

# Commentary



'I have been a witness, and these pictures are my testimony. The events I have recorded should not be forgotten and must not be repeated.'

James Nachtwey



An orphan in an institution for 'irrecoverables' – Romania, 1990, James Nachtwey.

James Nachtwey (°1948) is one of the most influential contemporary photojournalists and war photographers. He took this photograph at one of the many orphanages for 'irrecoverables' in Romania. These orphanages, 'indescribable in their filth, degradation and misery' (Kathleen Hunt, *The New York Times*, 24.06.'90), are one of the harshest legacies of the Ceaușescu regime. Many of the orphans are severely mentally retarded.



## Should we place less importance on intelligence?

Inevitably, issues on the justification of the importance of parametric intelligence and its societal impact arose while probing the genetics of human cognition. Since I feel that the views I developed during my time as a PhD student complement my research, I have compiled some of them in what follows.

The so-called Drake equation (1) for estimating the number  $N$  of extant technological civilisations in the galaxy is an excellent example demonstrating just how important we think intelligence is.

$$N = R^* \times f_p \times n_e \times f_l \times f_i \times f_c \times L \quad (1)$$

$N$ , number of extant technological civilisations in the galaxy;  $R^*$ , rate of star formation in the galaxy;  $f_p$ , fraction of those stars with planets;  $n_e$ , average number of planets that can potentially support life;  $f_l$ , fraction of the former that develop life;  $f_i$ , fraction of the former that develop intelligent life;  $f_c$ , fraction of the former that are able to communicate;  $L$ , expected lifetime of such a technological civilisation.

This ‘formula’, which has become a theoretical framework for SETI<sup>1256</sup>, was developed by radio astronomer Frank Drake, the first one to experimentally look for artificial signals from space<sup>1257</sup>. At the now-famous 1961 Green Bank Conference of the Space Science Board from the National Academy of Sciences, plausible values for each of the formula’s factors were discussed<sup>1258</sup>. The scientists felt they were unable to make a good estimate for  $f_c$ , the fraction of intelligent societies willing and able to communicate with other worlds, without consulting a sociologist. But they were confident that  $f_l$ , the fraction of planets on which life evolves into intelligent beings, equalled one<sup>1258-1260</sup>. In other words, they were convinced that evolution inevitably leads to intelligence. As a molecular biologist, I feel that these renowned scientists, one of whom was awarded the Nobel Prize in Chemistry ‘for his research on the carbon dioxide assimilation in plants’<sup>1261</sup> while attending the Green Bank Conference<sup>1258</sup>, were reasoning from a pre-scientific folk belief.

Suppose there would have been an evolutionary advantage on the prehistoric African steppe to have access to the highest leaves on a tree. One species may develop a long neck, another may evolve a trunk, a third may climb the tree and yet another may invent a ladder.

So intelligence could be *one* solution, but is certainly not *the* solution. In fact, as the experimental psychologist Steven Pinker points out, human intelligence comes at no small price<sup>1262</sup>. First, the bulky brain makes delivery a vulnerable process and requires a female anatomy that is biomechanically less efficient than its male counterpart. That same bulky brain, wobbling on a neck, makes us exceptionally prone to fatal mechanical injury. Second, the brain consumes a disproportionately large amount of the body's energy. Third, it takes a long time to learn to use our brains; we spend much of our lives being children or caring for them. Fourth, a complex brain is slow: human brains are about 12 times slower than those of house flies<sup>1263,1264</sup>.

Still, one could argue that, despite these disadvantages, intelligence *must* be the best evolutionary strategy, as we are obviously the most dominant species and are able to adapt to almost any environment. However, this is no more than an assumption. For it to be proven, we would need to be on Earth longer than, for example, 175 million years, the time crocodilians have been around without spectacular evolutionary changes<sup>1265,1266</sup>. In fact, we may, not unlike the Ebola virus, be too virulent to make it as an evolutionarily successful species. Ironically, the scientists attending the Green Bank Conference, taking place at a time nuclear weaponry was being amassed around the globe, were rather pessimistic about the value for  $L$ , the lifespan of technologically advanced societies. Their estimates were as low as 100 years<sup>1260</sup>.

