

# PSYCHOLOGY MISCELLANY

No.102 - December 2017

Kevin Brewer

ISSN: 1754-2200

Orsett Psychological Services  
PO Box 179  
Grays  
Essex  
RM16 3EW  
UK

[orsettpsychologicalservices@phoncoop.coop](mailto:orsettpsychologicalservices@phoncoop.coop)

This document is produced under two principles:

1. All work is sourced to the original authors. The images are all available in the public domain (most from [http://commons.wikimedia.org/wiki/Main\\_Page](http://commons.wikimedia.org/wiki/Main_Page)). You are free to use this document, but, please, quote the source (Kevin Brewer 2017) and do not claim it as you own work.

This work is licensed under the Creative Commons Attribution (by) 3.0 License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/3.0/> or send a letter to Creative Commons, 171 2nd Street, Suite 300, San Francisco, California, 94105, USA.

2. Details of the author are included so that the level of expertise of the writer can be assessed. This compares to documents which are not named and it is not possible to tell if the writer has any knowledge about their subject.

Kevin Brewer BSocSc, MSc

An independent academic psychologist, based in England, who has written extensively on different areas of psychology with an emphasis on the critical stance towards traditional ideas.

A complete listing of his writings at <http://psychologywritings.synthasite.com/> and <http://kmbpsychology.jottit.com>.

# CONTENTS

	Page Number
<b>1. DANGERISATION</b>	4
1.1. Introduction	
1.2. Security and dangerisation	
1.3. Repair	
1.4. Dangerous individuals	
1.5. Appendix 1A - Biosecurity	
1.5.1. Refugees to the West	
1.6. Appendix 1B - Virtual plagues	
1.7. References	
<b>2. THEORY OF FABRICATED RAPE</b>	19
<b>3. MEAT-EATING ANCESTORS</b>	22
<b>4. BRAIN MODELS AND CLAIMS</b>	30
<b>5. THE FACE: THREE DIFFERENT STUDIES</b>	36
5.1. Colour	
5.2. Mating-warring association	
5.3. Successful smiles	
5.4. References	

# **1. DANGERISATION**

- 1.1. Introduction
- 1.2. Security and dangerisation
- 1.3. Repair
- 1.4. Dangerous individuals
- 1.5. Appendix 1A - Biosecurity
  - 1.5.1. Refugees to the West
- 1.6. Appendix 1B - Virtual plagues
- 1.7. References

## **1.1. INTRODUCTION**

As Aradau et al (2008) pointed out, "risk is now everywhere", but they then asked, "what difference today introduces with respect to yesterday" (p147).

The post-Cold War period (beginning in the 1990s) is presented as "highly uncertain and characterised by an explosion of risks, including pandemics to organised crime, global warming, failed states, terrorism, poverty and nuclear proliferation" (Aradau et al 2008 p147). But this view tends to "simply conflate the concept of risk with those of danger and threat" (Aradau et al 2008), thus "every month is 'security awareness month'" (Klein 1997).

What is different today. Aradau et al (2008) argued is "an attempt to tame uncertainty and contingency" as risk is "classified, quantified and to some extent predicted. Risk can then be understood as a 'family of ways of thinking and acting, involving calculations about probable futures in the present followed by interventions into the present in order to control that potential future (Rose 200). Risk implies a specific relation to the future, a relation that requires a monitoring of the future, an attempt to calculate what the future can offer, and a need to control and minimise its potentially harmful effects" (Aradau et al 2008 pp148-149). "Technologies of risk" (eg: statistics, disaster-modelling, worst-case scenarios) are used to render the incalculable calculable.

"Risk management thus mobilises knowledge while at the same time exceeding knowability. According to Alan Feldman (2005), 'the risk structure of modernity is the structure of the imperceptible, that which transcends human perception in everyday life despite its immanence in, and parasitic relations to the everyday'. While the imperceptible exceeds everydayness, the 'strangeness' of what is beyond the perceptible is 'tamed' and reincorporated within the functioning of society through cultural mechanisms" (Aradau et al 2008 p151).

In the 9/11 world, insurance companies have offered policies to "ensure the continuity of social and economic life by underwriting this danger [...] Insurance enters the continuum of national security/social security by ordering a future of precariousness, threat, and uncertainty through actuarial practices" (Aradau and van Munster 2008 p192).

This type of insurance takes place under neoliberalism meaning that "insurance becomes a matter of individual responsibility, prudential conduct, and ultimately choice... The mitigation of damage through the provision of insurance is allied with technologies to prevent the occurrence of another terrorist attack" (Aradau and van Munster 2008 p197). Insurance is thus based on the precautionary approach. This approach "makes an explicit statement about the status quo as something worth preserving, as a value in itself: 'It is concerned with ensuring the continuity of the future with the past. The precautionary principle is counter-revolutionary. It aims to restrict innovation to a framework of unbroken progress' [Ewald 2002]" (Aradau and van Munster 2008 p200). Aradau and van Munster (2008) referred to this as the "temporality effect".

They also talked of the "subjectivity effect" (the measurement of life in monetary terms as in the valuing of property), and the "alterity effect". This is the representation of terrorist behaviour in the language of insurance and the "categories of calculability": "If the normal is what is right and what we are to strive for, then abnormality is monstrous and evil. If normality is simply average, then abnormality is a degree of deviation that can be modelled and understood from the standpoint of the normal. For insurance, the terrorist is only a variation and a deviation of 'normal' rationality" (Aradau and van Munster 2008 p204).

## **1.2. SECURITY AND DANGERISATION**

Focusing on the Western view of political risks in the world <sup>1</sup>, Andersson (2016) noted that "'security' is now everywhere". With particular reference to the "post-9/11 US 'counter-terror state'", Masco (2014) showed how "a catastrophic official orientation toward unlimited future (terrorist) threats has seen security practices extended into the global arena and novel fields, ranging

---

<sup>1</sup> Andersson (2016) referred to "the growing geographical divides between 'red' and 'green' zones today" (p709) (he also used the term "dangerisation"). Barnett (2004) divided the world into the developed "functioning core" and the "non-integrated (or non-integrating) gap" (ie: regions with instability that could breed future terrorists), while Gregory (2011) talked of "the everywhere war" against terrorism.

from disease control to development aid and academia <sup>2</sup>, where solid funding streams have emerged on 'border security', 'biosecurity' (appendix 1A), 'cybersecurity', and 'violent radicalisation'" (Andersson 2016 p708). Thus, "security" becomes "naturalised" (ie: seen as obvious and taken-for-granted). It is important, argued Andersson (2016), "to denaturalise security, calling into question how it is summoned, how it is put to work, and how it is given meaning in a specific setting" (p708).

This is not to deny that there are risks - for example, with the targeting of "neutrals" in a conflict, like journalists and aid workers (eg: 61 journalists killed worldwide in 2014 and 155 aid workers in 2013; Andersson 2016).

Beck (1999) spoke of the post-Cold War world as "moving from a world of enemies to one of dangers and risks". Andersson (2016) commented: "This may now seem rather prophetic; yet as danger and risk are gaining salience, we need to recall that risk should not be seen exclusively through a negative prism. Risk is rather double-edged, source of both fear and gains, as seen, for instance, in speculative global finance. Ever since the 1970s oil crisis and the financial revolutions that followed it, the global economy has thrived on risk, engendering a fundamental contradiction between increasingly risk-averse citizens and politicians and the premium put on rampant risk-taking not just in banking (financial risk) but also in sectors such as private security and mercenary activity (security risk)" (p721).

But risk is unevenly distributed across the world, and between different groups in societies. Andersson (2016) again:

---

<sup>2</sup> Keen (2008) used the term "complex emergency" to cover armed conflict as well as public health emergencies and natural disasters, particularly "when they unfold in remote, violent or resource-poor environments" (Stellmach and Beshar 2016). Stellmach and Beshar (2016) continued: "While we use the term partly as convenient shorthand, it also draws attention to the social and anthropogenic nature of crisis. Put simply, 'there is no such thing as a natural disaster'...; the anthropogenic factors that underlie mass casualty disasters, such as over-crowding, under-nutrition, poorly-resourced health systems, inadequate public infrastructure, and dysfunctional or unresponsive governments, are social and political phenomena... According to Keen (2008) these social dysfunctions serve a function: inequity, almost by definition, has beneficiaries. A related perspective argues that all human emergencies are underpinned by structural violence ... Ultimately, the very designation of a set of phenomena as an 'emergency' is itself a social act and a collective invocation to serve moral and political ends... Emergencies are, above all, social" (p2).

A "complex emergency" is a "state of exception" "where the power to impose legal and moral interpretations, to re-shape political and economic norms — often with unintended consequences — belongs to those who control the response. Complex emergencies amplify power differentials and vulnerabilities. In a state of emergency, the laws, rules and norms that govern everyday life may be suspended ... Those who were weak before are made weaker, while the old power structures persist and often reassert themselves with force... In crisis, action itself imparts a moral right of interpretation and imposition. This, naturally, means powerful governments and international actors most often dominate the moral, political and physical sphere in the wake of crisis" (Stellmach and Beshar 2016 p5).

Sassen (1991) has shown the financial world to be condensed into 'global cities' functioning as one-stop shops for speculative capital. Standing in sharp contrast to these are similarly 'extreme zones' for 'new or sharply expanded modes of profit extraction' (Sassen 2014): manufacturing hubs such as China's Shenzhen or the land-grab terrains of swathes of sub-Saharan Africa. These specialised sites in the world economy, Sassen (2014) shows, depend on a transfer of risk from costly Western labourers to poorer counterparts, from blue-chip companies to sub-contractors, and from mining groups to the villages or habitats they destroy. With this global map of risk distribution in mind, the remote danger zones of concern here may be seen as similarly specialised, but not in producing goods or forging out credit default swaps. Rather, they serve as sites for the manufacturing of one important 'product' in contemporary world markets: insecurity or danger. They also serve as zones in which the risk transfers prevalent elsewhere in our economies are taken to their most extreme, as the powerful withdraw from view and leave more vulnerable groups to deal with the dangers (p721).

Masco (2017) argued that the discourse of "crisis" dominates American media and culture, in particular, as a means to maintain the status quo. He stated:

there are no "natural" disasters any more, as the imbrication of technology, economy, and nature creates ever-emerging conditions for catastrophe, making crisis seem a permanent condition when it is in fact the effect of financial, technological, militaristic, and political processes interacting with earth systems. Crisis talk today seeks to stabilise an institution, practice, or reality rather than interrogate the historical conditions of possibility for that endangerment to occur. In our moment, crisis blocks thought by evoking the need for an emergency response to the potential loss of a status quo, emphasising urgency and restoration over a review of first principles and historical ontologies. In an era of complex interlocking systems of finance, technology, militarism, and ecology, unanticipated effects are inevitable and often cascading processes. In light of a post-welfare-state attitude of crisis management, one that does not protect citizens but rather seeks to restore the conditions from which crisis emerged, there is much attention today to precarity as the very condition for living. Precarity and resilience are the twin logics of a neoliberal order that abandons populations in pursuit of profit and then seeks to naturalise those abandonments as the only possible course of action... Put directly, crisis talk without the commitment to revolution becomes counter-revolutionary (Masco 2017 p573).

### **1.3. REPAIR**

Taking a different view, Jackson (2014) outlined "two radically different forces and realities" that are presented: "On one hand, a fractal world, a centrifugal world, an always-almost-falling-apart world. On the other, a world in constant process of fixing and reinvention, reconfiguring and reassembling into new

combinations and new possibilities – a topic of both hope and concern. It is a world of pain and possibility, creativity and destruction, innovation, and the worst excesses of leftover habit and power" (p222). At the fulcrum of these two visions is "repair" – "the subtle acts of care by which order and meaning in complex socio-technical systems are maintained and transformed, human value is preserved and extended, and the complicated work of fitting to the varied circumstances of organisations, systems, and lives is accomplished" (Jackson 2014 p222) <sup>3</sup> <sup>4</sup>.

