

# Life Span Extension Research and Public Debate: Societal Considerations\_

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## Abstract

The pace of a given strand of scientific research, whether purely curiosity-driven or motivated by a particular technological goal, is strongly influenced by public attitudes towards its value. In the case of research directed to the radical postponement of aging and the consequent extension of healthy and total lifespans, public opinion is entrenched in a “pro-aging trance” - a state of resolute irrationality. This arises from the entirely rational attitude to a grisly, inevitable and relatively far-off fate: putting it out of one’s mind allows one to make the most of what time one has, free of preoccupation with one’s demise, and it is immaterial how irrational the arguments that one uses to achieve this are, e.g. by persuading oneself that aging is not such a bad thing after all. As biotechnology increasingly nears the point where aging will no longer be inevitable, however, this studied fatalism has become a core part of the problem, making people reluctant to join the crusade to hasten that technology’s arrival. An effective way to address this hesitation is to promote debate about the reasons people give for fearing the defeat of aging, most of which are sociological. Such debate exposes people to the glaring flaws in their own logic. Thus, the more the debate is sustained and promoted, the harder it is for those flaws to be ignored.

**KEYWORDS:** life extension, human enhancement, transhumanism

## The pro-aging trance: causes and effects

Aging kills roughly 100,000 people every day worldwide.<sup>1</sup> Things that kill far fewer than 1% of this number are the subject of concerted efforts on the part of society to combat them and save these lives, yet aging is studied mainly as a phenomenon to be *understood*, rather in the way that astronomers study galaxies; *doing* anything about it is not generally prioritised. Why?

Firstly I must defend my assertion that biogerontologists do not prioritise intervention in aging, since many biogerontologists would hotly dispute it. In the following paragraphs it must be understood that I am blatantly generalising, because some biogerontologists are not guilty of the faults that I describe here. But most are – especially most of the senior biogerontologists who, as in any field, predominantly dictate their research community’s priorities.

It is indeed the case that most biogerontologists understand full well the incalculable suffering that aging causes. However, actions speak louder than words, and the work actually being performed in biogerontology laboratories around the world is overwhelmingly of an exploratory, rather than interventive, nature. Biogerontologists would argue that this is for two good reasons: firstly that any really hard technological problem must be reasonably well understood before it can be successfully tackled, and secondly that funding for interventive work on aging is very limited, on account of the long period before success can be expected and the ambivalence of society at large (hence governments) concerning such work. But my experience is that on neither of these counts do biogerontologists conscientiously analyse whether their professed frustration is justified. The approach to combating aging that I have propounded since 2000<sup>2-4</sup> is a case in point regarding whether intervention is currently feasible: it has received abundant criticism from the biogerontology establishment,<sup>5,6</sup> but the quality of that criticism has been thoroughly embarrassing,<sup>7,8</sup> betraying profound ignorance both of what I propose and of the experimental work on which my proposals are based (and which, of course, I fully cite in my

publications). The inescapable conclusion is that senior biogerontologists *prefer* to work in a curiosity-driven field with no prospect of practical utility – which biogerontology certainly was when most of them entered the field – than in something with a clear and possibly feasible goal. Similarly, biogerontologists know quite well that their inability to sway the holders of public purse-strings is overwhelmingly a situation that they themselves perpetuate by persisting in the use of rhetoric that prioritises political correctness above scientific rigour: above all, the emphasis on the wholly implausible concept of “compression of morbidity” as the field’s primary goal. (I will elaborate on this below.)

I must nonetheless concede that the last point I touch on above, that of the utility which biogerontologists claim for their work, is a two-way street. Biogerontologists have adopted a manifestly mealy-mouthed message because they perceive that the public, and in particular society’s elected representatives, are not ready to embark on a full-fledged assault on aging: in other words, biogerontologists recognise and work within society’s pro-aging trance.

“Pro-aging trance” is my preferred description of the irrationality in which most of those in the industrialised world indulge when they are called upon to consider the pros and cons of aging.<sup>9</sup> I call it that because it reminds me of nothing so much as the behaviour of subjects in a stage hypnotist’s show when asked to explain the obviously false. A popular example of such a show goes as follows:

- First, the hypnotist impresses upon the subject that his left elbow is the one on the right side of his body and vice versa.
- Having ensured that the subject is in no doubt about which elbow is which, he asks the subject to touch his right elbow with his left hand. Wriggling and writhing ensues, because the subject has not been divested of any other information that he knows about his body, such as that it is in fact easy to touch his right elbow with his left hand.
- Eventually the subject either gives up or is told to stop trying, and the hypnotist asks the subject why he couldn’t do this.
- The subject then proceeds to offer a *completely lucid and unhesitating* explanation.

