PSYCHOLOGY MISCELLANY

No.110 - August 2018

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ISSN: 1754-2200

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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.

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1. SOCIOLOGICAL VIEWS ON UNDERSTANDING RECENT POLITICAL EVENTS

1.1. INTRODUCTION

Dood et al (2017) introduced a special issue of the "British Journal of Sociology", which was commissioned in response to the Brexit referendum result in the UK in June 2016, and the election of Donald Trump as President of the United States of America in November 2016.

A lot has subsequently been said and written in the popular media, and Dodd et al (2017) wanted to avoid "the spirit of hyperbole or to dramatically announce the arrival of a new social and political order", but rather to "unravel the longer-term processes, ambivalences and complexities in the Brexit/Trump phenomenon" (pS4) (appendix 1A).

Dood et al (2017) highlighted three key issues of relevance:

i) "The intersections of the social and political" - The need to analyse recent events with sociology and political science together as "'political establishments' were found wanting, being unable to contain strongly held critical voices who were intent on challenging political orthodoxy" (Dodd et al 2017 pS5).

ii) "The new politics of economic inequality" - "It is hardly original to note that a powerful language of inequality informs the Brexit/Trump phenomenon. The language of 'left behinds', 'elites', racial inequalities and even the question of class looms large in any quick perusal of commentary on these election results" (Dodd et al 2017 pS6). But this is not a straightforward phenomenon, as, for example, class is "now operating in different kinds of modalities, in which the boundary between middle and working class captures only part of the stakes at play" (Dodd et al 2017 pS7).

iii) "Dystopic globalisation: nationalism, xenophobia and racism" - In the 21st century, "it has become increasingly clear that powerful globalising forces have not led to a homogeneous global social space, but have in fact intensified nationalism, often as a mechanism mobilised against global flows, but also – as in the case of Brexit – dismantling European institutional forms which seek to regulate and even forestall global capital flows" (Dodd et al 2017 pS8). But within nation states, there are also geographical divisions (eg: urban-rural) (appendix 1B).

1.2. UNDERSTANDING EVENTS

King and Le Gales (2017) wondered about a developing gap between elites and ordinary voters in the USA and a number of European countries:

> Social scientists don't lack for explanations of the anti-globalisation and anti-foreigner sentiments marinating the Trump, Brexiters and Le Pen worldviews. These include accounts of the impact of global trade, deindustrialisation and the financial crisis, the decline in social mobility prompted by widening income inequalities and the heightened risk of downward social mobility, the pilloring of immigrants, racism and the fear of Islam, the urban processes concentrating educated populations in cities and the less educated in peripheries, small towns or poor neighbourhoods within metropolitan areas, the rise of income, patrimonial and cultural inequalities..., the feelings of loss... for parts of the population, and the precarious situation of young less-educated men in terms of jobs and income. The pool of labour market 'outsiders' has grown in these economies..., and labour parties' responses show greatest sensitivity to the preferences of comfortable voters... (pS12).

King and Le Gales (2017) preferred to concentrate on the loss of the "unifying energy of the state" (Poggi 2001). This term refers to policies and institutions that limit inequalities and encourage integration of social groups into "common standards of provision and social citizenship across the nation state" (King and Le Gales 2017). Contradictory demands from three constituencies - voters, large companies and financial organisations, and other states and trans-national organisations - has led to structural changes in states. King and Le Gales (2017) continued: "The reconfigured state fails to protect some social groups from economic and social changes. Moreover, the internal changes to the state's organisation and engagement with societies through displaced and reduced public services induces a sense of abandonment by the state amongst citizens" (pS13).

Large companies and financial organisations, in

particular, stand "as a force against states as unifying energisers", which has produced a state that concentrates on "market making activities" [1]. The upshot is a "reconfigured state" that is struggling to deal with the demands of the three constituencies (King and Le Gales 2017).

Gidron and Hall (2017) sought to explain the increasing popularity of right-wing populism (appendix 1C). They defined "populism appeals" as "ones predicated on a moral opposition between an unsullied and unified people and a corrupt or incompetent political elite and focus on causes or candidates mounting the ethno-nationalistic appeals usually associated with the radical right" (pS57).