#### **1.4. DANGEROUS INDIVIDUALS**

Explanations of individuals involved in violent extremism vary from a "terrorist personality" (Kruglanski and Fishman 2006) to an "apparent normality" (Silke 1998). "Evolving knowledge and understanding in this field is revealing that a multitude of personal motives, circumstances and contexts may contribute to why people may become interested and involved in violent extremist groups, causes or ideologies and, perhaps separately, why they may offend on their behalf" (Dean 2017 p281).

It is worth noting that the causes for joining terrorist groups may not be the same as these that maintain membership (or can reduce it) (Dean 2017).

Dean (2017) preferred to concentrate on the nature of the relationships within such groups, and on identity. The latter includes "understanding how the processes of over-identification (where an individual exclusively identifies with one aspect of their life) or identity fusion (where an individual's sense of personal identity becomes fused with a group or sacred value) may contribute to such violence" (p283).

Dean (2017) noted that growing research on "disengagement" or "exit" from violent extremism groups has shown that "many of these circumstances appear to be related to personal confusion, conflict or crisis regarding the group, cause or ideology they are identified with; similar circumstances to those which may have initially attracted their interest and involvement" (Dean 2017 p283).

---

<sup>3</sup> Jackson (2014) argued "that breakdown, maintenance, and repair constitute crucial but vastly understudied sites or moments within the worlds of new media and technology today" (p226).

<sup>4</sup> Repair, though, is experienced differently: "Whether at the level of national 'technological styles' (Hughes 1987) that shape and differentiate the nature of 'same' technologies in different national contexts, or the simple but consequential variations by which industrial commodities are brought into, enlivened, and sustained within the circumstances of individual homes and lives, repair may constitute an important engine by which technological difference is produced and fit is accomplished" (Jackson 2014 p227).



Atran (2016) explain an individual's willingness to make sacrifices for their group or cause with the concept of "devoted actors" (ie: "deontic (ie: duty-based) agents who mobilise for collective action to protect cherished values in ways that are dissociated from likely risks or rewards"; Atran 2016 pS192).

More specifically, Atran and Ginges (2015) described it thus: "People will become willing to protect morally important or sacred values through costly sacrifice and extreme actions, even being willing to kill and die, particularly when such values are embedded in or fused with group identity, becoming intrinsic to 'Who I am' and 'Who We are'" (quoted in Atran 2016).

Key is religious or transcendental beliefs that bind the group together, and provide "unity motivation" (Ray and Fiske 2011). These "sacred values" are "non-negotiable preferences whose defence compels actions beyond evident reason, that is, regardless of calculable costs and consequences" (Atran 2016 pS193). While the binding of the group together produces "identity fusion" (Swann et al 2012), where "personal and group identities collapse into a unique identity to generate a collective sense of of invincibility and special destiny" (Atran 2016 pS193).

The attachment to "sacred values" includes (Atran 2016):

i) A "commitment to a rule-bound logic of moral appropriateness to do what is morally right no matter the likely risks or rewards rather than following a utilitarian calculus of costs and consequences" (Atran 2016 pS195);

ii) The "backfire effect" where reward or punishment to give up the values increases refusal to compromise;

iii) Insensitivity to future considerations;

iv) Obligatory rules dominate (ie: what must done as duty).

Put simply, the individual is the opposite to the "rational actor" who weighs up costs and benefits of actions, and thinks about future consequences. This can be seen in a study of Israeli settlers in the West Bank (Ginges and Atran 2011). Individuals who supported non-violent protests to protect their homes against Governmental removal were more likely to assess the costs and benefits of the behaviour, while individuals who advocated violent resistance were different. "Rather than how effective they thought violence would be in saving their homes, the settlers' willingness to engage in violent protest depended only on how morally correct they considered that option to be" (Atran 2016 pS195).

Atran (2016) challenged the view of "jihadis" as part of "'command and control' organisations sending recruiters to 'brainwash' unwitting minds into joining well-structured organisations" (pS199). Rather, he said, placing the behaviour in an everyday context: "Soccer, paintball, camping, hiking, rafting, body building, martial arts training, and other forms of physically stimulating and intimate group action create a small cultural niche: a bunch of buddies who become a 'band of brothers' in a glorious cause... It usually suffices that one or a few of these action buddies come to believe in the cause, truly and uncompromisingly, and for the rest to follow even unto death" (Atran 2016 pS199).

Atran (2016) continued: "Especially for young men, mortal combat with a 'band of brothers' in the service of a great cause is both the ultimate adventure and a road to esteem in the hearts of their peers. For many disaffected souls today, jihad is a heroic cause – a promise that anyone from anywhere can make a mark against history's most powerful country and its perceived allies" (pS199).

It is important to note that the "devoted actor" does not just explain terrorist groups, but any group where individuals are willing to "sacrifice" themselves for the cause (literally and metaphorically). In a recent literal example, Atran and Stone (2015 quoted in Atran 2016) found commitment to "Kurdistan" among Kurdish fighters against "Islamic State".

Another explanation of extreme behaviour is "syndrome E" <sup>5</sup> (Fried 1997), which sees such behaviour as a disease. It occurs as a result of "cognitive failure", when the prefrontal cortex (responsible for rational thinking and decision-making) stops paying attention to signals from more "primitive" areas of the brain, and the natural aversion to harming others is thus over-ridden. In the same way as obsessive-compulsive disorder, the following of rules rigidly comes to dominate, particularly if the rules of the group involve extreme behaviour (Spinney 2015).

The symptoms of "syndrome E" include compulsive repetitive violence, obsessive beliefs, obedience to authority, perceiving ingroup members as virtuous, rapid desensitisation to violence, fat emotional state, and the separation of violence from everyday activities (Spinney 2015).

But this approach "supposes that only people with flawed minds are capable of evil, when in fact everyone is, given the right (or wrong) context" (Spinney 2015 p43).

---

<sup>5</sup> E = evil.

Talking of "Western jihadists", Hegghammer (2013) asked: "should foreign fighters be treated as lethal terrorists-in- the-making or as harmless freedom fighters? In the past, countermeasures have vacillated between lenience (pre-9/11) and harshness (post-9/11), depending on prevailing assumptions about what foreign fighters 'really' want. Underestimating the threat is dangerous and overestimation expensive, so policy makers need assessments grounded in facts" (p1).

Often, Hegghammer (2013) argued, there is a "conflation of domestic and foreign fighting" <sup>6</sup>, whereas for him, "a 'domestic fighter' is a person who perpetrates or tries to perpetrate violence in the West, whereas a 'foreign fighter' is someone who leaves or tries to leave the West to fight somewhere else" (p1). Hegghammer (2013) continued: "Many assume that jihadists all want to attack the West, and that those who leave do so for training. I argue the opposite, namely, that most Western jihadists prefer foreign fighting, but a minority attacks at home after being radicalised, most often through foreign fighting or contact with a veteran" (p1).

Hegghammer (2013) used a variety of open-source data to estimate the number of domestic and foreign fighters between 1990 and 2010. For the former, Hegghammer (2013) counted 401 individuals (of whom 107 had previously been foreign fighters) from studies of four areas (Europe, USA, Australia, and Canada). Most were failed terrorist plotters. Hegghammer (2013) admitted that the "estimates are, of course, tentative and should be read as indicators of order of magnitude, not precise measurements" (p3).

In terms of foreign fighters, reliable data were even more elusive, so Hegghammer (2013) used anecdotal evidence provided by "qualified observers in written sources" (eg: FBI officials quoted in newspapers). Hegghammer (2013) estimated "'around a thousand' for convenience".

Hegghammer (2013) offered three possible explanations for the preference to become a foreign fighter:

a) Opportunity - "A key difference between domestic and foreign fighting is that in the West, attackers rarely get more than 'one shot' before being killed or arrested, whereas they can fight longer if they reach a conflict zone" (Hegghammer 2013 p6). There is also the "Hemingway effect" - ie: the search for adventure (Sageman 2004).

---

<sup>6</sup> Hemmingsen (2010 quoted in Hegghammer 2013) distinguished between "classical jihadists" (foreign fighters) and "global jihadists" (domestic fighters).

b) Training - It is assumed that future domestic fighters need training which can be best acquired abroad.

c) Norms - Foreign fighting is viewed as more "legitimate" or religiously sanctioned than domestic fighting.

Hegghammer (2013) summed up: "A majority of Western jihadis choose foreign fighting over domestic fighting, most likely because they have come to view the former as more legitimate after observing the distribution of views among religious authorities. The preference for foreign fighting among Western jihadists as a group has weakened over time, because foreign fighting has become more difficult and more ideologues encourage domestic fighting. Still, the preference remains strong" (p10).

However, there is the "'veteran effect' that makes returnees more lethal operatives... They are familiar with the arguments used to counter violence-constraining legal claims, and their combat experience gives them authority and credibility among non-veterans. In addition, they may have developed other motivations, such as a taste of military life or a desire for vengeance. A veteran may thus radicalise the people around him by helping dispel doubts they may have about the legality of domestic attacks. This hypothesis is strengthened by the fact... that 49 of 106 plots involved at least one veteran and by anecdotal evidence that veterans often act as plot entrepreneurs" (Hegghammer 2013 pp11; 12).

Shermer (2013) outlines five myths of terrorism:

i) Terrorists commit "pointless violence for no rational reason". But aggression is used for different reasons - eg: instrumental (to achieve a particular end), revenge, ideological.

ii) Terrorists are "part of a vast global network of top-down centrally controlled conspiracies against the West". But usually small, decentralised, self-organised groups.

iii) Terrorists are "diabolical geniuses". But Abrahams (2006) commenting on the terrorist attacks on US since 2001, described the perpetrators as "neither sophisticated nor masterminds, but incompetent fools" (quoted in Shermer 2013).

iv) Terrorism is deadly. Between 2001 (post 9/11) and 2013, 33 individuals were killed by terrorism in the USA, compared to 13 700 homicides per annum (Shermer 2013).

v) Terrorism works. Cronin (2009) analysed 457

terrorist campaigns since 1968, and found that over 90% failed to achieve even one of the group's goals.

Murder-suicide or "extended suicide", where an individual (say, a father) kills other family members before himself, is "not commonplace but nor is it outside of people's experience" (Gunn 2017 p286). Events like this involving strangers are often called "mass murder" (eg: over 400 US school shootings since 1764; Gunn 2017).

McCarthy (2012 quoted in Gunn 2017) analysed a database of school incidents (Academy of Critical Incident Analysis at John Jay College, New York) - 294 events of attempted or actual multiple killings in 38 countries between 1764 and 2009. The vast majority of perpetrators were lone (85%), 70% involved suicide afterwards, and many of these individuals had experienced bullying.

## 1.5. APPENDIX 1A - BIOSECURITY

"Biosecurity" is an increasingly used term today. After Bingham and Hinchcliffe (2008), Caduff (2014) defined "biosecurity practices" as "the scope of the social, political, and technological efforts to control the circulation of dangerous biological things... ranging from seemingly mundane habits of hygiene, such as hand-washing and disinfection, to complex systems of surveillance and cutting-edge biomedical research... Typically, biosecurity interventions highlight the uncertainty of the future, the unpredictability of events, and the difficulty of controlling life itself" (p106) <sup>7</sup>.

Such practices in relation to disease include "syndromic surveillance" (Fearnley 2008), which is "a system that relies on non-specific data sources such as retail sales, emergency calls, and discharge diagnostics to identify unpredictable but potentially catastrophic outbreaks of disease" (Caduff 2014 p108) <sup>8</sup>.

Cockburn (1963) envisaged a not-too-distant future with "a considerable degree of freedom from infectious diseases" (quoted in Caduff 2014). This faith in science and progress and its inevitable success was derailed by the appearance of HIV/AIDS in the 1980s. So came the "dramatic visions of biological vulnerability" (Caduff 2014) (both in fiction and the mass media, but also in

---

<sup>7</sup> Cohn (2016) challenged the view that plagues and epidemics in history inevitably led to blaming of outsiders and increased prejudice. This was the case for some (eg: 5th century BC in Athens), but not in others (eg: 4th century BC Rome). In other cases (eg: cholera in 18th century Italy), local officials were blamed.