The supposed entertainment value of this act, of course, is that the explanations that such subjects give are (necessarily) replete with logical enormities that astonishingly elude the subject. I expect the similarity (as I see it) with most people’s attitude to aging needs no further elaboration. The psychological underpinnings of the two cases are also similar: the apologists for aging and the hypnotist’s subjects are both at the mercy of their subconscious, which finds it easier to suppress normal processes of consistency-checking with other beliefs than to abandon a single, very deeply-held belief. In the subject’s case the belief is deeply held despite being very new; in the apologist’s case it has been entrenched throughout life; but that is the only difference. In short, the apologist has made his peace with aging and the prospect of rejoining the fight is too much to bear.

The problem I have with biogerontologists’ acceptance of society’s pro-aging trance as a *fait accompli* is that, as I have already hinted, they are to a large extent its causes as well as its victims.<sup>10</sup> Science is in a profound sense the modern world’s religion: the pronouncements of prominent scientists on their field are generally accepted as fact, at least when they are not conspicuously at variance with those of other scientists with greater perceived authority. As such, a concerted and courageous attempt by biogerontologists at large to condemn the pro-aging trance without ambiguity or circumlocution would go a long way towards breaking that trance, thereby instilling a sense of proportion in society concerning the importance of striving as hard as we can to defeat aging. The reason this would take courage is, of course, because in the short term it would resoundingly challenge the established policies of those whose funding decisions have put biogerontology in the woeful position it finds itself in today but who still dominate its funding allocation processes. Thus it is that only a small minority of

biogerontologists – those with both the security of career and the clarity of vision necessary to see this dilemma for what it is and to face it down – actually aver in public that aging is an unequivocally bad thing.<sup>11</sup>

### **Degree of postponement of aging: a painfully slow but welcome shift**

I confess that the picture is not, as I write, quite so gloomy as I have painted it in the previous section. It's very nearly that gloomy, but I would be unfair if I did not highlight the positives.

A key feature of the pro-aging trance is that, in its most extreme form, it applies only to the *comprehensive* defeat of aging and the consequent availability of *indefinitely* long lives. *Modest* life extension is altogether more appealing. This distinction should not be overstated – it is extremely common to hear even modest life extension branded a luxury, something towards which resource allocation should be contemplated only when diseases that kill the poor at an early age have been thoroughly conquered<sup>12</sup> – but the typical intensity of the knee-jerk reaction against modest life extension falls far short of what radical life extension evokes.

What is altogether more encouraging is that the biogerontology establishment is inching towards a fractionally less curmudgeonly position on combating aging. A prominent exposition of this is an initiative with the suspiciously spin-laden title “The Longevity Dividend” that is being spearheaded by a Washington lobbyist, a geriatrician, a demographer and just one biogerontologist.<sup>13,14</sup> Despite these unpromising characteristics, the Longevity Dividend is a real advance in how the biogerontology establishment sells itself to the powers that be. Two features of it – features that may strike the uninitiated reader as absurdly subtle, but which I feel presage much more – should be especially noted. The first is that the bottom line of this initiative is an explicit call for a large investment – billions of dollars – in research to postpone aging, based on an equally explicit exposition of the benefits that even a marginal success in this venture would confer on the US economy in terms of healthcare costs saved. Never before has the case for life-extension research been stated so publicly and so starkly in language that Capitol Hill might just understand. But in my view, this welcome feature is overshadowed by the second novel aspect of the Longevity Dividend: that it avoids any reference to compression of morbidity. (There was a brief reference to compression of morbidity in the initial publication,<sup>13</sup> but it was excised in the version presented to Congress.<sup>14</sup>)

What is this evil “compression of morbidity” of which I have already twice spoken so witheringly? A little background is in order. I will start, as is traditional, with Gilgamesh.

