



MY MAJOR WIKO TRANSITIONS
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Koos Boomsma's career-long interest is to understand adaptive design by natural selection, particularly when social interactions make it ambiguous what optimal design might be. An explicit "gene's-eye" focus on the social insects has allowed him to unravel deep-seated potential conflicts between the sexes, between castes, and between hosts and mutualistic symbionts and to address questions about the origins of major evolutionary transitions in organizational complexity. Born in Rotterdam in 1951, he studied biology in Amsterdam (Ph.D. 1982), had postdoctoral affiliations in Utrecht, Oxford, and Cornell, and settled down in Aarhus, Denmark (1990) and from 1999 on in Copenhagen. He coordinated two EU Research Training Networks in Social Evolution around the turn of the century and started the Copenhagen Centre for Social Evolution in 2005. He has done sabbaticals in Utrecht, Oxford, Regensburg, and Würzburg. His scholarship has been recognized with an elected membership of the Royal Danish Academy of Sciences and Letters (1998), an Alexander von Humboldt Research Award (2001), an honorary doctorate from the University of Helsinki (2010), a Newton Abraham visiting professorship at Oxford (2016), and the quadrennial Hamilton Award by the International Union for the Study of Social Insects (2018). – Address: Department of Biology, University of Copenhagen, Universitetsparken 15, 2100 Copenhagen, Denmark.
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My ten months at the Wissenschaftskolleg were characterized by two kinds of *Major Transitions*. Scientifically, our Focus Group discussed the key tenets of social evolution theory to explain when and why *Major Transitions* in organizational complexity can evolve

when natural selection capitalizes on high relatedness or symbiotic potential. Interestingly, however, Wiko residency also became a major personal transition in symbiosis across the academic disciplines. It soon dawned on me that many linguists, historians, and social scientists have a concept of evolution that merely means progression to something better, both individually and collectively. As an evolutionary biologist, I tend to be sceptical about progress, because natural selection has produced both impressively complex life forms and awful parasites whose bodies lost ancestral endowments for an “honest” independent life to retain only traits of specialized nastiness. Major transitions are relevant here because, very occasionally, life’s history on earth has been punctuated by irreversible upward reboots of life’s organizational complexity. We would like to think these events were unambiguous progress – how else could we have ultimately evolved ourselves to reflect on this topic? But every major gain in life’s complexity has always implied loss of individual freedom of the participants.

For example, the first eukaryote cell came about by one microorganism swallowing and enslaving another, turning it into a domesticated power station that we call mitochondrion (plural mitochondria). When animals, plants, fungi, and several lineages of algae later became multicellular, almost all their cells were domesticated as somatic service-tissue to help the germ cells pass on gene copies to future generations. A fruit fly or an elephant is thus fundamentally more complex in internal organization than the yeast that makes us bread or beer, but every yeast cell does its own thing and divides independently. If elephant cells revert to that deep ancestral legacy, we call their independent cell division cancer; and we know that natural selection has consistently minimized the likelihood that elephant cells do break loose in that manner. Suppression of almost all beginnings of cancer could evolve because animal cells are suicidally loyal to their bodies – they are all clonal so the elephant’s gametes pass on genes to the next generation that are identical to those in all its other cells. Evolved tumor suppression normally lasts until senescence finally makes these checks fail. Just like humans, elephants will die of cancer unless they die of something else first.

While multicellularity thus derives its “progress” from outright domestication and suppression, it appears to become even worse when we move one level of organizational complexity upward – to the ants, bees, wasps, and termites with morphologically differentiated queen, worker, and soldier castes. Every colony of these social insects is an organism in its own right, and every individual worker and queen is as loyal to her colony collective as muscle and bone cells are loyal to the elephant’s body. “Progress” again, it seems,

in sophisticated organizational complexity; but every ant worker is as totally unfree as the muscle and bone cells of the elephant, even though they all have six legs and a brain. A murky reflection made me realize that when human individuals with brains and legs become that loyal to a collective, we call that fascism. Early evolutionists such as Julian Huxley and George Gaylord Simpson therefore made it clear that humans should never use ants or honeybees as sociological models, but that notion was largely lost when socio-biology later tried to make us believe that fruit flies, elephants, ants, and humans are somehow all part of a smooth gradient toward increasing social perfection.