<sup>8</sup> For example, Woolhouse et al (2016) described 37 relatively unknown viruses with epidemic potential.

fact and science).

Caduff (2014) made a wider criticism of biosecurity: "It is not just rationalities of risk and danger but also fantasies of mass death and mass survival that are at the heart of biosecurity. These are fantasies of the state; they have been essential for the formation of national communities and the kinds of sacrifices that modern states demand in the name of the nation" (pp108-109).

The upshot is an inclination of biosecurity "to operate as an 'anti-politics machine' (Ferguson 1990), replacing debate and dissent with calculations of risk and danger" (Caduff 2014 p109).

Caduff (2014) described the paradox of the search for security: "In the system of alert that many states endorsed over the past few years, the probability of a terrorist attack or influenza pandemic is communicated using a scale of primary colours: The risk of an event is 'green', 'yellow', or 'red', corresponding to levels of risk that are low, elevated, or severe, but it is never nil. The purpose of such communication is not to make the public free of fear but to install a permanent sense of insecurity and create a constant state of readiness. In the government-sponsored scheme of green, red, and yellow risk, the freedom from doubt, anxiety, and apprehension has evaporated. And just as biological existence is assumed to be in constant danger, security itself remains liable to the possibility of failure. False alarms are inevitable, mishaps are always possible, and total protection is humanity's greatest fantasy. This, then, is the structure of security's insecurity, a condition of instability that has turned securitisation into a permanent project for a life that has yet to die" (p110) (appendix 1B).

Caduff (2014) reminded us that biosecurity takes place within the capitalist/neoliberal system of today: "When biological vulnerability became a commodity, an infinite source of profit making appeared and the global bio-economy prospered again. The outsourcing of biological security to private corporations and non-governmental organisations generated a market for potential pathologies. This market was based on a form of speculation that was both a response to and an articulation of the presumed infinity of the biological threat; it created a scene of extreme expectation... Experts and officials presented the preparedness plan and the emergency kit as critical assets for citizens and communities. But security's promise was not a promise of health; it was a promise of survival, survival in times of crushed institutions, broken infrastructures, and minimal care" (Caduff 2014 p115).

### 1.5.1. Refugees to the West

Said (1978) used the term "orientalism" to describe the Western binary representation of the West as "superior" to the "inferior" East. But this idea ignored the agency of individuals in the East (Alhayek 2014), and so Ong (1999) coined the term "self-orientalisation" to describe the use of orientalisating representations by individuals in the East.

The upshot is that some privileged voices in the East use the language of Western hegemony to represent themselves, which marginalises other voices (Alhayek 2014).

Alhayek (2014) quoted the example of the online representations of Syrian refugee families in Jordan allowing their daughters to be married to older local men for money in the "Refugees Not Captives" online campaign as not representative of the experiences of Syrian women generally. The campaign was presented as the voice of Syrian feminists, but Alhayek's (2014) interviews with thirty-three Syrian refugee women showed that this was not the case. For example, "Rula" said: "When Refugees not Captives was launched, it was unfair to the respect for Syrian women, men, and families. The problem is with generalisations. If a family marries their daughter off for money, that does not mean that all refugee families do that. I worked with activist groups to follow and document similar cases. We documented around ten cases in Za'atari camp and we started to communicate with the families to help them solve their economic hardship. Now there are almost no forced marriage cases in exchange for money. The Jordanian government also helped us and put many legal restrictions on Syrian women's marriage in order to legalise the process as much as possible" (p698).

Representations in social media of male Syrian refugees is different to that of women. Rettberg and Gajjala (2015) stated that there is "a history of colonial framing of Middle-Eastern men as simultaneously effeminate (in comparison with Anglo-Saxon men) and threatening to women (as potential rapists of white women and abusers of brown women). A more contemporary post-9/11 'invocation of the terrorist as a queer, non-national, perversely racialised other has become part of the normative script of the US war on terror' (Puar 2007), and feeds into a world-view about Middle-Eastern non-Jewish men, who are assumed to be Muslim by default. In the case of the Syrian refugee crisis, the question of what to do with the benign visibility of these non-terrorist Middle-Eastern men is further compounded by that fact that they do not conform to received visual expectations of what a 'refugee' looks like. Their masculinity is put into question when they are not coded

as terrorists or rapists" (p180). This was seen in the comments and images using the Twitter hashtag "#refugeesNOTwelcome".

Harrison (2016) emphasised the media representations of refugees coming to Europe as a combination of "fearful Other and simultaneous victim... relegated to inhabit the camp", and how this marginalises alternatives.

## 1.6. APPENDIX 1B - VIRTUAL PLAGUES

In September 2005, the makers of the massively multi-player online role-playing game "World of Warcraft" introduced a new playable area which involved an enemy who could infect players with a disease called "Corrupted Blood". But this disease "escaped" into other parts of the game.

How applicable is this incident to real-world pandemics? Lofgren and Fefferman (2007), for example, argued that such "virtual plagues" could "bridge the gap" between computer simulations and real-world research.

Oultram (2013), on the other hand, raised two main notes of caution:

a) "Death" in online games is not final, and because individuals (and characters) can return, "players can take more risks with their characters than they would with their own lives" (p116).

b) The "player actions might simply be products of unique facets of computer game play thus limiting real world application and/or interpretation" (p118).

## 1.7. REFERENCES

Abrahams, M (2006) Why terrorism does not work International Security 31, 2, 42-78

Alhayek, K (2014) Double marginalisation: The invisibility of Syrian refugee women's perspectives in mainstream online activism and global media Feminist Media Studies 14, 4, 696-700

Andersson, R (2016) Here be dragons: Mapping an ethnography of global danger Current Anthropology 57, 6, 707-722

Aradau, C & van Munster, R (2008) Insuring terrorism, assuring subjects, ensuring normality: The politics of risk after 9/11 Alternatives 33, 191-210

Aradau, C et al (2008) Security, technologies of risk, and the political: Guest editors' introduction Security Dialogue 39, 2-3, 147-154

Atran, S (2016) The devoted actor: Unconditional commitment and intractable conflict across cultures Current Anthropology 57, sup 13, S192-S203

Atran, S & Ginges, J (2015) Devoted actors and the moral foundations of intractable intergroup conflict. In Decety, J & Wheatley, T (eds) The



Moral Brain Cambridge, MA: MIT Press

Barnett, T.P.M (2004) The Pentagon's New Map: War and Peace in the Twenty-First Century New York: Putnam

Beck, U (1999) World Risk Society Cambridge: Polity

Bingham, N & Hinchcliffe, S (2008) Mapping the multiplicities of biosecurity. In Lakoff, A & Collier, S.J (eds) Biosecurity Interventions: Global Health and Security in Question New York: Columbia University Press

Caduff, C (2014) On the verge of death: Visions of biological vulnerability Annual Review of Anthropology 43, 105-121

Cockburn, T.A (1963) The Evolution and Eradication of Infectious Diseases Baltimore: Johns Hopkins University

Cohn, S (2016) Plague and prejudice History Today March, 31-37

Cronin, A (2009) How Terrorism Ends Princeton, NJ: Princeton University Press

Dean, C (2017) The role of identity in committing acts of violent extremism - and in desisting from them Criminal Behaviour and Mental Health 27, 281-285

Ewald, F (2002) The return of Descartes' malicious demon: An outline of the philosophy of precaution. In Baker, T & Simon, J (eds) Embracing Risk: The Changing Culture of Insurance and Responsibility Chicago: University of Chicago Press

Fearnley, L (2008) Redesigning syndromic surveillance for biosecurity. In Lakoff, A & Collier, S.J (eds) Biosecurity Interventions: Global Health and Security in Question New York: Columbia University Press

Feldman, A (2005) On the actuarial gaze: From 9/11 to Abu Ghraib Cultural Studies 19, 2, 203-226

Ferguson, J (1990) The Anti-Politics Machine: "Development", Depoliticisation and Bureaucratic Power in Lesotho Cambridge: Cambridge University Press

Fried, I (1997) Syndrome E Lancet 350, 1845-1847

Ginges, J & Atran, S (2011) War as a moral imperative: Not practical politics by other means Proceedings of the Royal Society B 27, 2930-2938

Gregory, D (2011) The everywhere war Geographical Journal 177, 3, 238-250

Gunn, J.C (2017) Extended suicide Criminal Behaviour and Mental Health 27, 286-289

Harrison, A.C (2016) Mediations of "the Refugee Crisis": The (ir)reconciliation of ideological contradictions in fortress Europe Networking Knowledge: Journal of the MeCCSA Postgraduate Network 9, 4, 1-18

Hegghammer, T (2013) Should I stay or should I go? Explaining variation in Western jihadists' choice between domestic and foreign fighting American Political Science Review 107, 1, 1-15

Hughes, T.P (1997) The evolution of large technical systems. In Bijker, W.E et al (eds) The Social Construction of Technical Systems: New Directions in the Sociology and History of Technology Cambridge, MA: MIT Press

Jackson, S.J (2014) Rethinking repair. In Gillispie, T et al (eds) Media Technologies: Essays on Communication, Materiality and Society Cambridge, MA: MIT Press

Keen, D.J (2008) Complex Emergencies Cambridge: Polity Press

- Klein, B.S (1997) Conclusion: Every month is "security awareness month". In Krause, K & Williams, M.C (eds) Critical Security Studies: Concepts and Cases London: Routledge
- Kruglanski, A.W & Fishman, S (2006) The psychology of terrorism: "Syndrome" versus "tool" perspectives Journal of Terrorism and Political Violence 18, 193-215
- Lofgren, E & Fefferman, N (2007) The untapped potential of virtual game worlds to shed light on real world epidemics Lancet Infectious Diseases 9, 625-629
- Masco, J (2014) The Theatre of Operations: National Security Affect from the Cold War to the War on Terror Durham, NC: Duke University Press
- Masco, J (2017) The crisis in crisis Current Anthropology 58, sup 15, S65-S76
- Ong, A (1999) Flexible Citizenship: The Cultural Logics of Transnationality Durham, NC: Duke University Press
- Oultram, S (2013) Virtual plagues and real-world pandemics: Reflecting on the potential for online computer role-playing games to inform real world epidemic research Medical Humanities 39, 115-118
- Puar, J (2007) Terrorist Assemblages: Homonationalism in Queer Times (Next Wave) Durham, NC: Duke University Press
- Ray, T & Fiske, W (2011) Moral psychology and regulating relationships Psychological Review 118, 57-75
- Rettberg, J.W & Gajjala, R (2015) Terrorists or cowards: Negative portrayals of male Syrian refugees in social media Feminist Media Studies 16, 1, 178-181
- Rose, N (2001) The politics of life itself Theory, Culture and Society 28, 6, 1-30
- Sageman, M (2004) Understanding Terror Networks Philadelphia: University of Pennsylvania Press
- Said, E (1978) Orientalism New York: Vintage Books
- Sassen, S (1991) The Global City: New York, London, Tokyo Princeton, NJ: Princeton University Press
- Sassen, S (2014) Expulsions: Brutality and Complexity in the Global Economy Cambridge, MA: Belknap/Harvard University Press
- Shermer, M (2013) Five myths of terrorism Scientific American August, p89
- Silke, A.P (1998) Cheshire-cat logic: The recurring theme of terrorist abnormality in psychological research Psychology, Crime and Law 5, 51-69
- Spinney, L (2015) Roots of brutality New Scientist 14th November, 40-43
- Stellmach, D & Beshar, I (2016) Introduction: Special issue on the ethics of anthropology in emergencies Journal of the Anthropological Society of Oxford 8, 1, 1-15
- Swann, W et al (2012) When group membership gets personal: A theory of identity fusion Psychological Review 119, 441-456
- Woolhouse, M.E.J et al (2016) Assessing the epidemic potential of RNA and DNA viruses Emerging Infectious Diseases 22, 12, 2037-2044

## 2. THEORY OF FABRICATED RAPE

False allegations of rape <sup>9</sup> "exist and are by no means harmless" (De Zutter et al 2017). There is a heated debate with claims varying at the extremes from 100% to 2% false. "Whereas Greer (1999) claims the 2% false rape figure is untrue since the figure was not based on sound research, the 100% figure has not been replicated either and was probably caused by methodological flaws. Besides that, it seems impossible that all allegations would be false" (De Zutter et al 2017 p2).