A foremost tactic that society has employed for maintaining its pro-aging trance is the creation of stories that subliminally reinforce pro-aging fallacies. The Sumerian epic of Gilgamesh,<sup>15</sup> in which the hero fails in two tasks that he has been told would secure him immortality were he to achieve them, was closely followed by the Greek myth of Tithonus, in which the hero is indeed granted eternal life but without the rather important adjunct of eternal youth.<sup>16</sup> The fact that these two tales have survived to the present day reveals much about their attractiveness to society: it shows that the repetition of mantras that life extension should not be sought, however arbitrary and unjustified those mantras may be, is somehow comforting.

Tithonus, rather than Gilgamesh, is in fact the natural starting-point for a discussion of compressing morbidity. In brief, it relates the fortunes of a Greek warrior who won the heart of the (immortal, naturally) goddess Eos. Eos was immortal herself but did not have the power to confer immortality on others, so she asked her father Zeus to make Tithonus immortal. She neglected to ask Zeus to make Tithonus eternally youthful, however, with the result that he aged like mortals, just without the usual side-effect of death. Eventually he became so frail and decrepit that Eos had no choice but to turn him into a grasshopper. The core message of this is, of course, that Tithonus's trajectory – one that can

succinctly be described as the expansion of morbidity – is what we can expect from any success we may achieve in extending life.

All biogerontologists know perfectly well that this is tripe. Being frail is risky. It is true that foreseeable medical advances may be able to extend the period of end-of-life frailty a *small* amount, but it is incontrovertible that the most straightforward way to add a year to someone's life is to add a year to their healthy life, not to their downward slide. Biogerontologists are unanimous on this point and have been declaring it since the dawn of their field.

Unfortunately, biogerontologists have reacted unwisely to the predictable (since trance-induced) tendency of society to remain deaf to this information. Their response has been to exaggerate their rejection of the “Tithonus error” (as it has become widely known) to the point of making their own, equally egregious error.

This error began quietly and ambiguously, signalled by the slogan that appeared on the cover of the inaugural issue of the first learned periodical dedicated to biogerontology, the *Journal of Biogerontology*: “To add life to years, not just years to life.” This was in 1946.<sup>17</sup> Parsed literally, it is no less – but also no more – than a repudiation of the Tithonus error: a statement that the intent of biogerontologists is to postpone frailty. But remove the one inconspicuous word “just” and it becomes something altogether different: an assertion that life extension is a matter of indifference to biogerontologists, or even something to be avoided. With the “just,” by contrast, it is merely categorised as the minor of two altogether unambiguous goals.

The ambiguity I refer to concerns, of course, the subtext – the mindset within which this slogan was adhered to and promoted. Were biogerontologists taking the “just” seriously, or were they quietly ignoring it? The answer to this question eventually became truly and horribly apparent – but only a third of a century later.

In 1980, the Stanford geriatrician James Fries published a seminal article in the *New England Journal of Medicine*<sup>18</sup> that introduced the term “compression of morbidity.” Fries was aware that, though life expectancy (average lifespan) had increased greatly over the past century, there had been little if any change in the lifespan of those fortunates who drew no short straws, whether in terms of genetic, infectious or dietary variation, and thus lived unusually long for their generation. He was acutely aware, also, that a huge proportion of the US populace were the victims of (partially self-inflicted) sub-optimality in their defences against decline into age-related ill-health. He made a bold but, in my view, entirely legitimate inference from these two facts: that, in the short term, there was a major opportunity to raise the average age at which people descended into infirmity, by motivating changes in lifestyle, and – here's the punchline – that, by contrast, efforts to increase the age that people might attain even when they were doing everything right would not bear fruit any time soon. The result of this combination is clear: that, if these lifestyle modifications could indeed be brought about, the average time spent frail at the end of life would diminish. This is the phenomenon that Fries termed “compression of morbidity.”

So far, so good. But I invite you to review the preceding paragraph with care, and to note the complete absence of – indeed, the *reliance* on the absence of – any role for biogerontology. Fries's paper focused on *lifestyle*: in fact, that very word appeared in the paper's abstract. He may have been a fraction too confident about the inability of biogerontologists to make inroads into the postponement of aging in the foreseeable future, but only a fraction: this was 1980, remember.

Such subtleties did not detain the biogerontological mainstream. Without hesitation, they embraced the “compression of morbidity” concept as their own: as a natural extension and intensification of their long-standing and frustratingly impotent assault on the Tithonus error. The fact that it was also a flagrant exaggeration of that assault was happily ignored.