Of course, I am not alone in the opinion that  $f_i$  equalling one is a rather arrogant assumption. In a letter to *Science*, the eminent evolutionary biologist Ernst Mayr pointed out that, if intelligence were so common, there should have arisen more than one technologically advanced society among the fifty billion species that have lived on Earth<sup>1267</sup>. A fairly fierce reaction from Drake and other SETI enthusiasts followed<sup>1268</sup>. Even though some of the world's most distinguished biologists, palaeontologists and astronomers have formulated a Rare Earth hypothesis, suggesting our uniqueness in the Universe<sup>1269</sup>, recent publications keep adopting a value of one for  $f_i$ <sup>1270</sup>, thereby fostering the fallacy that intelligence is inevitable rather than incidental.

But there are also other, more scientific, aspects to parametric intelligence that deserve attention. Analyses of large datasets estimate the heritability of intelligence at 50%<sup>831</sup>. In other words, half of the variance in parametric intelligence between individuals can be attributed to differences in their genetic make-up. Moreover, due to the nature of nurture<sup>1271</sup>, genetic components are involved in the active role we play in selecting, modifying and creating our own

environment, which accounts for the other half of parametric intelligence. Studies have indicated that some 40% of the genotype – environment correlation is steered by genetics<sup>1272</sup>. In addition, the heritability of intelligence increases throughout the human life-span<sup>1273,1274</sup>. This is, at least in part, due to environmental influence wearing out over time; even though environment affects intelligence in childhood, the average correlation between parametric intelligence and environment in adolescence is zero<sup>1275</sup>. Thus, parametric intelligence depends *at least* 50% on genetics, and this genetic component rises with age. Societally speaking, these are alarming statistics for three reasons. First, assortative mating for intelligence is substantial. In fact, correlations of ~0.40 between spouses for intelligence are significantly higher than for any other personality trait, where covariance typically hovers around 0.10<sup>1196</sup>. Second, there exists a correlation between parametric intelligence and socio-economic status<sup>1276</sup> and social outcomes<sup>1277</sup>. Third, there is the obvious correlation between genetics and ethnicity. Taken together, this means that the divide between the ‘bright Asian haves’ and the ‘dull Black don’t haves’ will increase generation after generation in, for example, American society. The uproar caused by Jensen’s Harvard Educational Review in 1969<sup>1278</sup> and the publication of *The Bell Curve* by Herrnstein and Murray in 1994<sup>1279</sup>, are only two well-known examples demonstrating how emotionally the ‘intelligence – genetics – ethnicity – social status’ connection is perceived.

So what can we do to make society cope with the inevitable widening of the divide between the ‘dull’ and the ‘bright’? We cannot change the facts, but we can, as a society, change our perception. Of intelligence, for example. That is, in scientific terms, the correlation between parametric intelligence and societal outcome lies in our hands. The notion that intelligence is not the ultimate endpoint of evolution, and may not be its best strategy either is one argument that should lead to a change in perception. The well-established link between genius and mental illness<sup>1280-1283</sup>, suggesting that genius and insanity are two sides of the intelligence coin, a coin largely based on convention, is another sign that should lead us to the realisation that only an infinitesimally thin line separates the brilliant from the retarded. Flourishing research into brain function resulting from the study of drugs of abuse<sup>1284</sup>, addiction<sup>1285</sup> and molecules mimicking insanity<sup>1286</sup> could serve as a last example for the questionability of parametric intelligence as an important societal measure.

On a different, less scientific, but maybe even more convincing note, just think about your standard 7 o’clock news bulletin followed by the customary block of commercials. The fact that, within the space of half an hour, modern man is confronted with famine, perfumed toilet paper, genocide and Botox injections, indicates that there must be more to humanity

than intelligence. Upon intercepting our electromagnetic waves, we may well find extraterrestrial Fanny beeping to her husband ‘Oh gosh, these Earthians again! Could you please close the window?’ instead of her wanting to communicate with us (Fig. VII-1).