More disturbingly, "police officers seem to believe that false allegations of rape are ubiquitous" (De Zutter et al 2017).

De Zutter et al (2017) proposed the "theory of fabricated rape", which "predicts that differences between the story of a false complainant and a true victim will arise because a false complainant has to fabricate an event that was not experienced and a true victim can rely on recollections of the event" (p2). This is a specific version of the general idea that there is a difference in the content of reports by liars and truth tellers. For example, liars produce a more simple story and fewer details.

In terms of specific research, Marshall and Alison (2006) asked female participants to produce a fabricated story of rape, and compared them to a police database of real cases. There were significant differences between the two sets of material in, for example, sexual acts and positions. The fabricated stories tended to include only one act and position, whereas the true cases had more variety.

Another means to distinguish false and true reports is that the "stereotype" of a rape is more common in the former. Media reports of rape tend not to include intimate or pseudo-intimate behaviours (eg: kissing), and false allegations will often be without these. De Zutter et al (2017) noted: "A woman filing a false allegation will for instance not report kissing, since kissing is not cognitively related to the offence of rape while kissing is a behaviour that is central to the offence of rape, as is exhibited by almost all rapists" (pp3-4).

Using vignettes, Gunby et al (2012) found that participants perceived scenarios with pseudo-intimate behaviour as false allegations (ie: consensual sex).

De Zutter et al (2017) performed an experiment with thirty-five female participants in the Netherlands, who

---

<sup>9</sup> Kanin (1994) used this definition: "The intentional reporting of a forcible rape by an alleged victim when no rape had occurred" (quoted in De Zutter et al 2017).

were asked to produce a false allegation of rape either within thirty minutes (short preparation condition) or after three days (long preparation condition) before being interviewed by a police officer. The stories were then compared to criminal files on 187 behavioural variables (table 2.1). There were no significant differences between the two false story conditions.

- Pulling victim's hair
- Holding victim by neck
- Unnecessary hurting during sex
- Longer than necessary
- Offender sexual comments self
- Offender sexual comments victim
- Licking breasts
- Foreplay
- Anal penetration
- Victim telling details spontaneous

(Data from De Zutter et al 2017 table 2 pp8-10)

Table 2.1 - Examples of behavioural variables which showed significant differences ( $p < 0.0001$ ) between true and false stories.

Comparing the criminal files and false stories, key differences included:

- More details in accounts of true victims, and reported spontaneously.
- True stories included post-rape details.
- False stories were shorter.
- True stories included "a lot of verbal interaction".
- True accounts had different sex acts, whereas false stories were mostly vaginal penetration.
- True victims included violence beyond the instrumental (eg: "unnecessarily hurting the victim during sex").
- Pseudo-intimate behaviours more common in true accounts.

De Zutter et al (2017) summed up: "A true allegation of rape has a complex structure, one that is not conveyed by news media and is therefore not part of the mental representations that lay people have of rape. A true allegation of rape contains a multiplicity of behaviours and a lot of victim-offender interaction. The story of a true rape is therefore a lengthy, detailed, and complex story that entails all the complexities and subtleties of rape" (p10).

De Zutter et al's (2017) "theory of fabricated rape", thus, concentrates on four differences between true and false stories:

i) Fabricated stories are brief.

ii) True stories have more varied sexual acts and positions.

iii) The violence reported in false accounts is instrumental (ie: related to control) rather than expressive (ie: sadistic and unnecessary).

iv) False complainants fill in gaps in response to questions rather than providing spontaneous information.

At the same time, there were no differences on certain variables which the police pay attention to. For example: "The belief that not handing over a diary is indicative of a false allegation might not be a valid predictor of a false allegation even though Dutch police officers seem to believe it is... Almost all false complainants as well as likely true victims were willing to hand over their diary" (De Zutter et al 2017 p12). Another false belief of the police is delayed reported by the victim (De Zutter et al 2017) (table 2.2).

- Victim told friends
- Scratching offender
- Disguise offender
- Attempting digital penetration
- Tearing or cutting clothes
- Victim keeping journal
- Blindfolding victim
- Several months before report
- Screaming/calling for help
- Stalking

(Data from De Zutter et al 2017 table 2 pp8-10)

Table 2.2 - Examples of behavioural variables which showed no differences between true and false stories.

## REFERENCES

- De Zutter, A.W.E.A et al (2017) Filing false vice reports: Distinguishing true from false allegations of rape European Journal of Psychology Applied to Legal Context 9, 1-14
- Greer, E (1999) The truth behind legal dominance feminism's "two percent false rape claim" figure Loyola of Los Angeles Law Review 33, 947-972
- Gunby, C et al (2012) Regretting it after? Focus group perspectives on alcohol consumption, non-consensual sex and false allegations of rape Social and Legal Studies 22, 87-106
- Kanin, E.J (1994) False rape allegations Archives of Sexual Behaviour 23, 81-92
- Marshall, B.C & Alison, L.J (2006) Structural behavioural analysis as a basis for discriminating between genuine and simulated rape allegations Journal of Investigative Psychology and Offender Profiling 3, 21-34

### **3. MEAT-EATING ANCESTORS**

The human brain is about 2% of body weight, but it requires around 20% of energy intake (Pobiner 2016). Aiello and Wheeler (1995) explained the evolution of this situation with the "expensive-tissue hypothesis". Large brains are only possible if our ancestors were meat-eaters, and the size of the liver and gastrointestinal tract are reduced <sup>10</sup>.

But what is the evidence for meat-eating among our ancestors?

It is assumed that the diet of six million years ago (MYA) was similar to chimpanzees today (appendix 3A), who eat mostly fruit, some insects, and meat is a small element (around 3% of total diet; Pobiner 2016). Occasional meat offers macronutrients (eg: protein) that are limited in a vegetarian diet <sup>11</sup>.

The fossil record suggests some differences to modern chimpanzees. Firstly, they catch only small animals, which are eaten immediately, whereas our ancestors ate larger animals, using tools, and the meat was brought back to a central place to share. The pattern of animal bones found near caves (called skeletal part profiles) support this latter idea (Pobiner 2016).

Bunn (1981) placed meat-eating at 1.8 MYA from the skeletal part profile at a site in Tanzania <sup>12 13 14</sup>. Potts and Shipman (1981) found support with an electron microscopy study of animal bones suggesting cutting of muscles from bones.

Evidence of cut-marks on bones and tool use have subsequently moved meat-eating back to 3.3 MYA (ie: before the Homo genus to Australopithecus) (eg: Harmand et al 2015).

The move from occasional meat to "persistent carnivory" has been dated at 2 MYA (ie: Homo erectus) by Ferraro et al (2013) <sup>15</sup>, who reported cut-marks on 3700

---

<sup>10</sup> In terms of other developments, Dunn (2011) described the genetic mutation that allowed the digestion of milk as adults as key in humans developing an agricultural lifestyle (9-10 000 years ago).

<sup>11</sup> Based on analysis of plaque on teeth, Weyrich et al (2017) found a great variety in the diet of Neanderthals, including some who appeared to be eating only moss, bark, and mushrooms (Barras 2017).

<sup>12</sup> Olduvai Gorge (Tanzania) has layers dated 1.8 - 1.6 MYA at lowest (Bed I) and 200 000 - 100 000 YA higher up (Bed IV). Stone tools found in Bed I are associated with Homo habilis (Fletcher 2003).

<sup>13</sup> Bunn described the transition to meat-eating in three steps:

i) "Occasional butchery" (2.5 MYA) (ie: limited ability to get meat from bones, which were scavenged);  
ii) "Habitual butchery" (2.3 - 1.9 MYA);  
iii) "Extensive butchery" (1.8 MYA) (ie: transporting whole carcasses home, probably after hunting, to cut meat off) (Werdelin 2013).

<sup>14</sup> Brain (1981) argued that this skeletal part profile was due to non-human animals (eg: hyenas), and natural death.

<sup>15</sup> Pliocene epoch (5 - 1.6 MYA); Pleistocene epoch (1.6 MYA onwards).

animal fossils <sup>16</sup> and the presence of 2900 stone tools <sup>17</sup> <sup>18</sup>.

The next question is how the meat was acquired. Blumenschine (1989) proposed the answer of scavenging flesh scraps and marrow from kills by large carnivores. Pobiner (2015) tried to calculate the energy gained from such behaviour by observing the meat left on kills by lions in Kenya today. She found that plenty of scraps are left on a zebra carcass, and altogether this gives enough energy (eg: 15 kg of meat on a carcass gives 6000 calories when around 2000 calories needed per day for an adult male *Homo erectus*) (Pobiner 2016).

Bunn and Gurtov (2014) proposed that scavenging would leave mostly bones of old prey (as those are attacked disproportionately more by predators), while hunting ancestors would leave the mortality profile of the bones of prey in their prime. Bones around a Tanzanian site showed the latter (Wong 2014).

Ferraro et al (2013) provided further evidence of hunting from a western Kenyan site. The bones were mostly small antelopes "that if large carnivores had killed them, they would have completely consumed the carcasses rather than leaving any tissue behind" (Wong 2014 p36).

Hunting, ultimately, was important, and physical changes in hominin ancestors aided in the development of this ability, including (Wong 2014):

---

<sup>16</sup> Fossils are dated by the materials they contain by absolute methods (eg: radiocarbon dating) or by relative methods (eg: faunal dating of bones based on knowledge of evolutionary stages of bones) (Groves 2003b). Radiocarbon dating is based on the decay rate of radioactive carbon-14. All living plants absorb minute amounts of carbon-14 from the atmosphere, which is ingested when the plant is consumed. But carbon dating does not correspond simply to calendar years because of fluctuations in the Earth's magnetic field among other reasons (Burenhult 2003).

<sup>17</sup> Early stone tools may not necessarily be evidence of human tool use. It has been observed (Proffitt et al 2016) that wild capuchins in Brazil, for example, smash one rock down on to another, which "unintentionally produced artefacts that look for all the world like stone tools found at some human archaeological sites" (Wong 2017 p9). The monkeys are not making tools themselves. But Roche (2016) argued that "the capuchin findings should not raise suspicions about who produced the early stone tools found in Africa. Archaeologists have studied hundreds of those sites... and many of them contain contextual clues, including cut-marked bones that show how tools were used, as well as fossils that indicate human ancestors made them" (Wong 2017 p10).

<sup>18</sup> Werdelin (2013) outlined the consequences of the "rise of the meat-eater", including the loss of big carnivores (ie: >21.5 kg), and changes to the whole food chain, even plants. These changes appeared between 2 - 1.5 MYA. "Not only did individual species die out, but entire groups of species, such as sabretooth cats, disappeared" (Werdelin 2013 p23). In Africa, 2.5 MYA, there were eleven "true carnivores" - ancestors of lions, cheetahs, leopards, and three types of hyena, as well as five now extinct species - and two of these were extinct by 1.7 MYA (Shipman 2011). Werdelin and Lewis (2013) also showed a reduction in the ecological function of carnivores from that period. Today's carnivores in East Africa, say, are hypercarnivores, and eat mainly meat from a small number of prey species, whereas African mammalian carnivores from 7 MYA, for instance, had a more varied diet (Werdelin 2013).

a) Long-distance running ability (eg: narrow waist, long legs).

b) Loss of fur and the ability to sweat through the skin.

c) The ability to throw with speed and accuracy (eg: sideways-facing shoulder joint) (Roach et al 2013).

d) Brain development and technology (eg: stone tools; spears).

"It is hard to overstate the impact of Homo's shift to a meaty diet. Trends evident in the fossil and archaeological records indicate that it established a feedback loop in which access to calorie-packed food fuelled brain growth, which led to the invention of technologies that permitted our ancestors to obtain even more meat (as well as high-quality plant foods), which in turn powered further expansion of the grey matter" (Wong 2014 p37).