Key support here comes from male manual workers (sometimes called the "white male working class") as "economic changes that have depressed the income or job security of some segments of the population and shifts in the cultural frameworks that people use to interpret society and their place within it" (Gidron and Hall 2017 pS58).

A proximate factor of these changes is "subjective social status" (SSS), which is "the level of social respect or esteem people believe is accorded them within the social order. It reflects people's own feelings about the levels of respect or recognition they receive relative to others in society. As such, subjective social status is a relational variable, that is to say, it embodies a person's sense of where she stands in relation to the full social assembly and, in that respect, might be said to represent social integration, namely, whether or not the person feels herself to be a fully recognised member of society" (Gidron and Hall 2017 pS61) [2].

Gidron and Hall (2017) showed empirically the role of SSS and right-wing populism with data from the International Social Survey Programme (began in 1987). Data from twelve "developed democracies" (eg: UK, Germany, USA) for 1987, 1992, 1999, 2004, 2009 and 2014 were analysed. Each year covers around 1500-2000 individuals. SSS was measured by a ten-point social ladder in which individuals place themselves to reflect their perceived position in society.

The SSS of lower-educated men had declined over the study period (while that of lower-educated women had risen). In relation to voting, "the more the subjective social status of a group declined in the preceding 25

[1] The rise of the "regulatory state" (Moran 2003).

[2] "Objective social status" is "widely shared beliefs about the social categories or 'types' of people that are ranked by society as more esteemed and respected compared to others" (Ridgeway 2014 quoted in Gidron and Hall 2017).

years, the more likely the members of that group were to support for the populist right in 2014" (Gidron and Hall 2017 pS76).

Gidron and Hall (2017) made this point of clarification: "We are not claiming that changes in subjective social status are the only factor responsible for growing support for the populist right among working-class men. However, they constitute a pathway illuminating the ways in which long-term economic and cultural developments might combine to impinge on partisan choices" (pS77).

Bonikowski (2017) focused on "ethno-nationalist populism" to explain recent events, which had three elements:

a) Populism, which Bonikowski (2017) preferred to see as "a political strategy, a way of formulating political claims that is more likely to be employed by the same actors in some circumstances and not others. Rather than treating populism as a property of parties and candidates, it becomes more useful to measure it at the level of political speeches, or even speech elements" (pS186).

b) Ethno-nationalism, which is "the idea that legitimate membership in the nation is limited to those with the appropriate immutable, or at least highly persistent, traits, such as national ancestry, native birth, majority religion, dominant racial group membership, or deeply ingrained dominant cultural traits" (Bonikowski 2017 pS187).

c) Authoritarianism, which is "a style of governance that attempts to "circumvent the rule of law and democratic norms in favour of centralised authority and limited political freedom. Authoritarianism is inherently opposed to pluralism in that it views a strong leader as the natural embodiment of a singular will of the people" (Bonikowski 2017 ppS189-190) (appendix 1D).

These ideas are attractive in particular contexts, like the global and economic changes of recent years, such that:

> As segments of the population have come to be uncertain about their economic well-being and fearful of demographic change, they are also becoming alienated from mainstream culture, which is increasingly socially egalitarian, cosmopolitan, and multi-cultural..., a process that is further exacerbated by the erosion of previously stable and valued collective identities, rooted in class position and national belonging... Those who do not see themselves as part of the changing cultural landscape, not just figuratively but also literally, given the

> concentration of cultural liberalism in large urban centres, perceive it as antithetical to their way of life... Not surprisingly, much of this is about the politics of race and ethnicity. Normative constraints on everyday talk intended to protect the dignity of minority groups and diffused through educational institutions and the media are vilified as irrational political correctness – the work of overzealous liberal elites: At the same time, the culture of lower-status members of the ethnic majority – once seen as inhabiting the nation's 'heartland' – is increasingly devalued as retrograde, while the cultural practices of ethnic minorities continue to be appropriated and venerated by omnivorous cultural elites... These developments in turn breed anti-elite sentiments and nationalist nostalgia for an era when people could talk plainly and minorities 'knew their place' (Bonikowski 2017 pS203).