I could not have written these paragraphs before my stay at Wiko. I had the intuitions, but reading lots of older sources that the Wiko librarians tracked down made me realize that evolutionary scholars in the first two-thirds of the 20th century were sometimes thinking more clearly about these fundamental interpretations of social life than my own generation. A sobering insight, flying in the face of what we would like to believe about scientific progress.

Discussions with Wiko Fellows were instrumental in encouraging historical reflection. It often seemed easier to explain the questions that I was wrestling with in the skeptical phrasing of the previous paragraphs than in language that today's science journalists like to use. But metaphors and analogies with human social life remain a two-edged sword. Sometimes, they help to cut a Gordian knot like a hot knife goes through a clump of butter, but anthropomorphic language also often misleads, particularly when we start to emphasize that animals are so sophisticated that we cannot help feeling inspired by them. Is it not marvelous that termites can farm fungus gardens that are free of disease (work by my colleague Michael Poulsen in Copenhagen) or that fungus-farming ants have evolved ways to solve problems of antibiotic resistance when they control crop pathogens with bacterial symbionts? Is it not impressive how clever tool-making Caledonian crows and politically inclined chimpanzees appear to be, not to mention honeybees and their dance language? These animals sometimes seem to be almost like us, but it is all blind natural selection that has created these complex cleverness adaptations. They ultimately serve only one purpose, which is maximizing the efficiency of passing on copies of the genes coding for these characteristics to offspring and other close kin – it is coerced cleverness throughout, even when it involves advanced associative learning.

All this justifies admiration of the efficiency of blind natural selection in “designing” complex adaptations, but we cannot take this as evidence that “with hard work” nature, nurture, and humanity should be able to head for a bright joint future because so many

other animals seem to have made forms of harmonious cooperation work. If nature shows itself to us as a glass half empty rather than half full (of meaning), that is really what it is.

Natural selection does not appreciate *liberté*, *égalité*, and *fraternité* as simultaneous values. When kinship (*fraternité*) drives natural selection for stepwise transitions to higher organizational complexity, inevitably freedom and equality suffer. When rain forests or coral reefs strike us as harmoniously beautiful, that is because unseen death and destruction reign. All visible and invisible life forms in these communities are shaped by a relentless statistical lottery with odds biased against the less strong and not quite optimally functional. A Darwinian understanding of adaptation through natural selection is one of the most profound scientific achievements of all time but – in humanistic terms – it is at best a very mixed bag of pluses and minuses. And if we cannot trust nature to offer us moral values that are good by definition, we are on our own to achieve them. Our only chance of maintaining enlightened universal rights and values – freedom of thought and speech, equality of opportunity protected by law, and appropriate solidarity with the deprived – is to build and maintain public institutions that secure these objectives and to protect and defend them against continuing threats of free-riding, complacency, and corruption.

Academic institutions devoted to the fundamental sciences and humanities are instrumental to help maintain these universal human values, and Wiko is outstanding among them. Since the turn of the century, the appreciation of scholarship has suffered from erosion in many affluent countries, but Wiko – and Germany in general – appear to have been relatively resistant. The political temptation to prioritize academic enterprises of short-term incremental benefit over those pursuing deeper and more fundamental contributions appears to have been less pronounced in Germany than elsewhere. It was that commitment to scholarship that invited us to Wiko, a class of 2018/2019 Fellows representing hugely diverse scholarly and artistic strength. However, it was sobering to experience that a number of Fellows suffered from direct personal repression or depreciation of their fundamental academic freedom by national governments, even though it was encouraging that other Fellows served international missions to remedy these breaches of humanistic values or prevent worse. Overall, the Wiko experience clearly carried the perspective of a glass at least half full, because the potential for a more meaningful future was always there.