Wrangham (2009) would add the cooking of food as key to the development of the large brain.

Overall, meat-eating was present at 3 MYA (Pobiner 2016).

### **APPENDIX 3A - EVOLUTION OF HUMANS**

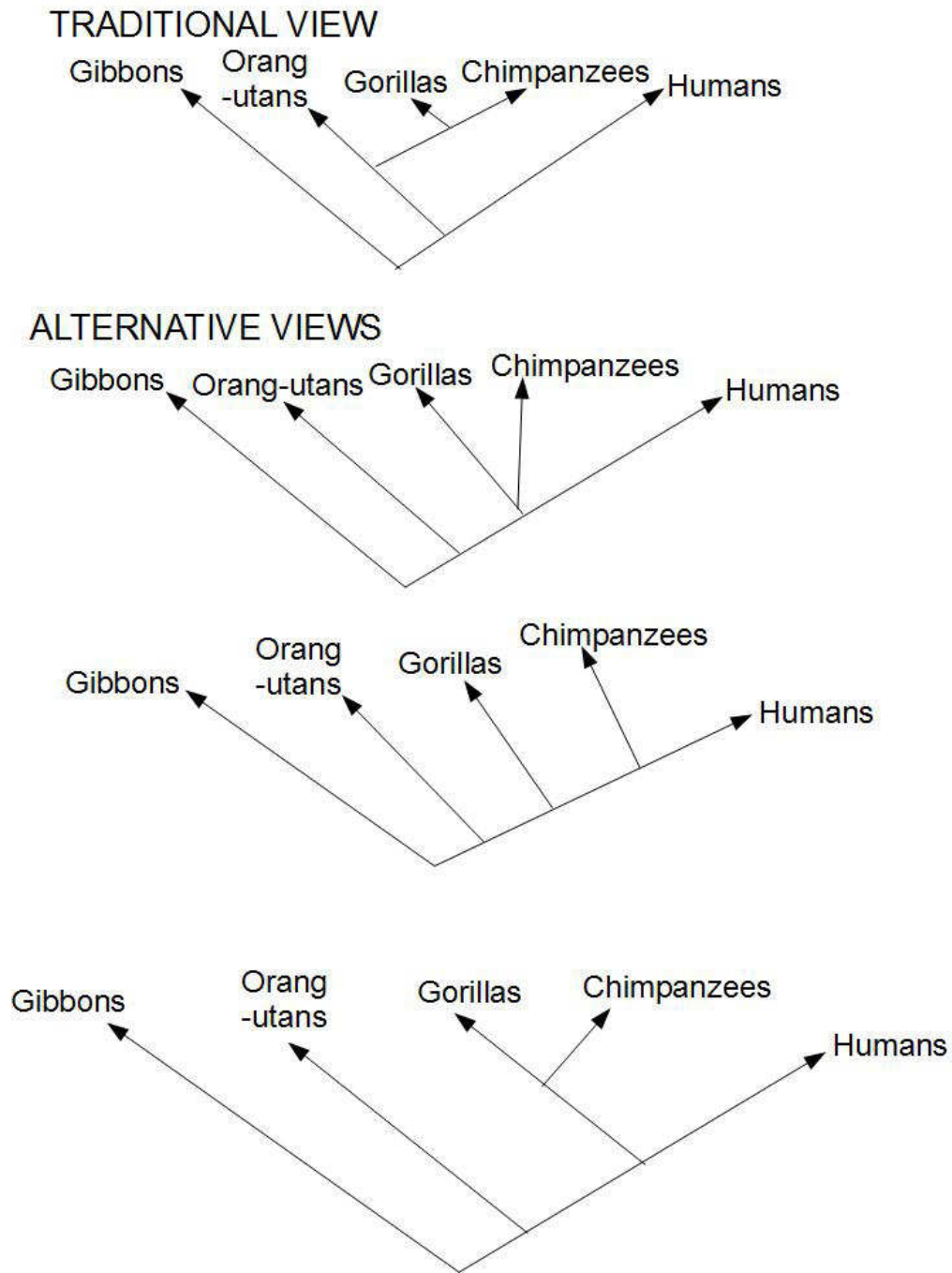
There are different ideas about the evolution of humans from apes (figure 3.1). Generally, the split between gorillas and humans is placed at 8-10 MYA, and between humans and chimpanzees at 4-6 MYA (Katoch et al 2016).

Establishing the lineage of humans is not straightforward, particularly as new fossil finds can both clarify and obscure the evolutionary pathways. Also there is the concept of "homoplasy" (Wood and Harrison 2011) - ie: "different species develop similar traits independently... Independent development means that the presence of a trait, such as walking upright - even in species separated by millions of years - does not guarantee that one species is directly descended from the other" (Harmon 2013 p43).

To what extent did early humans mate with other human-like species like Neanderthals? There are three basic answers to this question (Hammer 2013):

i) None at all (African Replacement model or Out of Africa model) - Humans evolved in sub-Saharan Africa and then moved outwards replacing the archaic human species





(Based on Groves 2003a p43)

Figure 3.1 - Four possible models (cladograms) of the evolution of humans from chimpanzees etc.

without interbreeding.

ii) Quite a lot (Assimilation model) - Linked to the

Multi-Regional Evolution model, this sees humans as evolving in different parts of the world after mating with archaic populations. Homo erectus emerged in Africa and spread outwards is the basis of this process.

iii) Rarely (Hybridisation model) - This model combines the Replacement model with some interbreeding as humans moved out of Africa. This has been updated into the African Multi-Regional Evolution model, which allows for the evolution of humans in Africa and some interbreeding there <sup>19</sup>.

Recent analysis of genes seems to support a hybridisation model (Hammer 2013) <sup>20</sup>.

Evolution occurs through processes like recombination. Recombination is "the exchange of DNA between maternal and paternal chromosomes during meiosis <sup>21</sup>" (Stapley et al 2017 p1). It can produce novel genetic combinations, but can "brake apart favourable combinations of alleles" (Stapley et al 2017). Recombination varies between individuals, species, and taxa, and within the genome (eg: genomic regions called "hotspots") (Stapley et al 2017).

Evolution depends on variation (between individuals from random genetic mutations), selection (for the "fittest" individuals) and inheritance (ie: "fitter" individuals have more offspring). "Any process built purely on random changes has a lot of potential changes to try. So how does natural selection come up with such good solutions to the problems of survival so quickly, given population sizes and the number of generations available?" (Douglas 2016 p35). One answer is "massive parallelism" - ie: many offspring means many opportunities for solutions (Douglas 2016).

Another answer is that natural selection "learns" from past successes (eg: Valiant 2013) (ie: "reuses successful variants from the past") (Douglas 2016). This is the "evolution of evolvability" - ie: evolution gets better at what it does and "not only evolve new adaptations, but improve its ability to do so" (Douglas 2016 p38) <sup>22</sup>.

"Innovation" is a term used to describe unexpected evolutionary changes (ie: "distinctive, apparently

---

<sup>19</sup> Clarkson et al (2017) recently dated excavations in Australia to suggest an earlier arrival of humans than previously thought, which gives more time for interactions with other archaic hominins.

<sup>20</sup> Any one individual today only has a small amount of DNA from Neanderthals, say, but not everyone carries the same bits. Thus, it has been possible to reconstruct the Neanderthal genome (Wong 2015).

<sup>21</sup> Specialised cell division during reproduction.

<sup>22</sup> One version sees genes within organisms as networks (eg: Watson and Szathmary 2016).

improbable changes to the phenotype") (Hochberg et al 2017). This novelty has to have positive fitness advantages to be innovation <sup>23</sup>.

Hochberg et al (2017) distinguished:

a) Performance innovations - "the novel phenotypic trait is associated with increases in performance, without fundamental changes to the organism's ecological niche" (Hochberg et al 2017 p3).

b) Niche innovations - "the novel phenotypic trait is associated with the utilisation of a new ecological niche" (Hochberg et al 2017 p3).

Hochberg et al (2017) proposed four criteria to identify innovations, which can be applied to the example of winged flight in birds that emerged as an innovation in their reptile ancestors:

1 - The new trait is qualitatively different from the previous trait.

2 - The new trait is associated with an increase in performance.

3 - The new trait confers a fitness advantage.

4- The population with the new trait will have advantages over other populations.

All birds have an advantage from wings, even flightless birds, because wings are used for other behaviours as well as flying (eg: flap-running, paddle-swimming, displays) (Hochberg et al 2017).

## REFERENCES

Aiello, L.C & Wheeler, P (1995) The expensive-tissue hypothesis: The brain and digestive system in human and primate evolution Current Anthropology 36, 199-221

Barras, C (2017) Neanderthal Paleo diet was meat, veg and drugs New Scientist 11 March, p9

Blumenshine, R.J (1989) Characteristics of an early hominid scavenging niche Current Anthropology 28, 383-407

Brain, C.K (1981) The Hunters or the Hunted? An Introduction to

---

<sup>23</sup> "A novelty stems from a series of inventions (mutations in biology; discoveries, ideas, or new devices in culture and technology) and/or recombination events to a blueprint, buttressed by facilitating phenotypic traits, such as standards. A novelty may affect structure (eg: biochemical pathways, tissue architecture, appendages) and/or function, and particularly for the latter be associated, for example, with the ways organisms acquire resources, evade predators, interact with other organisms and modify their environments through niche construction or technologies" (Hochberg et al 2017 p2).

African Cave Taphonomy Chicago: University of Chicago Press

Bunn, H.T (1981) Archaeological evidence for meat-eating by Plio-Pleistocene hominids from Koobi Fora and Olduvai Gorge Nature 291, 574-577

Bunn, H.T & Gurtov, A.N (2014) Prey mortality profiles indicate that early Pleistocene Homo at Olduvai was an ambush predator Quaternary International 322-323, 44-53

Burenhult, G (2003) Radiocarbon: A key to the past. In Burenhult, G (ed) People of the Past San Francisco: Weldon Owen

Clarkson, C et al (2017) Human occupation of northern Australia by 65 000 years ago Nature 547, 306-310

Douglas, K (2016) Intelligent without design New Scientist 26th March, 35-38

Dunn, R (2011) When cows changed our genes Discover Evolution Summer, 59-62

Ferraro, J.V et al (2013) Earliest archaeological evidence of persistent hominin carnivory PLoS ONE 8, 4, e62174 (Freely available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0062174>)

Fletcher, R (2003) Olduvai Gorge: A window on the past. In Burenhult, G (ed) People of the Past San Francisco: Weldon Owen

Groves, C (2003a) Our earliest ancestors. In Burenhult, G (ed) People of the Past San Francisco: Weldon Owen

Groves, C (2003b) Dating the past. In Burenhult, G (ed) People of the Past San Francisco: Weldon Owen

Hammer, M.F (2013) Human hybrids Scientific American May, 52-57

Harmand, S et al (2015) 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya Nature 521, 310-315

Harmon, K (2013) Shattered ancestry Scientific American February, 36-43

Hochberg, M.E et al (2017) Innovation: An emerging focus from cells to societies Philosophical Transactions of the Royal Society B 372, 20160414

Katoh, S et al (2016) New geological and palaeontological age constraint for the gorilla-human lineage split Nature 530, 215-218

Pobiner, B (2015) New actualistic data on the ecology and energetics of scavenging opportunities Journal of Human Evolution 80, 1-16

Pobiner, B (2016) Meat-eating among the earliest humans American Scientist March-April, 110-117

Potts, R & Shipman, P (1981) Cut-marks made by stone tools on bones from Olduvai Gorge, Tanzania Nature 291, 577-580

Proffitt, T et al (2016) Wild monkeys flake stone tools Nature 539, 85-88

Roach, N.T et al (2013) Elastic energy storage in the shoulder and the evolution of high-speed throwing in Homo Nature 498, 483-487

Roche, H (2016) Stone that could cause ripples Nature 539, 34-35

Shipman, P (2011) Creature comforts New Scientist 28 May, 33-36

Stapley, J et al (2017) Recombination: The good, the bad and the variable Philosophical Transactions of the Royal Society B 372, 20170279

Valiant, L (2013) Probably Approximately Correct: Nature's Algorithms for Learning and Prospering in a Complex World New York: Basic Books

- Watson, R.A & Szathmary, E (2016) How can evolution learn? Trends in Ecology and Evolution 31, 2, 147-157
- Werdelin, L (2013) King of beasts Scientific American November, 21-25
- Werdelin, L & Lewis, M.E (2013) Temporal change in functional richness and evenness in the Eastern African Plio-Pleistocene carnivoran guild PLoS ONE 8, 3, e57944 (Freely available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0057944>)
- Weyrich, L.S et al (2017) Neanderthal behaviour, diet, and disease inferred from ancient DNA in dental calculus Nature 544, 357-361
- Wong, K (2014) Rise of the human predator Scientific American April, 32-37
- Wong, K (2015) Neanderthal minds Scientific American February, 26-33
- Wong, K (2017) Whose tools are those? Scientific American January, 9-10
- Wood, B & Harrison, T (2011) The evolutionary context of the first hominins Nature 470, 347-352
- Wrangham, R (2009) Catching Fire: How Cooking Made Us Human New York: Basic Books

## 4. BRAIN MODELS AND CLAIMS

"The brains of mammals contain some  $10^8$ - $10^{11}$  <sup>24</sup> neurons, organised into well-defined groupings, and each neuron possesses up to thousands of synaptic connections with other neurons" (Turner and De Haan 2017 p184). Faced with such complexity, how to make sense of brain function? The answer is brain models (and simulations).