Flagrant? I accept that I must robustly defend such strong condemnation. My defence comes, however, from the best possible source: biogerontological dogma itself. (And, in this case, dogma with which I have no quarrel whatsoever.)

In the late 19<sup>th</sup> century, the towering biologist August Weismann offered an explanation for why so paradoxical a phenomenon as aging exists at all.<sup>19</sup> (Paradoxical, because it seems obvious that the maintenance of a complex machine in a fully functional state is a vastly simpler problem than the construction of that machine, so evolution, having mastered the latter, should find the former a doddle.) He suggested that the competitiveness of a species might be compromised by the absence of aging, because natural selection requires competition between the members of a species in order to respond to changing environmental conditions and this competition might be blunted by the presence of older individuals whose genes had been selected in a former era. It was not until 1952 that the fatal flaw in this idea was noticed, by the renowned immunologist Peter Medawar:<sup>20</sup> namely, that it overlooks the fact that aging is a very rare phenomenon in nature, on account of the multitude of age-independent causes of death that do away with virtually all organisms before aging has done them much harm at all. And rare phenomena cannot exert significant pressure on natural selection, so genes that cause those phenomena will mutate to oblivion over evolutionary time, as the constant rain of spontaneous germline mutations that all genes suffer overwhelms inadequate selective pressure to retain them.

In the intervening half-century, the Medawar model has been repeatedly but ineffectually challenged; essentially no contemporary biogerontologists view the concept of “programmed aging” of typical metazoans as even plausible, let alone preferable to the alternative that aging happens by default in just the same way as it does for machines not subject to natural selection (such as cars). Exceptions exist (salmon being the most oft-cited example), but they age in unusual ways that would not happen by default, so this logic does not apply to them.<sup>21</sup>

Why have I engaged in what you may be thinking was an irrelevant digression in the past few paragraphs? Because it is very relevant indeed. If aging were programmed, one would be altogether entitled to infer that it would impose a cap on our lifespans that would not be raised by interventions to postpone the advance of mere *characteristics* of aging. Conversely, if aging is a consequence of unprogrammed processes that occur by default, we can be very sure indeed that our death will, to a pretty close approximation, be postponed by anti-aging interventions to the same extent that our age-related frailty is postponed. In other words, the case is clear: biogerontologists know full well that appreciable compression of morbidity is only possible if one of the tenets that they hold most dear, the unprogrammed nature of aging, is wrong.

In closing this section, however, let me return to the positive message with which I began it. Yes, the desirability of compressing morbidity (relative to doing nothing) is unchallenged, and yes, the idea that biogerontology can *deliver* compression of morbidity is one of which its proponents should be truly ashamed – but there is light at the end of the tunnel. The good news comes in two parts. Firstly, the implausibility of compressing morbidity seems to have been rather clearly appreciated by those to whom biogerontologists have been appealing for an increased slice of biomedical research funding, since said funding has not materialised. And secondly, recent developments – most important among them being the Longevity Dividend initiative – have demonstrated that biogerontologists are finally hearing that message and retreating from the suicidally implausible message that has for so long dominated their rhetoric.

I cannot authoritatively claim credit for this shift to a more intervention-friendly and scientifically justified expression of biogerontology’s *raison d’être*, but I do like to think that my success over the past few years in forcing radical life extension onto the popular science agenda has played a small part in these first steps towards releasing the biogerontological establishment from its self-imposed straitjacket described above. But, whether or not that is the case, what can confidently be said is that a great deal

more work remains to be done to expose the flaws in society's ambivalence about aging so clearly that the man in the street can no longer maintain that ambivalence. In the remainder of this essay I shall describe what I feel is needed.

### **Breaking the pro-aging trance: exposing its illogicality**

The slivers of good news summarised above are not enough, of course. Those who can cling to the Tithonus error in the face of over 60 years of unanimous expert correction of it will need more than a tiptoeing retreat from the compression-of-morbidity goal to appreciate that the days of their fatalism are numbered.

Rebuttals of the arguments popularly proffered for why aging is a good thing are so numerous that a remotely representative survey of them exceeds the scope of this short essay, though I have offered many such rebuttals elsewhere.<sup>22-27</sup> By way of a substitute, I will here mention just two such rebuttals, which have the distinction that they forcefully challenge not merely one *specific* concern about the defeat of aging, but *every* such concern.