Dorling's (2016 quoted in Bhambra 2017) analysis of voting data found that the majority of "Leave" voters in the EU Referendum were middle class and from southern England, not the traditionally described northern working-class "backlash". Swales (2016 quoted in Bhambra 2017), in fact, distinguished three groups voting to "Leave": "affluent Eurosceptics, the older working class, and a smaller group of economically disadvantaged, anti-immigration voters".

Bhambra (2017) argued that discussions about recent elections in the West have ignored the actual voting data. Concentrating on the USA, she pointed out that "the swing to Trump was carried not so much by the white working-class vote, but the vote of the white middle class, including college-educated white people" (pS216). The analysis of events focused on the "left behind", while ignoring that ethnic minorities in the USA and the UK have suffered disproportionately in economic terms. "While these populations also make up the category of the 'left behind', they disproportionately voted to remain in the European Union and voted for Hilary Clinton. As such, to discuss the 'left behind' simply in terms of the white working class, and to rationalise their vote for Brexit and Trump in terms of their economic position, is to conflate socio-economic position with racialised identity while claiming to speak only about class and to repudiate identity politics" (Bhambra 2017 pS217).

Ultimately, for Bhambra (2017), a "'methodological whiteness' has distorted social scientific accounts" of events (ie: a narrative that explains the decline of Whites at the expense of other groups) [3]. "What is being described is a relative loss of privilege rather than any real account of serious and systemic economic decline that is uniquely affecting white citizens in the United

[3] Bhambra (2017) is particularly critical of Hochschild (2016) and her conclusions from the study of White conservatives in Louisiana.

States" (Bhambra 2017 pS226).

Flemmen and Savage (2017) also challenged assumptions about racism being the province of the "left behind" White working class, but rather the "elite" articulate an "imperial racism". Flemmen and Savage (2017) based their arguments on data from the National Child Development Study (NCDS) cohort in the UK (of individuals born in one week in 1958). A qualitative booster study on 220 participants was made in 2008.

In response to three questions about racism (eg: "would you mind if another race moved in next door"), Flemmen and Savage (2017) calculated that "1–2 per cent of the NCDS panel members are clearly and overtly racist; around 30 per cent are clearly committed to racial equity as such, and the largest proportion, around two-thirds, are positioned with varying degrees of ambivalence between these poles" (ppS241-242).

Flemmen and Savage (2017) focused on sixteen individuals classed as "disenfranchised" ("most deprived of economic and cultural capital"), five individuals classed as "economic elite", and fourteen "cultural elite". The "elites" made use of an "imperial nationalism", which related to British "greatness", but this could "easily flip into a nostalgic and reactionary form". For example, "P607": "... I do think we have traditions and standards in British life and those are I think sometimes being eroded by people from ethnic minorities" (pS252). Flemmen and Savage (2017) felt that this was the majority of the ambivalence position in response to the racism questions.

The "disenfranchised" individuals presented an "anti-establishment nationalism", which had "no trace of imperial visions of British greatness. Their evocations of nationalism tend to be ambivalent, and much more personal and sensuous, associated with particular feelings and attachments which the nation evokes" (Flemmen and Savage 2017 pS254). For example, "P5": "I think Britain is a nice place, I think as a place it's, by the fact that I was born here means I'm British so therefore to try and relate to other areas, hmmm, but Britain is Britain, you know. It's got a lot to offer, I think it's got definite problems now which there'll not be a quick fix solution to but Britain is Britain, you know" (pS254).

McKenzie (2017) drew on her ethnographic work in East London in 2013-16 and in ex-mining towns in Nottinghamshire post-June 2016 to understand the feelings of "left out" among "Leave" voters in the EU Referendum. The feelings were embedded over a number of years, and include the response to Margaret Thatcher's policies in the 1980s and to "New Labour" in the 2000s. The "longitudinal damage... that class inequality causes"

(pS267) was important to McKenzie (2017).

