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# Brain drain: a non-political perspective

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Brains should matter for all academics. In brawn, horsepower of any kind will always be superior. As human species, we may not have the biggest brains in relative or absolute terms, but we certainly have the best. We should never forget, however, that this superior brainpower does not only let academics excel, it is just as responsible for the best CEOs, the best artists, the best sport champions – even for the most efficient and atrocious criminals. Therefore, just battling for brains may not be enough. It must be the right brains, and these do not come freely and ready-made by mother Nature. We cannot simply breed them, we have to nurture, to educate and to hone them, far from only battling for them.

The 'Battle for the Brains' has begun, we are told, and the battle cry seems to be 'Stop the Brain Drain'. What a silly perception that is of the global world of science! Evidently, it must even be a battle royal, a free-for-all for scientific gamecocks, with a rising number of battle-maidens joining the brawl.

I dislike the notion of 'brain drain' itself. For me, it sounds like flushing waste through a sewer. It reminds me of my postdoc days in Harvard some 40 years ago, when Tom Lehrer was very popular – more so for his songs than for his maths, I must admit – and he once remarked wryly that 'Life is like a sewer: what you get out of it, depends on what you put into it'; but brains swept down the drain are certainly not what we should be talking about when young scientific talents are building their future by their own will freely moving abroad, whenever and wherever they want to.

Is it not a telling fact that the whole issue is usually represented as some zero-sum game, with one nation's loss being the other nation's gain and vice versa? Are we not hearing politicians talking about promoting 'brain-gain', as if brains were some kind of commercial commodity?

While – if it is some game at all – it must be of the win-win-type if properly played, at best it is some battle *of* brains, rather than one *for* brains. And instead

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of *draining* brains through some unsavoury gutters, we should actually focus on best *training* brains, so that they can contribute through their own improvement to the progress of the sciences and of technology for all humanity.

We all know that creative minds (rather than slippery brain masses) are the true bottleneck for scientific and economic innovation. But that does not make institutions of research and education battlegrounds in some ongoing war for the scientific and economic wealth of nations. The history of science is not a history of battles between nations, but one of joining forces for facing and hopefully overcoming the challenges of a risky future both for our still surging species of 6, 7, 8 or 9 billion busy-minds and eager beavers, and for the whole biosphere which they toil and exploit and turn upside down.

Admittedly, the global efforts of scientists and technologists, driven by their own curiosity and by the seemingly insatiable greed of their fellow human beings, have contributed their share – one hesitates to call it fair share – to bringing our world into the predicaments (plus achievements) in which we now find it. But no knowledgeable person can doubt, that it is the bounden duty of the very same scientists and technologists to do everything to help humankind prevail against all odds under humane conditions in a sustainable biosphere. It would be completely mistaken to believe that this global common challenge could be overcome by the thoughts or deeds of any single genius, even of a new Albert Einstein, nor by the combined efforts of the geniuses of any single nation, even the most powerful nation of the world. Science is, as it were, the common rational mind, the *social brain of humanity* which relentlessly drives forward together at the limits of knowledge and of inventiveness. That is the real competition (unlike any kind of battle) going on between American, German, Chinese or Russian scientists. It involves theories, experiments, multinational and multidisciplinary research projects and task-groups, who strive for success and achievement in their selected problem-fields, which are or will be very much the problems for all of us. Presently there are mainly four large competing pools of scientific and technological talents all over the world, in the United States, Europe, East and South Asia plus Australia and New Zealand, in an increasing exchange and merging of forces, none of whom have yet fully tapped their most precious talent reservoir: the female part of their populations; Germany probably the very least, as I must shamefully admit.

It is from such a perspective that we must address the problems of scientific cooperation, competition, of joining and of exchanging of human capital and of other resources for the successful further development of our respective nations in innovative vitality, security, health and economic prosperity. If human history has taught us one thing, it is surely: 'barter beats battle', any time and any place; there is no winning of competition without cooperation. Having been a myrmecologist some time ago (for instance while doing research at Harvard and

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Rockefeller Universities during the 1960s), I can say from very close experience: what is true in this respect for the super-organism of the social ants is just as true for the social primate *par excellence*, the human super-organism.