The "big science" projects "building" brain models like the "Human Brain Project" have been described as empirical research that will "enable the formulation of multi-scale theories and predictive neuroinformatics by modelling and simulation to identify organisational principles of spatial and temporal brain architecture" (Amunts et al 2016 quoted in Mahmoud et al 2017) <sup>25</sup> <sup>26</sup>.

With such brain models, many feel, that "an integrated understanding of the different scales or levels of the brain that neuroscientists usually study in isolation – genes, molecules, neurons, networks, brain regions, all the way to the whole brain – can be achieved, leading to better treatment of brain disorders and illnesses" (Mahmoud et al 2017 pxi) <sup>27</sup>.

But brain models are just that <sup>28</sup>. Many models focus on the brain in isolation, whereas the "vital brain" is a term used to describe "a shared understanding of brains as complex open systems, shaped by constant interactions between nervous system bodies, as well as social and cultural processes" (Mahmoud et al 2017 pxi). In other words, "a living organism is inseparable from its location in time (the time of evolution, the time of development, the time of its existence) and space (the space mapped by its incessant transactions with other organisms and with its environment)..." (Mahmoud et al

---

<sup>24</sup> This is 10 followed by 8 or 11 zeros (ie: very large numbers).

<sup>25</sup> The aspirations of large-scale projects can be seen in this quote in an introduction about the "Human Brain Project" in 2011: "petascale computers, now available, are potentially powerful enough for cellular level simulations of the whole rodent brain, or for molecular-level simulations of single neurons. Exascale computers, predicted for the end of the decade, could allow cellular-level simulations of the complete human brain with dynamic switching to molecular-level simulation of parts of the brain when required" (Markram et al 2011 quoted in Serban 2017).

<sup>26</sup> More soberly, Turner and De Haan (2017) stated: "Models constructed at the scale of the entire brain that specify individual neurons as components are obviously unusable. While much is known regarding the typical characteristics of typical neurons, no method has yet been established for mapping every neuron in an actual mammalian brain, together with its activity over time. Even if such data could be obtained, the computational power available in the most powerful computers yet available would be wholly inadequate to the task of making testable predictions of the future states of such a model system" (188).

<sup>27</sup> The "normal" brain is an "epistemic thing" (ie: "an object that is studied to learn something about it") while the "abnormal" brain is a "technological object" (ie: "an object that could be used as a tool for elucidating something else") (Keuck 2017 p42).

<sup>28</sup> Geertz (1973) saw models "not just as 'models of' but also as 'models for' something - as devices that are both descriptive and prescriptive" (Langlitz 2017 p68).

2017 pxiv).

Borck (2017) observed that at the moment "brain research counts among the most productive and visible areas science, rivalled perhaps only by genetics and molecular biology" (p1). He continued: "As a consequence of the massive concentration of research into studies on/of the brain, and regardless of the yet-to-materialise breakthrough in understanding mind and soul, a new anthropology seems to be emerging: an understanding of many if not most things human as being related to neuroscientific data" (Borck 2017 p4). What Ortega and Vidal (2011) called "neuroculture" (ie: "autonomy centres now on 'brainhood' (Vidal 2009), the neurophysiological basis of individual traits; and subjectivity can be characterised neuroscientifically as anchored in a 'cerebral subject (Ehrenberg 2004), the neurophysiology and neuropsychiatry of lived experience"; Borck 2017 p4). More than that, "neuroculture" refers to the belief that neuroscience can explain cultural phenomena (Borck 2017).

Borck (2017) emphasised "how the research technologies employed for exploring the brain and for visualising its activity have shaped theories and models about the brain and its functioning" (p2). In terms of the history of the study of the brain, Borck (2017) expanded: "Research technologies generate data which, in turn, foster frameworks for interpretation and relate to brain models and brain theories: the characterisation of reflex action generated reflex theory with the telegraph system or telephone switchboard as the guiding model, pathological localization and the microarchitecture of cerebral organs inspired localisation theory and the classification of brain types, and the recording of electrical signals generated the notion of the 'action' potential which, in turn, resulted in the theory of a universal signalling code in the nervous system – and from there to information theory and the computer model... Each of these frameworks and paradigms clustered around different instruments and disciplinary approaches" (p12).

Langlitz (2017) distinguished between transparent and opaque models: "A transparent model is a simplified representation of a real world phenomenon. If it is not patently clear, it is at least much better comprehended than its objects of representation. An opaque model, by contrast, looks at one only partially understood phenomenon to stand in for another partially understood phenomenon. Here, the model is often just as complex as its target" (p53). An example of an opaque model is the dreaming brain as a model of consciousness or of

psychosis (Langlitz 2017) <sup>29</sup>.

The "computer metaphor" of the mind (ie: rational, rule-based and serial information processor) dominated from the end of World War II until the early 1980s, but this model declined in interest with changes in industrial society, Stadler (2017) argued. The mind of "post-industrial cognition" is "parallel", "tacit", and "embodied and embedded". Artificial intelligence (AI)/computers are now seen as rational and humans are not.

The antithesis to the "computer metaphor" today is summed up by Robert Epstein recently: "we don't store words or the rules that tell us how to manipulate them. We don't create representations of visual stimuli, store them in short term memory buffer, and then transfer the representation into a long-term memory device. We don't retrieve information or images or words from memory registers. Computers do all of these things, but organisms do not" (quoted in Bruder 2017).

Bruder (2017) saw the idea of "infrastructural intelligence" from computer science becoming the new model of the brain. "Infrastructure, by definition marginalised 'as a substrate, something upon which something else "runs" or "operates"', is generally conceived as 'something that is built and maintained, and which then sinks into an invisible background' (Star and Ruhleder 1996)" (Bruder 2017 p111). This means that "the biological brain takes a backseat in favour of the cerebral infrastructures of intelligence, creativity, and subjectivity..." (Bruder 2017 p122).

For Haueis and Slaby (2017) the "brain as a network" is the "dominant metaphor of contemporary brain research", and it fits with the idea of modern "network societies" <sup>30</sup>. This is seen in the use of "connectome" ("defined as 'inventories' or 'part lists' that completely describe the entities in the domain of neural connectivity") in models.

Turner and De Haan (2017) talked of "a crisis in brain science", including over "how the European Human Brain Project should be steered and directed, the distress regarding 'voodoo' brain imaging results... caused by bad practice in data analysis (resurfacing in a further panic about estimates of spatial extent...), and

---

<sup>29</sup> Serban (2017) distinguished two types of large-scale neural simulations - model-oriented applications that look for new ideas about brain organisation and function, and data-oriented applications that collect data that other neuroscientific methods cannot.

<sup>30</sup> "The way of life in question is that of contemporary network sociality (Wittel 2001) — the highly interconnected, communication-intensive, mobile, and flexible lifestyles of creative knowledge workers in the developed West, what has been analyzed by sociologists as 'the new spirit of capitalism' (Boltanski and Chiapello 2005)" (Haueis and Slaby 2017 p169).



reactions to the author's own critique of neuroimaging analyses which rely on drastic spatial smoothing of reasonably high-resolution raw data" (p180). They continued: "A number of preliminary issues pertain to the uncritical adoption and employment of particular conceptual frameworks or theoretical assumptions in the descriptions, interpretations, and explanations of experimental data" (Turner and De Haan 2017 p180).

At the root of these issues for Turner and De Haan (2017) is the problem of the relationship between the mind and the brain. In recent times, "mind" has been relabelled as "cognition" as one solution, but many researchers "take the English word 'cognition' to mean the processes internal to the brain that culminate in the encoding of memories, planning of action, or directly as immediate actions. This common practice must be regarded as metaphorical, and thus not really scientific" (Turner and De Haan 2017 p181).

Turner and De Haan (2017) listed their criticisms of models based on modern neuroimaging:

a) Components of the models are "typically ill-defined", such that often "assignment of activity to named brain regions is no more than informed guesswork" (p210).

b) The way in which components interact and are organised is "also poorly defined", and "the directionality of any of these connections is very hard to deduce" (p210).

c) The mereological fallacy - ie: "ascribing to portions of the brain psychological concepts that only make sense when ascribed to whole human persons", and this can "encourage the idea that mental tasks can be localised in specialised brain tissue" (Turner and De Haan 2017 p210).

## **ANIMAL EXAMPLE**

Runyan et al (2017) placed mice in a virtual-reality T-shaped maze, which was navigated by noise cues (eg: noise from left meant move left at T-junction), and simultaneously measured brain activity using two-photon calcium imaging. A genetically engineered protein reacts (fluoresces) in response to calcium ions, which is a signal that a neuron is firing (David 2017).

The researchers were interested in "neuronal coupling" where two or more neurons close together fire simultaneously. Concentrating on the posterior parietal cortex, which is involved in decision-making. Runyan et al (2017) found that neuronal coupling appeared several

milliseconds before a behavioural response in the maze. This suggested that "information about decision-making emerges and is maintained by sequential activation of connected sub-networks of neurons in the posterior parietal cortex" (David 2017 p36). This finding fits with the "synfire" chain model of neuronal activity (Abeles 1982), which is "the idea that a coupled assembly of firing neurons can form a chain that maintains and transmits information through dense thickets of interconnected neurons" (David 2017 p36).

Runyan et al (2017) was the first study to use a virtual-reality maze and two-photon calcium imaging together (David 2017).

But David (2017) raised a word of warning: "Although Runyan and co-workers' results are compelling, it remains to be proved whether coupling has a causal role in decision-making, or whether the phenomenon is generalisable across brain regions, species or behaviours" (p36).