Managing academics is comparable to herding cats, and the secret of Wiko's success is precisely that they support rather than manage their Fellows – or if they did manage us it

was subtle enough not to notice. Where dogs focus on their masters, cats associate with the house that feeds them and that is what Wiko practices. The superb devotion of Dunia and her kitchen staff kept us well looked after in a stimulating restaurant setting, and Wiko's unrivalled personal library service and the colloquia nourished our brains. All very apt and consistent with what cats stand for when they thrive. In Japan, a breed of cats symbolizes good fortune, and the Nordic goddess Freya – representing love, beauty, and fertility – rides a chariot drawn by cats. Because of all that, I did indeed thrive academically. My book project developed, not quite as much as I had hoped, but enough to feel assured it is viable. There were, as I understand, an unusually high number of biologists in our 2018/2019 class – both junior and senior, so we could organize a *Social Evolution Forum* to meet and talk, and Wiko used the opportunity to set up a series of informative *Sci-Hum* sessions on sometimes controversial topics of general interest. At times it helped me to think more like a historian or a social scientist and I hope other Fellows came to understand what drives evolutionary biology better than they did before.

It is impossible to live in Berlin for ten months without experiencing a deep sense of world history almost wherever one goes. Even in a luxurious suburban area like Grunewald, one is confronted with the statue of Chancellor Bismarck, who started building the neighborhood, and with the names of many Jewish inhabitants who died during the Nazi regime, as they are commemorated via brass cobblestones in front of the houses where they lived. These are not just history book paragraphs but memories kept alive. It was touching to see fresh flowers at the Rathenau monument just outside Wiko on 24 June, the day on which he – Foreign Secretary of the Weimar republic – was murdered by one of the first street gangs that would help to bring Hitler to power. A visit to Gatow airport, where British airplanes landed for more than a year during the 1948 airlift, was another unforgettable experience and a welcome reminder of the price and resolve that secured the first major Western victory in the Cold War.

Further highlights were visits to the Bauhaus Museum in Weimar, a monumental illustration of how Weimar Republic Germany gave the world deep innovation toward modernity, and to the Reichstag, where soberly designed displays summarize more than a century of tremendous hubris and suffering. However, the same series of panels also disseminate an impressive rebound into what may now well be the best-functioning liberal democracy in the world, at least among the big countries with 50–100 million residents and beyond. The 70th anniversary of the German constitution on 23 May was celebrated for 75 minutes in prime television time on *Das Erste* under the telling title *Im Namen des Volkes*,

which made me wonder how many other established parliamentary democracies would engage in a national celebration of comparable ambition. But all this is fragile and in need of continuous nurture – the Weimar Bauhaus Museum has a *writing-on-the-wall* display with quotations from politicians and “intellectuals” who were instrumental in eroding the credibility of Germany’s first democratic republic – the similarity with contemporary populist language is uncanny.

Fortunately, Berlin’s cultural legacy is not just history, but vibrantly alive and we can only regret we did not experience more of the tremendous variety of high-quality music, theater, and exhibitions. Our special highlight was the Pierre Boulez Saal, where we attended four concert evenings, including the second season’s closing one with Daniel Barenboim as director – a great mix of contemporary and classical music and with an *im-promptu* closing speech by the maestro himself – now 76 – in appreciation of the public’s support throughout the year. Visiting Schloss Tegel, the former residence of Wilhelm von Humboldt, with a Wiko delegation marked our final farewell to Berlin’s cultural pinnacles. Von Humboldt was the German diplomat, philosopher, and linguistic scholar who developed the idea of the enlightened state and its citizens having aligned interests in the pursuit of education, truth, and virtue. It is to him the world owes the concept of research universities and of the doctoral degree as a necessary condition for being employed there.

But let me end with biology. Probably few non-biologists are aware that Berlin’s Museum für Naturkunde hosts the world’s best-preserved fossil specimen of *Archeopteryx*, the famous missing link with both reptile and bird characteristics that symbolizes another major transition in life’s modern appearance. A small animal relative to the huge dinosaur skeletons on display next to it and a fitting reminder that our own mouse-like primate origins would almost certainly not have progressed much further if not all dinosaurs except the bird lineage had been wiped out 66 million years ago.