The first of these focuses on logic, and especially on sense of proportion. Aging kills 100,000 people every single day. To elaborate: of the roughly 150,000 deaths that occur each day across the globe, somewhere around two thirds are due to causes that kill hardly anyone under the age of 40. If a cause of death is strongly age-related, it's a death from aging, even if the medical profession might categorise it otherwise. Road accidents are an instructive example: some road accidents are of course entirely age-independent, being the result of mechanical failure, sleeplessness and the like, but many are due to the slowed reaction times, failing eyesight or loss of capacity for sustained concentration that old age inexorably heralds. In the industrialised world, the proportion of deaths that are due to aging is much higher than 2/3 – indeed, it approaches 90%.<sup>1</sup>

Since 100,000 per day is hundreds of times more deaths than occur from each of a wide variety of diseases against which society invests quite a lot of resources, there are, I claim, only four ways to explain why we invest so little in research on combating aging:

- 1) we think it's futile – aging is immutable so why try;
- 2) we think a world without aging would actually be a miserable place for some reason;
- 3) we think the elderly are minimally deserving of longer healthy lives; or
- 4) we refuse to form a rational opinion at all.

I have already expanded on the last of these possibilities, which is what I call the pro-aging trance. The other three alternatives are joined at the hip to the pro-aging trance, however, because they are the main ways in which apologists for aging justify their reluctance to combat it. Option 3, one might think, is easily banished: ageism is a recognised deviation from egalitarian norms that are now firmly established, and it is hard to think of a view more un-egalitarian than that some people have more right than others to life. Yet, even here there is resistance, with many people earnestly asserting that the more life one has had, the less important it is to ensure that one can have more still. At root, this often comes down to a failure to take the question seriously: a tendency to answer the question in the current context, where a given expenditure can add many more healthy years to a young person's life than to a pensioner's. When aging is truly defeated (which only means the attainment of what I have called "longevity escape velocity"), that fact of life is a fact no longer – but the apologist simply jettisons this feature of the question and answers a different one.<sup>23</sup>

I think of the above as an example of failure of sense of proportion, because that is really what all types of discrimination are: if all men (and women) are created equal, it is wrong to put disproportionate effort

into improving the lot of some people relative to others. The “argument from futility,” however, is a rather starker example. Here the failure is one that is all too common in the public’s understanding of science and new technology: an inability to cope with probabilities. The more we might benefit from success in some highly challenging venture, the more effort it makes sense to invest in that venture. But equivalently, the more the benefit would be, the lower the probability that a given amount of effort will succeed needs to be in order to justify that effort. So: how certain do we need to be that aging will not submit to, for example, a \$10B/year assault on it, in order for that assault not to be worth mounting even though success would save 100,000 lives a day? Let’s be more specific still. Technology advances at a certain rate anyway, as a result of sheer scientific serendipity; thus, if aging can be defeated it eventually will be. So the real question is, how much can we bring forward the defeat of aging by trying hard to do so? I believe that a reasonable guess is that we can hasten it by a decade. But let’s say I’m an order of magnitude out, and we can only hasten it by a year. In round numbers, that’s about 30 million lives saved. Even ignoring the question of whether adding potentially centuries or more to someone’s life is more valuable than adding a decade or three (which is the best that most of the causes of death we already work hard to minimise deprive people of), it seems pretty clear that even a 1% chance of success would justify the spending of \$1B/year for, say, 30 years, since that would only amount to \$100,000 over those 30 years per life saved. And no one, not even the most curmudgeonly researcher, would be able to justify an estimate as low as 1% that that sort of money would fail to defeat aging within 30 years.

### **Breaking the pro-aging trance: exposing the immorality of “anti-immortality”**

In this last section, I will complete the analysis of my list of reasons why we invest so little in combating aging, by addressing item 2: the tendency of people to oppose (or, at least, not to support) work to defeat aging because they feel that a post-aging world will not be particularly enjoyable. An example of this is the idea that eliminating death from aging will lower the death rate so sharply that terrible overpopulation will inevitably ensue. In my view, this type of reasoning (generally – not only in respect of overpopulation) is not merely illogical: it is profoundly and clearly immoral.<sup>26</sup>

Many of those reading this essay have had children; all readers have *been* children. Both perspectives teach the simple truth that independence comes gradually but naturally and rightly. In their early years, children must be instructed as well as guided; as they grow the guidance takes precedence over the instruction; and in due course, after they have been given enough opportunity to make their own mistakes and learn from them – and learn how to learn from future ones more efficiently – guidance too gives way, to an exchange of views between equals.