She stated: "Since June 2016 and the referendum result, elites in the political classes as well as middle-class 'cosmopolitans' appear to have no grasp or awareness in acknowledging working-class experience, or to have any reflexivity of their own historical or present politically privileged positions. Williams (2017) summed up a type of 'class cluelessness' around both class and racial privilege following the equally unforeseen' election victory of a divisive and populist politics in the USA as embodied in the human form of Donald Trump. Consequently misunderstanding and misrecognising working-class political anger and defaulting to corrosive narratives about a 'feckless poor' [Savage et al 2015) that recalls Victorian-era poverty discourses" (McKenzie 2017 pS268).

McKenzie (2017) argued that the term "left behind" has become used as "it patronisingly dismisses the poor white working class as 'old fashioned' and unmodern, immobilised by a nostalgic longing for the past" (pS277). On the other hand, the term "left out" highlights the longer term experience, where the "people who were once categorised as 'respectable working class' have been devalued in the last 30 years, and are now 'residuum'" (McKenzie 2017 pS278).

1.3. SPECIFIC TO USA

"Identity politics" (appendix 1E) is the idea that individuals in democracies vote for candidates who they can identify with, and who represent the identity of the voter (rather than ideology). For example, in the 2016 US Presidential election, this was seen in Hilary Clinton's expectation that White women would votes for her. Subsequently, "some Democratic commentators bemoaned the fact that a majority of white women had voted for Trump, and called it a kind of betrayal, underlining their expectation that women would naturally, on the basis of their gender interests and identity, support a woman with politics and policies understood to be women-friendly" (McCall and Orloff 2017 pS35).

McCall and Orloff (2017) argued for an understanding of identity as multi-dimensional (as in intersectionality; Crenshaw 1991). For example, White women with college degrees voted for Clinton, but those with less educational qualifications voted for Trump. Furthermore, "identifications are politically mediated and constructed" rather than being something objective (McCall and Orloff 2017).

Social psychology experiments where individuals are encouraged to focus on one aspect of their identity (eg: gender) can produce "derogation" of groups based on other aspects of their identity (eg: ethnicity) (eg: Craig et

al 2012) (appendix 1F).

Explanations for Trump's victory discussed in the popular media include (Lamont et al 2017):

- "Revenge" of downwardly mobile White working-class against elites
- Race-related resentment post-Obama
- A backlash against globalisation that scapegoated Mexican immigrants
- Fear of Muslims and terrorism
- A reassertion of traditional gender roles.

Bobo (2017) discussed racism in relation to Trump's Presidential election. Racism was defined by Wilson (1973) as "an ideology of racial domination or exploitation that (1) incorporates beliefs in a particular race's cultural and or inherent biological inferiority and (2) uses such beliefs to justify and prescribe inferior treatment for that group" (quoted in Bobo 2017).

Bobo et al (1997) used the term "laissez-faire racism social order" to describe the situation "a putatively race neutral or colour-blind state and market place accedes to as much racial inequality and division as individual taste, talent and inclination are said to create" (Bobo 2017 pS90) [4]. This is distinct from the segregationist policies of the past in the USA ("Jim Crow racism social order"). Simplistically, the racism today is more subtle, and is not just "Black-White", but all ethnic minorities.

Bobo (2017) described three "critical dilemmas of race" in the 2016 Presidential election:

i) Worsening economic inequality in a society with changes in ethnic demography (eg: rising share of the US population coming from Latin America).

ii) Intensifying political partisanship in "the presence of well-institutionalised racially coded campaign strategies and rhetoric" - "Not only is race... increasingly aligned with voting by party identification, but political scientists and political psychologists have shown us that attitudes that we would characterise as racial resentments play an increasingly strong role in defining the meaning of those party attachments... The

[4] Bonilla-Silva (2006) coined the term "colour-blind racism".

end result is what legal scholar Ian Haney-Lopez (2015) has termed 'dog-whistle politics'" (Bobo 2017 pS96).

So, the "call to 'Make America Great Again' was a none-too- subtle dog whistle signalling an effort to return to an America where the material well-being and privileged position of white citizens would be protected and made something that could be again taken comfortably for granted" (Bobo 2017 pS100).

iii) The failure of the Clinton campaign to champion the interests of working- and middle-class families, such that "a billionaire, who has a gold-plated toilet in his high-rise condominium in Manhattan, has a stronger appeal to poorly educated, working-class whites than a woman running as the head of the Democratic Party with some of the greatest egalitarian social policy credentials in mainstream politics one might have" (Bobo 2017 pS97).

