

Identification, definition and improvement of factors which significantly influence international stability and improve its effectiveness

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Abstract: This paper looks at the converging relationship between artificial intelligence and the human brain, the consequences and risks of the human-machine interface, its effects on individual, national and international stability, and an alternative pathway for human development.

Keywords: Brain Development, Artificial Intelligence, Ethics, Value Systems, Human-Machine Systems.

1. INTRODUCTION

This paper explores how the *artificial* and *human* intelligences relate to the *human brain*; the brain's ability to recreate aspects of its own cognitive development in the outside world; the consequences for individual and international stability, and the steps that can be taken to reduce instability.

Technological advances play a role in international relationships, but, as with all the machines people make, that role can be constrained by culture, law and a greater understanding of the consequences of its use, as in the case of nuclear weapons. Sometimes its role is restricted because the grandiose ambition of its creators does not match reality. "Self-driving cars were meant to be a flagship for the power of AI. Their struggles offer valuable lessons in the limits of technology when compared with humans' quick-fire learning, cognitive flexibility, reference to higher values and ability to apply new knowledge anywhere" (Self-Driving Cars, 2019).

2. BRAIN DEVELOPMENT

"The human brain is the most complex phenomenon in the known universe" (Rose, 2011). It is made up of many parts, each with different functions, which recapitulate human evolution from pre-history to today (Siegel, 2018; Ornstein 1985). The key to human success as a species has been the brain's 'plasticity' or ability to adapt. The subsequent Figure 1 shows the different levels of the human brain.

The first part to develop is the *Primal Brain* at the base of the skull, which relies on two very ancient brain structures to ensure survival. There is the rapid response reptilian core and its *fight or flight* response, inherited from the age of cold-blooded reptiles. It processes vast quantities of internal and external data using algorithms and binary codes, and runs the body's automatic, habit, reward and maintenance systems (Kahneman, 2011). The 'machine learning' of skills, such as driving a car, are broken into repetitive steps by more

advanced parts of the brain, and then handed to the Primal Brain to become automatic in order to free up space for new learning.

HUMAN DEVELOPMENT

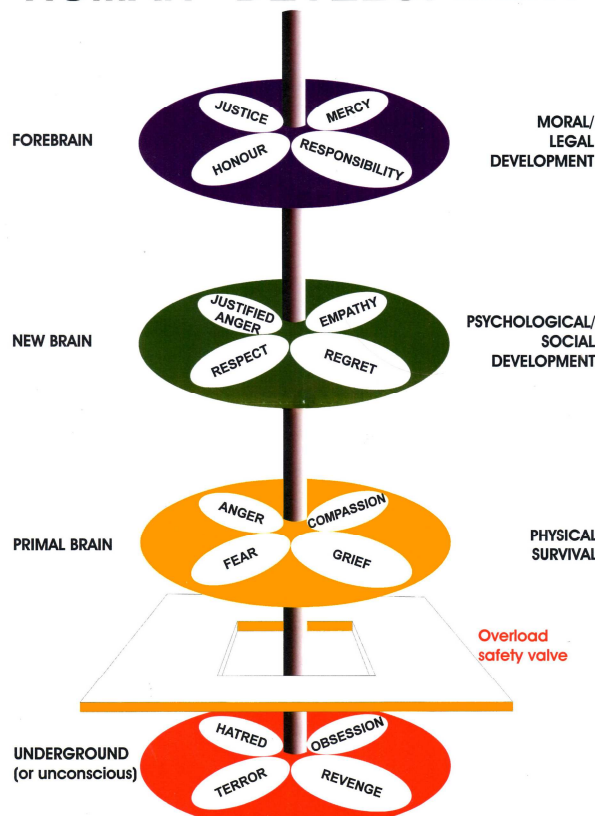


Fig. 1: The Human Brain (Pearson, 2015).

The reptilian core also retains primitive predatory behaviour, and is closely connected to the virtual reality world of the unconscious, similar to the Dark Net sub-culture online. "Facebook's business model depends on appeals to our most basic 'reptile brain' emotions" (McNamee, 2019).