## REFERENCES

- Abeles, M (1982) Local Cortical Circuits: An Electrophysiological Study New York: Springer
- Amunts, K et al (2016) The human brain project: Creating a European research infrastructure to decode the human brain Neuron 92, 3, 574-581
- Boltanski, L & Chiapello, E (2005) The New Spirit of Capitalism London: Verso
- Borck, C (2017) Vital brains: On the entanglement of media, minds, and models Progress in Brain Research 233, 1-24
- Bruder, J (2017) Infrastructure intelligence: Contemporary entanglements between neuroscience and artificial intelligence Progress in Brain Research 233, 101-128
- David, S.V (2017) Neurons couple up to make decisions Nature 548, 35-36
- Ehrenberg, A (2004) Le Sujet cerebral Espirit 309, 11, 130-155
- Geertz, C (1973) The Interpretation of Cultures New York: Basic Books
- Haueis, P & Slaby, J (2017) Connectomes as constitutively epistemic objects: Critical perspectives on modelling in current neuroanatomy Progress in Brain Research 233, 149-178
- Keuck, L (2017) Slicing the cortex to study mental illness: Alois Alzheimer's pictures of equivalence Progress in Brain Research 233, 25-52
- Langlitz, N (2017) Opaque models: Using drugs and dreams to explore the neurobiological basis of mental phenomena Progress in Brain Research 233, 53-72
- Mahmoud, T et al (2017) Preface Progress in Brain Research 233, xi-xx
- Markram, H et al (2011) Introducing the Human Brain Project Procedia Computer Science 7, 39-42
- Ortega, F & Vidal, F (2011) (eds) Neurocultures, Glimpses into an Expanding Universe New York: Peter Lang

Runyan, C.A et al (2017) Distinct timescales of population coding across cortex Nature 548, 92-96

Serban, M (2017) Learning from large-scale neural simulations Progress in Brain Research 233, 129-148

Stadler, M (2017) Man not a machine: Models, minds, and mental labour, c.1980 Progress in Brain Research 233, 73-101

Star, S.L & Ruhleder, K (1996) Steps toward an ecology of infrastructure: Design and access for large information spaces Information Systems Research 7, 111-134

Turner, R & De Haan, D (2017) Bridging the gap between system and cell: The role of ultra-high field MRI in human neuroscience Progress in Brain Research 233, 179-220

Vidal, F (2009) Brainhood, anthropological figure of modernity History of the Human Sciences 22, 1, 5-36

Wittel, A (2001) Towards a network sociality Theory, Culture and Society 18, 6, 51-76

## **5. THE FACE: THREE DIFFERENT STUDIES**

- 5.1. Colour
- 5.2. Mating-warring association
- 5.3. Successful smiles
- 5.4. References

### **5.1. COLOUR**

"Unlike most other animals, humans have the ability to use and interpret colour where it does not naturally occur and we imbue colours with complex meanings" (Rowland and Burriss 2017 p1) <sup>31</sup>. Variety in colour of skin due to diet and hormone levels, for instance, can affect how individuals are perceived.

Applying an evolutionary framework, "in both humans and non-humans, some colour signals are proposed to arise from the evolutionary pressures on females to select healthy, disease-free mates, and on males to display their healthy, disease-free state" (Rowland and Burriss 2017 p2). For example, humans with redder skin are perceived as more healthy, and judged as more attractive (Rowland and Burriss 2017).

When experiments allow participants to adjust the skin colour of facial images on a computer, they increase skin blood colour (which are taken as signs of blood perfusion and oxygenation, and ultimately health) (eg: Re et al 2011) (figure 5.1).

Yellower skin is perceived as more attractive in male faces (which again is related to health, through melanin and carotenoid pigments) (Rowland and Burriss 2017).

In relation to the ovulatory cycle, Jones et al (2015) reported that women's facial skin was significantly redder, but not yellower, when saliva measures of oestrogen were increased (ie: ovulation). As to whether these changes are detectable to normal vision is debated (Rowland and Burriss 2017). Likewise, reddened male facial skin and anger does sometimes occur, but it may not be visible (except with sophisticated equipment) (Rowland and Burriss 2017).

Rowland and Burriss (2017) made this conclusion about the study of human colouration: "Clearly, overall changes in facial colour and contrast are sufficient to alter face perceptions but do not tell the whole story. For example, while we know that red lips are more

---

<sup>31</sup> Elliot and Maier (2014) proposed the "colour-in-context" theory to explain how colour affects human psychological functioning.



(Top photographs have lower oxygenated blood colour and are rated as less healthy and attractive than the lower photographs)

(Source: Re et al 2011 figure 1)

Figure 5.1 - Pictures used by Re et al (2011).

attractive, we do not know if this is because they are red or because they are redder than the surrounding skin, or whether dark periorbital regions appear less healthy because they are dark or because they are darker than the surrounding skin" (p6).

## 5.2. MATING-WARRING ASSOCIATION

"Throughout human history, men, but few or far fewer women, have fought in wars, and unmarried young men, rather than married or older men, have been more likely to go to war" (Chang et al 2011 p976). These authors argued that because of the post-war mating advantages for men, war is linked to sexual selection theory. They provided evidence from four experiments to support this argument (the "mating-warring association").

Experiment 1 - Sixty heterosexual male and 51 female students in China were shown photographs of attractive or unattractive members of the opposite sex under the pretext of guessing their age. Then the participants completed a questionnaire "about having wars or trade conflicts with three foreign countries that have had hostile relationships with China in recent history" (p978).

The male participants who had seen the attractive photographs in this independent design experiment showed more support for war than males in the unattractive photographs condition, but there was no difference for trade conflicts. The female participants showed no difference between the photograph conditions (figure 5.2).

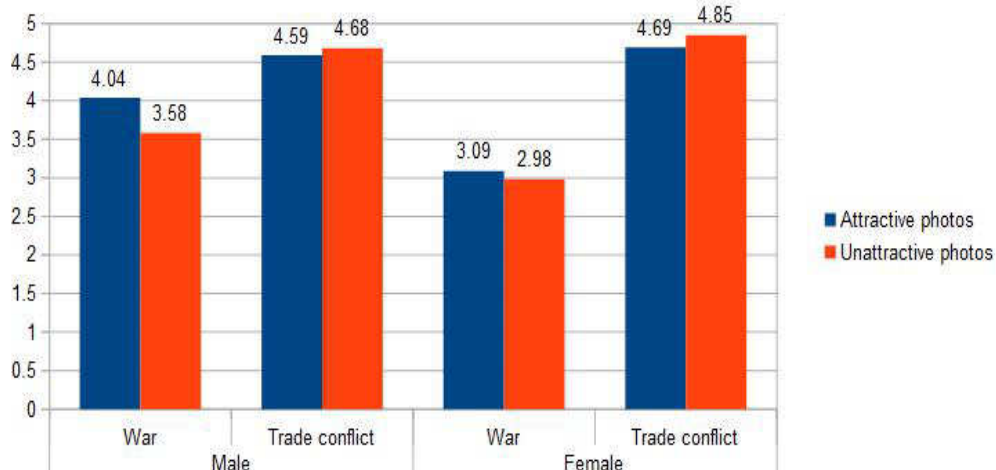


Figure 5.2 - Mean scores (out of 6) for war and trade conflict (where a higher score is more supportive of an aggressive approach).

Experiment 2 - Thirty-one more male and 25 more female students were shown pictures of attractive or unattractive opposite sex individuals before seeing pictures of war or farm scenes with a male soldier or

farmer. The task was to say as quickly as possible whether the soldier or farmer was on the left or right of the picture.

Male participants were significantly faster to respond to war scenes after seeing attractive female faces than unattractive ones. There was no difference for farm scenes, and female participants showed no difference overall (figure 5.3).

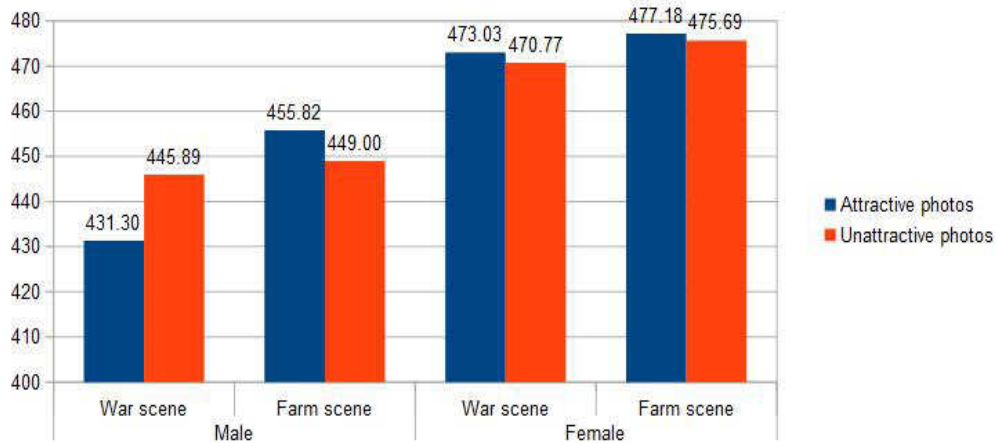


Figure 5.3 - Mean response times (milliseconds) in Experiment 2.

Experiment 3 - Twenty-three more male and 44 more female students were shown pictures of opposite sex legs or Chinese flags before responding to Chinese words about wars or farms. Male participants responded faster to war words after seeing legs than flags (figure 5.4).

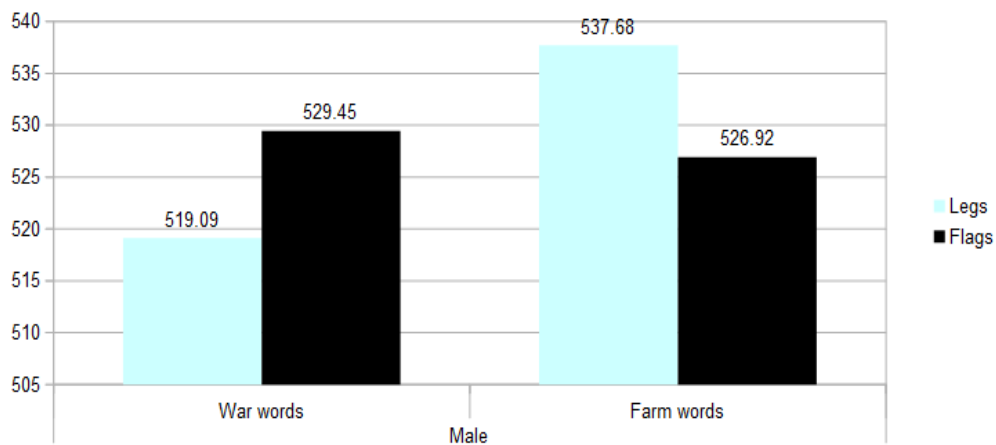


Figure 5.4 - Mean response times (milliseconds) of male participants in Experiment 3.

Experiment 4 - This study involved only male participants (34 more Chinese undergraduates), and was the same as Experiment 3, except the words were about wars or general aggression. The participants responded faster to war words only after seeing legs (figure 5.5).

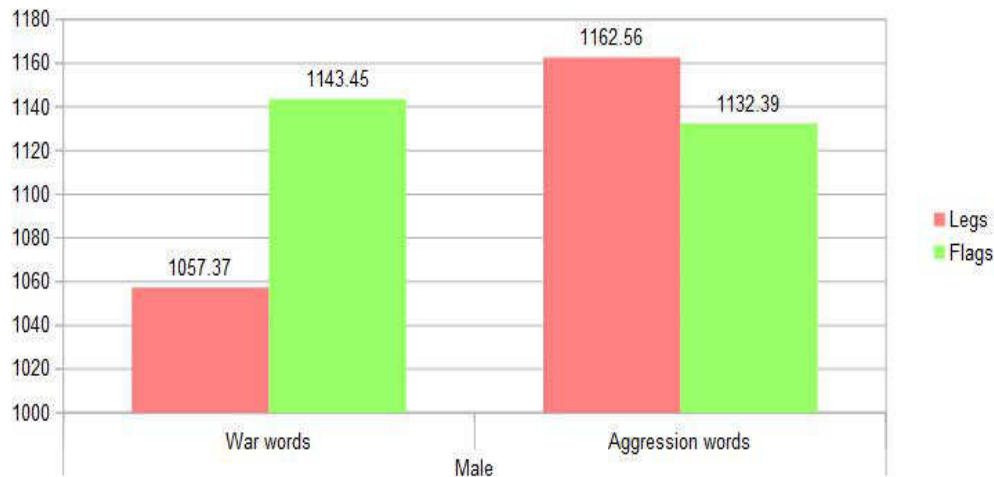


Figure 5.5 - Mean response times (milliseconds) of male participants in Experiment 3.

Overall, the researchers concluded that the priming of mating (through photographs of the opposite sex) for males produced an association with "war-related responses in the form of faster perceptual processing of war scenes or recognition of war-related words and more militant attitudes towards hostile countries" (Chang et al 2011 p981).