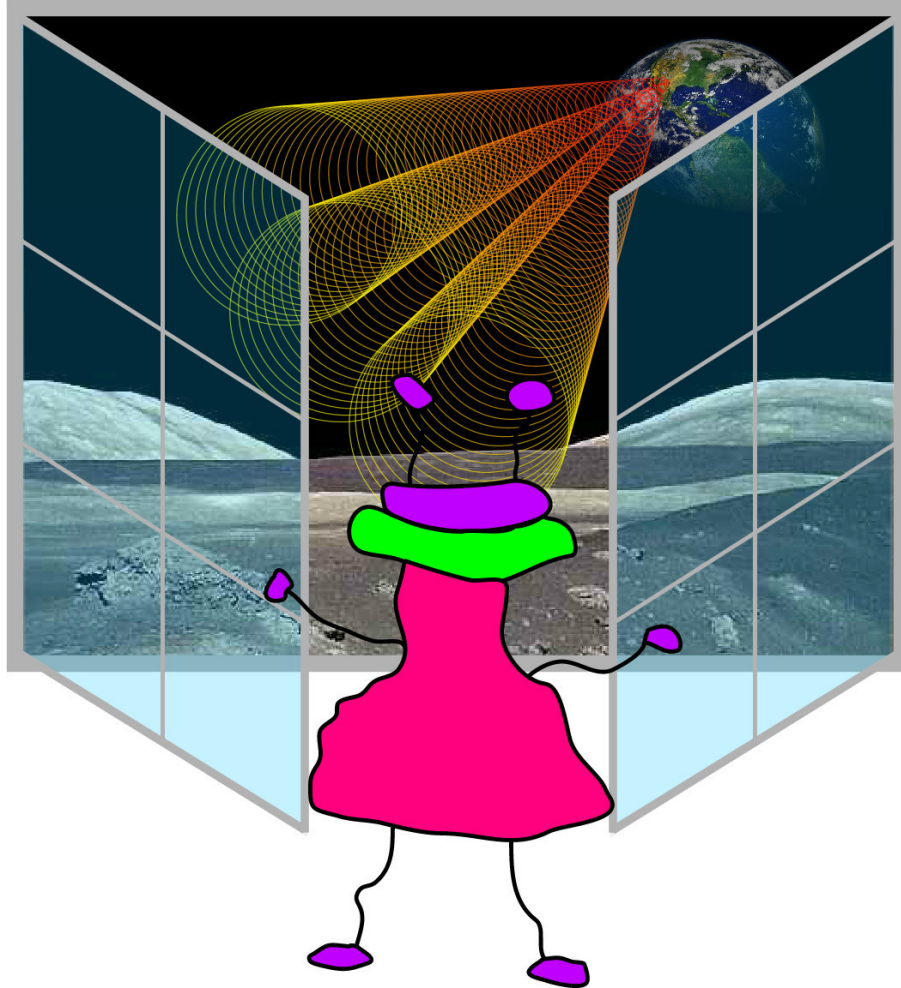


Fig. VII-1 | **Extraterrestrial Fanny.**

Do we have good reason to believe that Fanny would want to contact us should she be able to?

In my opinion, we would all be winners if the focus on intelligence as a societal measure would move from centre stage. Rather than concentrate on one single aspect of humanity, we should have an eye for its diversity, use its pluses to our advantage and learn to deal with its minuses.

This commentary should not be interpreted as a plea to stop investigating intelligence. On the contrary, understanding how the mind works is one of the most exciting fields of study in contemporary science. Whether scientific studies on human intelligence, genetic and otherwise, are dangerous to society depends solely on how it deals with the results, not on the results themselves. Investigation uncovers facts; it does not change them. It is our values and,

for that matter, our culture that will decide the moral outcome of such research. One outcome could be that intelligence research will act as a major impetus to strive for a culture focusing on personal individuality rather than on assessing group averages.

However, bringing about the essential change in attitude that such an unusual perspective requires may prove more challenging than finding out which genes modify intelligence, even though understanding the complexity of the human brain with nothing more than a brain may well turn out to be an intrinsic impossibility.