The other ancient survival mechanism in the Primal Brain is the limbic system from the age of warm-hearted mammals. Unlike the individual focus of the reptilian core, this part of the brain helps us to survive collectively by caring for others, particularly the young. “Compared to reptiles, mammals are social creatures” (Wise, 2009). When the anger and fear aroused by reptilian core’s automatic *fight or flight* response is released into the *grief and compassion* of the limbic system, then the emotional energy can flow upwards to more evolved emotions (Holmes, 1998), and activate the brain’s mirror neurons (Rizzolatti, 2005) that reflect back to us what others are feeling, and enable us to self-reflect. If the tension from anger or fear is blocked from being released into the limbic system, it finds another outlet down into the unconscious, which can drive regressive and aggressive behaviour later in life.

The second part of the brain, the *New Brain*, sits above the Primal Brain and is divided into bicameral chambers, *Right* and *Left* (Jaynes, 1976) on either side of the head. The New Brain is responsible for human life beyond physical survival. The *Right Side* is linked to the Primal Brain’s limbic system and matures first as a child learns to adapt as a dependent member to their group’s culture. An adolescent, particularly in the West and through education, crosses over to develop more of the *Left Side* functions of individualism and independence, facts and figures. We all have both Sides and use each one as appropriate: Right Side for attachment and people, Left Side for detachment and things. However, where there has been a block between the reptilian core and the limbic system at an earlier stage, the reptilian core’s predation, *fight or flight* response and automatic systems can feed directly into the Left Side’s focus on the competitive individual, science and technology, and things like money, power and possessions (Raworth, 2017), largely bypassing or neglecting the development of the Right Side. In others, it is education, independence and full development of the Left Side that is blocked by culture or lack of access.

These two ways of seeing ourselves and the world offer contrasting cognitive views: “The Left Side limits the breadth and depth of the perceptual field by its overreliance on linear thinking: by contrast the Right Side seeks potential allies and its processing is characterised by the circle, seeing the whole in depth and ‘in the round’” (McGilchrist, 2009).

On the third level of the brain in Fig.1, there is the *Forebrain* to be found. “When both sides of the New Brain are in balance, then we can make best use of the most highly evolved part of the brain, the Forebrain or prefrontal cortex, which lies behind the forehead. This is ‘the masterpiece of humanity’s evolutionary journey’” (Wise, 2009). It is responsible for the uniquely human skills of insight, foresight and hindsight; the psychological and social advances in justice and responsibility, and the awareness of consciousness and enlightenment. It also has critical oversight over the Primal Brain, and can inhibit the faster, cruder alarm system (Wise, 2009). The Forebrain can access all information from the whole brain when making decisions, a facility replicated in the UN General Assembly, created in 1945 to bring

international stability and maintain peace after World War II.

3. INTERNATIONAL INSTABILITY AND STABILITY

International relations between states used to be conducted by a restricted elite consisting of heads of states, ministries of foreign affairs, diplomats and the armed forces. Now many other actors are involved, including multi-national organisations, cross-border immigrants, religious groups, ministries of commerce, environment, and NGO’s (Jones, 2014), as well as factors such as foreign aid and justice, economic globalisation and communication, and threats such as climate change, environmental pollution, terrorism and inequality. Understanding these complex international interconnections requires a coherent view of the whole complex pattern of psychological, political, social and economic relations – a Forebrain ability beyond the scope of Artificial Intelligence.

Factors which influence instability or stability in international relations have remained consistent over time (Haugen, 2014). Those that cause instability reflect the dominance of the more primitive parts of the brain, and the construct or schema of *man the hunter/warrior* (Livingstone Smith, 2011). These include predatory violence; competition and aggression; lawlessness and greed; social divisions and the demonisation of minority groups; abuse of human rights and damage to the environment (Pinker, 2011). By contrast, the factors which support an international stability that is based on respect for human rights (and not on repression of dissent) include agreed principles of co-operation and mutual benefit; moral sense and self-control; the rule of law and internal cohesion; tolerance of difference; development of democracy, and a preference for peacemaking, human rights and rational behaviour (UN Charter of Human Rights, 1948). The constraint of instability by the forces of stability reflects the growing influence of the Forebrain over the Primal Brain in individual, social and global cultural development.