What does this general outlook on science as the common social mind of the super-organism *Homo sapiens* mean for the scientific and educational relationship between Europe and the United States? On the one side are small countries, stricken with many problems, historical and otherwise, but nevertheless sometimes pompous and grandiloquent. And there, on the other side, the overpowering United States, the 500-pound gorilla that sits where it wants, the shining leader of the world, even though one sometimes wonders whether it always knows well enough where it is leading us. Important questions are not only how to proceed together, at least in the sciences and humanities, the arts and commerce, but also how to get along with each other! I will try to approach this problem with a string of five short theses, all the way sticking to my much-disliked notion of a brain drain, for the heck of it. Whilst I may be primarily speaking for Germany, it could mostly refer to the whole of the European Union, to which Germany contributes approximately one quarter of its economic and scientific-technological potential.

> *Thesis 1*: Global science needs attractors – therefore global science produces brain drains.

Scientific talent does not behave wastefully; it does not go down the drain but is always attracted by the heights of excellence, like a paradoxical fluid flowing uphill. If we are to be at all successful in solving the world's frightening global problems – of climate change, of sustainable energy supplies, of water management, of epidemic infectious diseases, of poverty migration, of terrorist ideologies, of peace and justice in good governance of all nations, and so on – we need all the help we can get from the sciences: (a) the resourcefulness of scientifically and technologically leading nations, (b) contributions from many different disciplines of research and learning, (c) experienced management of international programmes by the real leaders in their fields and, most important of all, (d) the most talented minds from wherever they may come. The philosopher Immanuel Kant once remarked that fortunately nothing is more equitably distributed throughout all of the people from all over the world than the power of intelligent reasoning ('Urteilskraft'). In other words, the most prodigious talents grow where they want, potentially everywhere, but they are always rare, as it were, occurring according to a statistical Poisson process. Therefore, in order to give the brightest of them the best training which always needs the top scholarly environments to let them develop and thrive, and to make them collaboratively work on the most pressing and hardest problems, we have to accept – no, we have

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to encourage – their uphill movement to the respective foci of excellence. More often than not these happen to be in other places in the world than where these talents occurred and grew up.

Only through this process of upward percolation in the steamy heat of the best scientific environment, can mankind make optimal use of its rare creative scientific talents. Of course, these centres of excellence should not only be found in one country, and in fact even today they are not concentrated in such a way, but distributed over many nations. Every nation has to make determined efforts to build up such centres for itself and for the rest of the world, as the Max Planck Society tries hard to do in Germany. But even then, there will be this self-selective process, so that at any one point in time and for any particular discipline, some, especially smaller, poorer nations will feel drained of their most precious intellectual lifeblood – but the alternative of having to waste it and to stay second- or third-rate in every respect forever seems hardly more attractive.

However, at the same time, the participation of their best and brightest talents in these truly international efforts to solve mankind's common problems, is the best guarantee for every (even the most insignificant) nation to be part of the self-organizing networks of international cooperation, opening the doors and channels not only for contributing but also for benefiting from them. One way to do so is to receive back the advantage of nationals returning home, strengthening their own innovative base of society and economy. At the bottom line this may be the most important way forward. What David Ricardo, when emphasizing the comparative competitive advantages of nations, may have overlooked in his day, is that the most precious intellectual resource base of different nations can only be fully developed, when they let their people go – especially the very best talents – so that they may return enriched and enriching.

> *Thesis 2*: In a free world, a brain drain is inevitable, it is the cost and benefit of freedom

When politicians from less advantaged nations – which, sometimes are in fact only the more badly governed nations – complain about the losses from brain drain, one can get the impression that societies felt they owned their members, just like some of cattle or chattels. Being born in some stretch of land and growing up speaking the particular tongue of its inhabitants certainly imbues one with a strong feeling of attachment and obligations, which nobody would lightly deny. But there is a great difference between regarding young talents as some kind of national heritage and state-owned property, which may not cross borders except with governmental permission, especially if under the control of politicians who do little or nothing to let them grow to their full potential! Contrast the more enlightened self-interest of a society who lets its people decide for themselves

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where they want to settle, to learn, to work for some time or for good. It is those latter societies who live up to the ideals of freedom, which a free, democratic society should hold in highest esteem.