The studies were all artificial laboratory experiments with students, which limits their generalisability (table 5.1). Furthermore, the motivation for actual wars is complex, and includes political factors. Chang et al (2011) would respond that "individuals may act without knowing the ultimate motive of their action" (p982) (ie: the evolutionary basis).



STRENGTHS	WEAKNESSES
<p>1. Use of full-body colour photographs taken from Chinese online attractiveness rating site, and further rated for attractiveness by independent judges.</p> <p>2. Experiments involving reaction time allowed for practice (eg: Experiment 2 - eight practice trials before 40 experimental trials).</p> <p>3. Standardised procedure - eg: Experiment 2 - 400 ms photograph; 116 ms gap; farm or war scene; press "K" or "L" key.</p> <p>4. Independent groups (or between-subjects) design used - eg: "no order effects" as participants perform in one condition only.</p> <p>5. Laboratory experiment - eg: high level of control of variables and confounders; isolate relevant variables to study.</p>	<p>1. Sample - non-psychology undergraduates at one university in China.</p> <p>2. Sample size relatively small - in total, 148 male and 120 female participants.</p> <p>3. Independent groups design - eg: no guarantee that groups are comparable on participant characteristics.</p> <p>4. Other variables not controlled or explanations for findings not tested (eg: "potential emotional and hormonal influences relevant to mating motivation"; Chang et al 2011 p982).</p> <p>5. Laboratory experiment - eg: artificial environment; low ecological validity (eg: reaction time to war stimulus after 400 ms exposure to photograph = decision to go to war).</p>

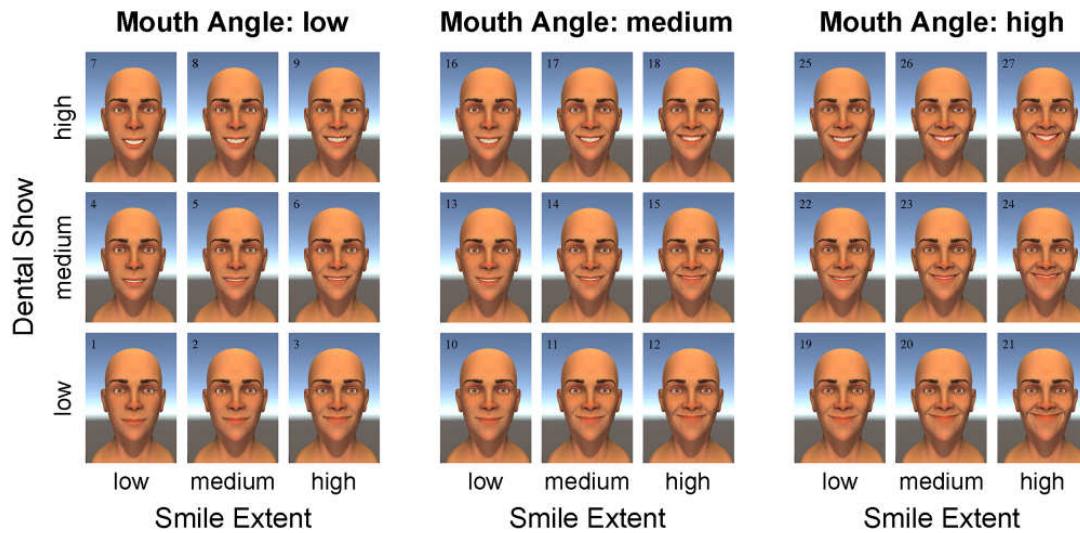
Table 5.1 - Main strengths and weaknesses of Chang et al (2011).

### 5.3. SUCCESSFUL SMILES

A "successful smile" is rated as genuine and pleasant, but what are the spatial and temporal characteristics of such a smile?

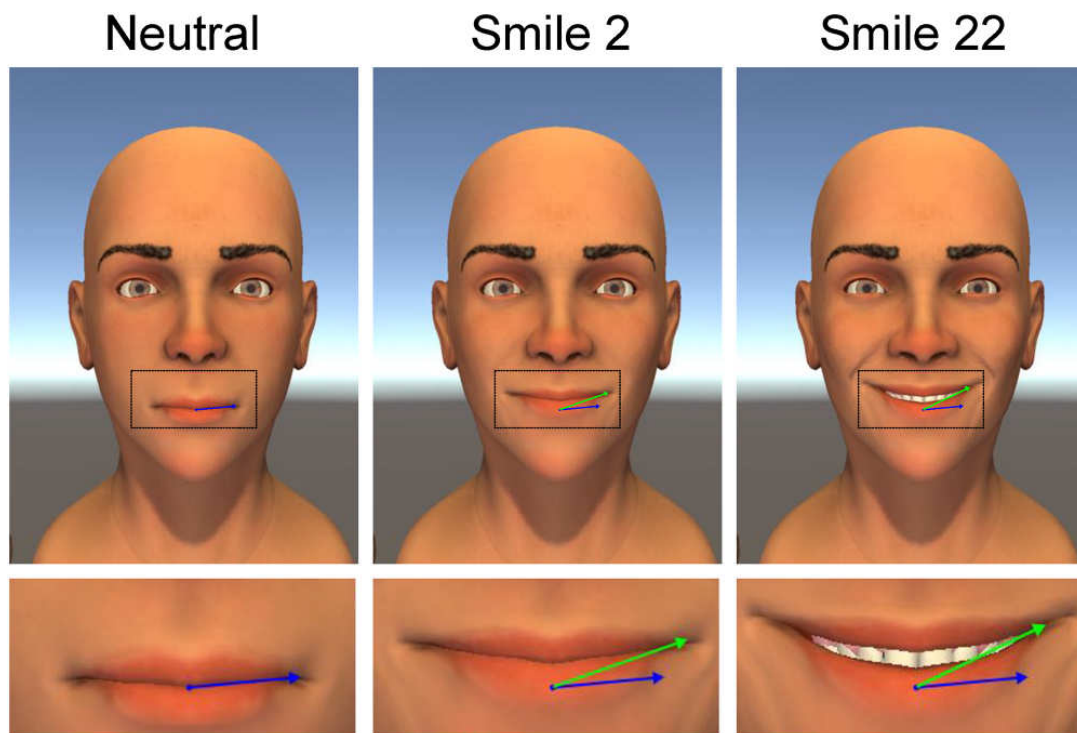
Helwig et al (2017) investigated this question with a computer-animated 3D facial tool, which showed 250 ms animations of smile-like expressions. The researchers created 27 versions by manipulating three spatial characteristics (figs 5.6 and 5.7):

- The mouth angle
- The smile extent
- The amount of dental show.



(Source: Helwig et al 2017 figure 1)

Figure 5.6 - The 27 different smiling faces created by Helwig et al (2017) by manipulating three spatial characteristics.



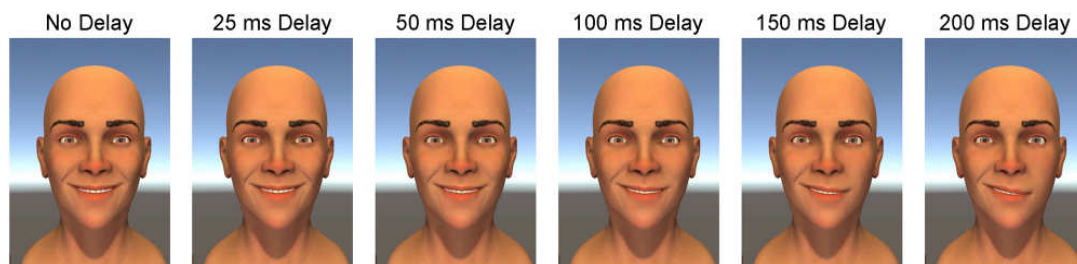
(Mouth angle = angle between green and blue lines; smile extent = length of green line; dental show = distance between the lower and upper lips)

(Source: Helwig et al 2017 figure 2)

Figure 5.7 - Spatial characteristics of the face manipulated.

The temporal characteristics were manipulated by

taking "smile 22" (high mouth angle, low smile extent, and medium dental show) and delaying the start of the smile on the left side of the face (figure 5.8).



(Source: Helwig et al 2017 figure 3)

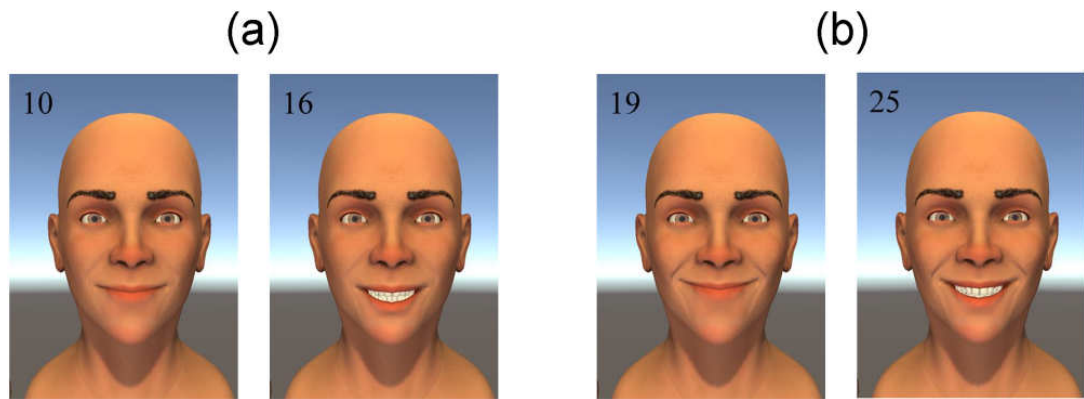
Figure 5.8 - "Smile 22" with delay of aspects of the smile (timing asymmetry).

Over 800 participants recruited at the 2015 Minnesota State Fair looked at fifteen randomly chosen animations, and rated them for effectiveness as a smile, emotion shown, genuine/fake, and creepy/pleasant.

Helwig et al (2017) found that "a successful smile consists of (i) an optimal window of mouth angle and smile extent<sup>32</sup>, (ii) the correct amount of dental show for the given angle-extent combination, and (iii) dynamic symmetry such that the left and right sides of the mouth are temporally synced within 125 ms" (p13). Importantly, the researchers found that dental show under the principle "more is always better" was not always right. The degree of dental show can have both positive and negative effects: "increasing dental show can decrease smile quality (for low angle-extent smiles), increase smile quality (for high angle-extent smiles), or have little influence on smile quality (for medium angle-extent smiles)" (Helwig et al 2017 p13) (figure 5.9).

---

<sup>32</sup> Successful smiles have mouth angles of 13-17° and smile extents of 55-62% the distance between the eyes (interpupillary distance; IPD), but "the best smiles represent a diverse collection of different combinations of facial parameters. This reveals that, although there is an optimal window of parameters, there is not a single path to a successful smile" (Helwig et al 2017 pp9-10).



((a) = smaller angle-extent combinations and increased dental show makes smile worse;  
 (b) = larger angle-extent combinations and increased dental show makes smile better)

(Source: Helwig et al 2017 figure 8)

Figure 5.9 - Dental show and different levels of angle-extent.

#### 5.4. REFERENCES

Chang, L et al (2011) The face that launched a thousand ships: The mating-warring association in men Personality and Social Psychology Bulletin 37, 7, 976-984

Elliot, A.J & Maier, M.A (2014) Colour psychology: Effects of perceiving colour on psychological functioning in humans Annual Review of Psychology 65, 95-120

Helwig, N.E et al (2017) Dynamic properties of successful smiles PLoS ONE 12, 6, e0179708 (Freely available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0179708>)

Jones, B.C et al (2015) Facial colouration tracks changes in women's oestradiol Psychoneuroendocrinology 56, 29-34

Re, D.E et al (2011) Oxygenated-blood colour change thresholds for perceived facial redness, health, and attractiveness PLoS ONE 6, e17859 (Freely available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0017859>)

Rowland, H.M & Burriss, R.P (2017) Human colour in mate choice and competition Philosophical Transactions of the Royal Society B 372, 20160350