Consider now, if you will, the position of an individual who is aged 80 at the time that the first truly comprehensive rejuvenation therapies – treatments that can give, say, 30 years of extra healthy life – become available. These therapies, like any new technology, will be highly imperfect: expensive and elaborate, for sure, but also arduous and risky. Just as we hesitate to perform major surgery on the frail elderly, we will be unable to save typical 80-year-olds with these therapies, because they will simply be too infirm to survive the short-term stress that the treatment will unavoidably impose. A decade or two later, refinements to these treatments will in all probability have accumulated to the point where even those at death’s door can be pulled back from the brink; but initially this is too much to expect. So our hero will probably be out of luck. Those aged only 70 at this same point in time, by contrast, will on average be more robust – probably robust enough to withstand the acute stress associated with the treatments, and thus to reap their long-term benefits.

Now: let us suppose that, in the early years of the 21<sup>st</sup> century, society balks at investing heavily in research to defeat aging, on the basis of concern for the quality of life that a post-aging world would deliver. Let us further suppose that, in hindsight, it is agreed that this hesitation slowed the arrival of

comprehensive life-extension therapies by about a decade. What does this mean for our unfortunate octogenarians? It means that they are destined to die in the same manner – and at more or less the same age – as their ancestors, whereas, if their forebears a few decades previously had got on with the job, these therapies would have arrived when they were only 70, i.e. in time to save them.

My best estimate is that we have a 50% chance of delivering comprehensive life-extension therapies within about 25-30 years if we really put our minds to it, and that at least a decade is likely to be added to that timeframe if we continue in our current sleepwalk on the matter. (As always, I must stress that these timeframes are immensely speculative: we may get unlucky and take 100 years to reach this goal even if we try hard. But a respectable *chance* of success in this timeframe is all I need to postulate for present purposes.) Thus, the “forebears” of whom I spoke in the preceding paragraph may well, in many cases, be the preceding generation. In other words, the parents of those whose lifespans have been wilfully condemned to the miserable brevity of old will have been the ones who did the condemning.

Let us, now, further suppose that the trepidation of today’s society concerning overpopulation, immortal tyrants and such like has, by the time these therapies actually arrive, been seen for the foolishness that it is: that society of the nascent post-aging era has confronted, and is confident of continuing to confront, such issues in a manner that quite thoroughly maintains its quality of life, just as (albeit with varying degrees of transient turbulence) humanity has always done. The foolishness in question will then be seen as an expression of the pro-aging trance. But will today’s society be forgiven for its failure to snap out of that trance?

Michael Rose, one of the few contemporary biogerontologists courageous enough to have repudiated the establishment’s fear of speaking plainly about aging, made a memorable remark more than a decade ago in a BBC television interview:<sup>11</sup> he said that when (not if) we succeed in doubling human lifespans, we will be ashamed that we did not do so sooner. Rose is Canadian by birth, but he obtained his Ph.D. in the UK; I think it is fair to say that he demonstrated here that the habit of “classic British understatement” somewhat infected him.

### **Conclusion: it is up to us to unblock the triangular logjam**

Society’s prevailing paralysis, or at least inertia, concerning efforts to combat aging is not the fault of any single group in society; rather, it is the result of what in systems engineering one would call a negative feedback loop. It involves three key communities: policy makers (both in government and in the private sector), their electorate (voters and shareholders, respectively), and scientific experts. Scientists have difficulty speaking out against the mainstream thrust of their field, because they rely for funding on peer review of their grant applications and thus cannot afford to undermine their more cautious colleagues, let alone the policy-makers and funders themselves. But policy-makers have as their inevitable top priority the maintenance of their incumbency as policy-makers, and hence the views of their electorate, who will be unimpressed if the policy-makers spend hard-earned (or levied) funds on what that electorate perceive as blue-sky pipe dreams. Thus it is that only those who, through a combination of good fortune, diplomacy and – to be frank – abandonment of diplomacy, have acquired a position of relative invulnerability in this regard can shake this triangular logjam hard enough to have a chance of unblocking it. Quite a lot of shaking will be required, however. We must all shake together – and we must do it now.

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