4. CULTURE

Culture can be defined as the collective mental construct of a group or society. Thus a culture can be, e.g., militaristic, economic, democratic, authoritarian, open or closed. The linguistic terminology indicates which culture, and therefore which part of the brain, is dominant: for example, “mastery”, “rights”, “control” and “unrestricted growth” are linked to the Western capitalist economic model (Raworth, 2017), to the Primal Brain/Left Side worldview, and increasingly to the world of technology. The key question is whether this technological culture of control and growth, in particular artificial intelligence and mass communication, improve or negatively affect international stability? Digital algorithms are not neutral. They reproduce the prejudices, instabilities and cognitive imbalances of their creators and the culture from which they emerge (Susskind, 2018). Even though online communication has played a key role, especially among the young, to promote change in repressive regimes, it has also undermined stability through the promotion of violence, for example ISIS videos and online radicalisation

and it has recently undermined trust in the democratic processes through data manipulation.

5. HUMAN-MACHINE INTERFACE

There are risks in over-stimulating the Primal Brain by synchronising computer and brain activity.

The first risk is of neurological downgrading of humans' quick-fire learning, so that by handing over skills to automation and AI, we lose them. "Build a system to improve human performance and it will lead – ironically – to a reduction in human ability" (Bainbridge, 1983).

The second risk is a reduction in cognitive flexibility. By overdeveloping the algorithms, binary divisions and automatic processing of the *reptilian core* through the human-machine interface, resources are drawn from more advanced brain areas to feed demand from the Primal Brain's overgrowth. This makes it more difficult for people to use their brains' highly evolved executive and creative functions that are needed to resolve complex situations and problems.

The third risk is that scientific objectivity becomes objectification, a schema that fails to differentiate between objects and people, undermining higher human values. If the development of both Left and Right Sides of the New Brain is unbalanced, the differentiation between people and 'things' fails to develop, and other human beings can be seen as objects (McNamee, 2019), or as numbers to be discounted in the drive for higher profits.

The fourth risk is that the overgrowth in the Primal Brain will encourage the automatic, predatory and *us/them* binary thinking of the *reptilian core* to be released online in hate crime, abuse and the rise of nationalism (Nagle 2018) and a regression to primitive behaviours and thinking that directly affect the ability to apply new knowledge anywhere, and to use the intelligence from the whole brain flexibly. Just as internet users are demanding to know how biases in Google's algorithms reinforce prejudices and affect users' thinking and decision-making, people also need to understand how this applies to the brains' own algorithms.

6. THE SNAKE IN THE SYSTEM

Whenever the *reptilian core* becomes dominant, its intelligence is without empathy. Looking back into our pre-history: once animals were farmed and meat was more easily available, the hunters, whose *reptilian core's* predatory skills were well-developed, became largely redundant. Some failed to adapt and instead, angry at the loss of status, turned their cold-blooded, calculating, cunning and killing skills on their own kind, to become violent leaders, backed by a warrior elite, taking the produce of others to consolidate their power (Livingstone Smith, 2011). It is a strategy still used by ruthless political leaders who promise to make those who feel left behind by social changes, and the loss of their status-giving jobs, feel great again driven by a belief in "Be a killer, be a king" (Wolff, 2018).

The role of a dominant *reptilian core* is not restricted to war and dictators, however, but drives most activities now considered criminal. Like the crocodile, the reptilian core does not distinguish between animal and human as prey. "The image of dehumanised people as prey and ourselves as predators comes from our ancient legacy of hunting" (Livingstone Smith, 2011). In this mindset, the non-elite are seen as prey or as farm animals: "Virtually all practices deployed for controlling livestock – whipping, chaining, branding, castrating, cropping ears – have also been used to control slaves. In Nazi thought, the Jews were represented as parasitic organisms" (Livingstone Smith, 2011).