Of course, such disinterestedness in one's own best interest carries with it the possibility of loss of some talents to other nations. Depending on their specific qualifications, such a loss can even be quite grave. I am for instance not really comforted by the recent report from the German Research Council that, of an approximately 20,000 Science & Technology graduate and postdoc workforce of German origin in the United States in the last twenty years, only about 15–20% have stayed there for longer or even permanently, depending on their disciplines, because one knows that it depends very much on which ones came back and which ones stayed on; the chances are that US institutions know very well how to cream off the supply from the top down.

However, not only would I strongly oppose any effort to keep all 100% from leaving the country, because they are free people after all, but I am also convinced from decades of experience that the 85% returning, bring with them so much improved expertise, so much knowledge of other languages and cultures, and so many excellent connections not only to Americans but also to scholars from many other nations from all over the world in their respective fields of scholarship, with whom they made friends abroad, that I would not know of any better way to tie in so firmly and tightly with the leading developments in science, humanities and technology in the rest of the world, than by this flow of brains, even though at the first glance it may seem a drain. This represents not some immobile steady state, but rather an equilibrium between flow and counterflow of human resources, like some social law of mass action.

> *Thesis 3*: A brain drain is necessary if a society does not want to fall back in international competition.

Except maybe in the arts – but probably not even there – but certainly in the sciences, nobody can become a master if she or he remains isolated. This is not to deny the importance of individuals, struggling to stand intellectually on their own feet, for the progress of knowledge. It does mean, however, that in order to grow tall, in the sciences and most probably everywhere, a tree needs closely competing company, in order to be driven to real excellence.

But this is only the first stage of scientific development, most appropriately provided by a rich variety of schools offering just the right intellectually challenging environments for all kinds of individual gifts and motivations. As mentioned before, the most important problems that science and technology can address, come not in well-ordered, disciplinary packets, but rather need to be tackled by task-forces of very different qualifications and experiences, drawn from

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wherever needed. Not even the largest and most powerful nation could at any time harbour within its limits all the differing talents needed to make best advances, much less so a smaller nation. In order to guarantee the needed progress of science-based achievements it is therefore necessary to draw on all the human resources and to set them into work in the most efficient manner.

Over the last decades, numerous internationally organized programmes in astronomy, space, atmospheric or marine research, in polar studies, in biodiversity or global ecology of the biosphere, in plant breeding, in desertification or in acidification of ecosystems, have thus developed their contributions for human knowledge by cooperatively bringing together scientists and economists and finally also drawing on the expertise of politicians from all corners of the world. How could that ever happen without some drainage of human resources? For me, it is much more important to know that German scientists are welcomed and sought after in so many research and development programmes all over the world – and to find them as principal investigators in some, but also as second- and third-line contributors in many other such programmes – than to shepherd a German herd of scientists within a national pen.

*Thesis 4*: A brain drain is beneficial both for givers and takers.

I have already described how smaller nations can benefit in many ways from lively scientific exchange even if they 'lose' some of their talents to foreign 'attractors' in other countries. However, according to data from the German Research Council, of all German postdocs going abroad, one third in the humanities, and more than 70% in the natural sciences, biosciences and in engineering spend their postdoc time in the United States, compared with some 15% in member-states of the European Union and less than 3% in Switzerland. But of those roughly 15–20% who stay on abroad afterwards, only 40% do so in the US, with the same proportion in the EU, and a whopping 20% in Switzerland. There seem to be many different and often quite personal reasons for scientific emigration – there is no simple drain of brains to a blessed land!

Here, I want to emphasize another, much more fundamental beneficial influence of this coming and going for all nations participating in it, both for emitters and receivers. Science as a global social enterprise needs continuous stimulation by difference and diversity, differences of cultural traditions embedded in language and literature, differences in styles of education, learning and thinking, differences in gender, in giftedness, age, religious background and so on. The United States alone receives many thousands of young foreigners every year at all levels of their educational system, and has done so over more than a century. I myself confess that my postdoc years at Harvard and Rockefeller Universities deeply influenced

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my thinking for my whole life, long after my return to Germany and even as a retired professor that I am now.

American institutions not only exert these formative influences, but also receive just as much in return from the many thousands of young bright Europeans, East Asians, East Indians, South Americans, and Australians, or wherever they may come from. Some of these reciprocal benefits may be quite intangible, but others can clearly be followed up in their cultural and economic consequences. All of these benefits cannot be harvested without quite deliberately risking some unequal balance of numbers of emigrants versus immigrants; such risk-proneness of our societies is the only way to reap the benefits of collaboration and of exchange.

