*, Timisoara: Mirton Publishing House, pp. 80-90, ISBN (10) 973-52-0014-7.
69. **Simandan D.** (2007), An evolutionary geography of environmental and social justice *Studia Universitatis Babes-Bolyai Seria Ambientum/Environmental Studies I* (1-2).
70. **Simandan D.** (submitted) Towards a geography of intelligence <http://www.brocku.ca/geography/people/default.html>.
71. **Simonton D. K.** (2003), *Scientific creativity as constrained stochastic behavior: The integration of product, process, and person perspectives*, Psychological Bulletin 129: 475-494.
72. **Simonton D. K.** (2005), *Giftedness and genetics: The emergenic-epigenetic model and its implications*. Journal for the Education of the Gifted, 28, 270-286.
73. **Simonton D. K.** (2007), *Creativity: Specialized expertise or general cognitive processes?* In M J Roberts (Ed) Integrating the mind Hove, UK: Psychology Press.
74. **Stanovich, K. E.** (2004), *The robot's rebellion: Finding meaning in the age of Darwin*, Chicago: University of Chicago Press.
75. **Strogatz S. H.** (2002), *Fermi's 'Little Discovery' and the Future of Chaos and Complexity Theory*, in J Brockman, ed, The Next Fifty Years: science in the first half of the twenty-first century New York: Weidenfeld & Nicholson.
76. **Thorndyke E. L.** (1924), *The measurement of intelligence: present status*, Psychological Review 31: 219-252.
77. **Thrift N.** (1999), *Steps to an ecology of place* in Allen J Massey D Sarre P eds. *Human geography today* Cambridge: Polity Press, 295-322.

78. **Thrift N.** (2006), *Re-inventing invention: new tendencies in capitalist commodification*, *Economy and Society* 35(2): 279-306.
79. **Tooby, J., & Cosmides, L.** (2005), *Conceptual foundations of evolutionary psychology*, In D. M. Buss. (Ed.), *The handbook of evolutionary psychology* (pp. 5-67). Hoboken: Wiley.
80. **Tuan Yi Fu** (2004) *Sense of place: its relationship to self and time*, In Tom Mels, ed, *Reanimating places* Burlington: Ashgate 45-56.
81. **van der Maas, H. L. J., Dolan, C. V., Grasman, R. P. P. P., Wicherts, J. M., Huizenga, H. M., & Raijmakers, M. E. J.** (2006), *A dynamical model of general intelligence: The positive manifold of intelligence by mutualism*, *Psychological Review*, 113, 842–861.
82. **White R. L.** (1959), *Motivation reconsidered: the concept of competence*, *Psychological Review* 66: 297-333.