The domination of the Primal Brain's *reptilian core* over other, more evolved modes of cognition influences those who 'make a killing' on the stock market, or in the *fat cats* in business, banking and politics who take the lion's share of the produce of others for themselves (Pearson, 2015). Thus the world is now dominated by two of the *reptilian core* functions: age-old predation and the more recent algorithms in automation. By elevating inhuman intelligence to a superhuman level, we are at risk of losing our humanity as well as our gods.

7. PRACTICAL STEPS

The steps to rebalance the different parts of the human brain, and to inhibit the overgrowth of the *reptilian core* are those that take the *gatherer's* path rather than the *hunter's*.

The starting point is the removal of any blocks that stop the development of the other ancient inherited system in the Primal Brain that works for our collective survival: the *limbic system* from the age of warm-hearted mammals. Thus developing *emotional intelligence* has to be included in quick-fire learning so as to recognise and respond appropriately to emotional responses in ourselves and others (Goleman, 1996). Emotional intelligence relies on the *limbic system*, the Right Side of the New Brain and the vital *mirror neurons* that enable us to feel what others feel. Thus through compassion and caring for others, human beings develop cognitive and emotional *empathy*, the ability to understand other people, and to recognise them as human beings like ourselves. Empathy is the key factor identified to significantly improve relationships and understanding between people and between countries, support international stability and works best in face-to-face communication. "The growing scientific evidence that we are a fundamentally empathetic species has profound and far-reaching consequences for society", and for international stability (Rifkin, 2009). The cognitive mutual understanding and emotional tolerance that empathy requires is beyond the capability of machines, and even of some human beings: for example those on the autistic spectrum who are disproportionately represented in the field of technology, furthermore psychopaths, and those who treat other people as objects, animals or numbers (Baron-Cohen, 2011).

Secondly, there needs to be a change in culture through the rebalancing of Left and Right Sides of the New Brain to

improve cognitive flexibility and internal and external stability. “The Right Side presents an array of possible solutions: the left side takes a single solution that seems best to fit what it already knows. By contrast, an increasingly mechanistic, fragmented, decontextualised world reflects the unopposed action of a dysfunctional Left Side” (McGilchrist, 2009). The omnipresence of the internet has created a replica of life as processed by the Left Side of the New Brain, driven by the *reptilian core’s* automatic and predatory functions.

Thirdly, once both sides of the New Brain are developed and work in harmony, the Forebrain’s reference to higher order thinking and values can be put to best use to create individual and international stability. This is already happening in many cultures with the rise of equality, human rights and democracy. The Forebrain’s skills of insight can open up creativity, of hindsight to use remorse and self-awareness to change direction, and of foresight to predict the consequences of one’s actions.

The final step is to apply anywhere the recent increase in knowledge from neuroscience of how the brain works, including the brain’s internal structures.

In this new venture, IFAC has already played an important role. During the 1990s and well into the 2000 years, the IFAC Committee 9.2 “Social Impact of Automation” has widely discussed all these issues referred to in this paper, supported by the then Committee chairman Dietrich Brandt. They were presented in different ways at the following IFAC Conferences of this Committee: firstly in Berlin (1995), subsequently in Slovenia (1997), and particularly extensively at Aachen University in 2000 (Brandt, 2005). The conference materials have now been incorporated into an online video (Pearson, 2015): Since then these concepts have also been followed further with the IFAC TC 9.5

8. CONCLUSION

Alan Turing (1951) said in a radio broadcast that artificial intelligence can help us understand our own brains better, but this paper seeks to show that this only applies to the automatic data processing systems, not the more advanced brain developments, including cognitive and emotional empathy that seeks understanding and greater awareness of others. However, what automation and AI have done is to externalise some of the Primal Brain’s functions, which can be used as a mirror to see inside the human brain to light the way to a new future for human development itself (van Wyk, 2018), and greater international co-operation and stability.

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