But this should certainly not be a one-way street. It has been my impression for many years, that the United States makes too little effort for its own rising talents to go abroad, in order to expose themselves to foreign cultural influences, learn foreign languages, and of course also risk being more permanently attached to other societies, e.g. by finding their spouses there. I understand well that the direction of intellectual flow tends to be upwards and that the high ground for Americans is more often than not to be found at home. However, this is not always so; some American scientists, who have dared to venture abroad, have become, where they work now, their own foci of attention and attraction! At the Max Planck Society, to draw from my own recent experience, more than one quarter of our prestigious 278 Scientific Directors are foreigners, particularly in our most recently founded institutes in the former DDR, and many of them are Americans. I dare say that they have begun to build there real scientific lighthouses, which shine even more widely than they might have done so if they had stayed at home. We should not diminish efforts to strengthen our scientific ties by encouraging such a 'brain drain' in both directions, which is actually a kind of 'mind swapping' across the ocean, of uniting the forces for the pursuit of knowledge, which is, after all, for us scientists the better part of the 'pursuit of happiness'.

> *Thesis 5*: Therefore, a brain drain is not another deplorable negative outcome of a globalized open world, but rather a challenge for attracting the best from wherever one can get them.

Nothing stimulates scientific performance as much as free competition among the very best. When I hear the frequent whining about all the talent lost by a brain drain, I can only say: what a very good reason to stop investing in rising consumption, or in agricultural subsidies, in featherbedding early pensioners, or in hypothetical environmental concerns, or even less so by increasing world air-traffic by making even more people travel all over the world on even longer holiday trips, but to rather invest in excellence of education, of research, of science and technology, which would not only help to solve our global problems, and

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which would not only bring back many talented people after they have gained new experiences abroad, but which would also draw talented foreigners up the hills to our own centres of excellence. A brain drain is neither god-given one-directional nor the destiny of left-behind nations, it is a signal of insufficient own efforts to maintain and assert one's place in the frontline, a harbinger of the need to reassess and change one's own priorities, a call to arms – if we have to use such language – in the battle for, and in the battle, of brains, not for giving up, but for standing up.

Let me conclude this with a somewhat different perspective. We need not be scared by the brain-drain-doom-gloom mis-prophets, not even if we come from little, Old European countries to the big New United States. Instead, we can and should use the brain drain wherever we can, but in both directions over the Atlantic. When I was President of the Max Planck Society, I did not care so much about the numbers of graduates and PhDs from our institutes going abroad. This was even a particularly clear sign – a benchmark, you might call it – of their superior scientific quality, if great American institutions cared to hire them. What really worried me was, whether we received as much or even more counterparts from other countries, joining forces with us in our research groups. Fortunately, we did. Let our governments do what they feel is necessary for them to do, hopefully not just big talk. However, what is much more important: let us do, what we ourselves can do to make the brain exchange a real two-way traffic.

So let me sum up by drawing a few conclusions.

(1) Yes, we – the Germans, Europeans, Russians, Chinese, Indians, what have you – we all suffer from a brain drain and we should like to invite you, our American friends, to join us in this suffering at least a little bit more than you have done so up to now, in order to make our brains coalesce, as it were, and our minds join forces, rather than wasting opportunities, because wasting scientific and technological opportunities would be the real pouring of brains down the notorious drain for all of us.

(2) No, we should not alleviate this suffering from the brain drain by fencing in our respective pools of talent. We – the small, or the less scientifically developed nations – should much rather all bite the bullet and continue to breed and educate even more and potentially even better minds than you, our competing friends from across the Atlantic, seem to be able to do, because otherwise you would certainly not care to draw so persistently on our precious human resources. This, at the same time, will be the best way to stop us from becoming lazy, complacent, despondent or, at the other extreme, even deluded by presumptuous nationalist megalomania.

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(3) Let us stop talking and whining or bragging in martial vocabulary, and complaining about that ominous brain drain. Let us just get down to work together and get on with the many hopeful challenges and necessary contributions that science has to offer all of our people, as we have done successfully in the last half century and in fact so much longer than that.

## About the Author

**Hubert Markl** is a retired Professor of Biology at the University of Constance and former President of the German Research Council and of the Max Planck Society. His books include *Evolution, Genetics and Human Behaviour*, *The Progress Drug, Science against Angst of the Future* and *Beautiful new Humans?*

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