Pierson (2017) talked of an "American hybrid" combining populism and plutocracy to explain Trump's election. The populism that supported him came out of the "out-sized influence of the wealthy" (plutocracy), as well as the "intensifying political polarisation". This makes the situation distinct from other populist movements around the world, for Pierson (2017).

"Trump has continued to present himself in populist garb, but it has rarely carried over to policy. Whatever label one might attach to his substantive actions as president, one would be hard pressed to call most of them populist. Trump has filled his administration with a mix of the staggeringly wealthy and the staggeringly reactionary. On the big economic issues of taxes, spending and regulation – ones that have animated conservative elites for a generation – he has pursued, or supported, an agenda that is extremely friendly to large corporations, wealthy families, and well-positioned rent-seekers. His budgetary policies (and those pursued by his Republican allies in Congress) will, if enacted, be devastating to the same rural and moderate-income communities that helped him win office" (Pierson 2017 ppS106-107).

McQuarrie's (2017) explanation of Trump's victory was "the product of a confluence of historical factors rather than the distinctive appeal of the victor himself" (pS120). In particular, "a Rust Belt revolt that unified black and white working-class voters against Hilary Clinton and the Democratic Party" (McQuarrie 2017 pS120).

The "Rust Belt" includes the states of Michigan, Ohio, Wisconsin, Iowa, and Pennsylvania ("Rust Belt Five"), where heavy industrial areas have declined and become marginalised in US politics (McQuarrie 2017).

The growth of the financial services industry since the 1980s has made New York an example of an "urban

vortex" (Hall and Savage 2015) (ie: "inflows of capital, people and culture"; McQuarrie 2017), while the "Rust Belt" has seen the opposite.

More than these changes was the perception that Clinton's Democratic Party was "for" New York (ie: "progressive neoliberal") rather than the ordinary worker of the past. "Donald Trump gave Rust Belt voters the opportunity to express their anger and disappointment by exacting revenge on the party that had turned its back on them. This anger and disappointment was not simply about the physical collapse of their communities and the decline of their material circumstances. It was also rooted in expectations that are a legacy of white supremacy" (McQuarrie 2017 pS144).

But McQuarrie (2017) struggled with the idea that there was a "reassertion of white supremacy". He stated: "It is true that Trump is only possible in a nation with a deep-seated normative racial status hierarchy and a profound investment in the privileges and cultural meaning of whiteness, but that hardly explains why we see most of the country voting more or less as it always does in partisan terms, while a few dozen Midwestern counties saw radical shifts in voting behaviour" (McQuarrie 2017 pS122).

Lamont et al (2017) found that Trump's campaign "addressed the white working class's concern with their declining position in the national pecking order" in their analysis of 73 formal speeches. He did this by drawing boundaries between "hard-working" White working-class Americans, who were victims of globalisation, and the "people above" (professionals, the rich, and politicians), undocumented immigrants and refugees, and Muslims.

This fits with work by Lamont (2000) in the 1990s, who described White working-class men as developing "a moral matrix, which helps them maximise their worth in relation to 'people above' and 'people below'. The relationship that working-class Americans have to 'people above' is ambivalent. On one hand, working-class men in the 1990s often expressed respect for economic success, and when queried about possible heroes, a number mentioned Donald Trump due to their belief that 'becoming rich' is proof of intelligence. At the same time, Lamont (2000) found that 75 percent of her respondents were critical of the morality of 'people above', who are perceived as too self-centred and ambitious, lacking in sincerity, and not concerned enough 'with people'" (Lamont et al 2017 pS162).

Working-class men presented a "disciplined self" to Lamont (2000), which was hard-working, and upholding family responsibilities as the breadwinner, while "people below" were the poor who had "given up".

1.4. COGNITIVE RESPONSE

Rationalisation is a cognitive process after an anticipated unpleasant change where individuals are "motivated to reconstrue in an exaggeratedly positive light any undesirable elements of the status quo, presumably to reassure themselves that the world they live in is right, good, and likely to satisfy their desires" (Laurin 2018 p483). In other words, things are never as bad as feared. But this perception is due to attitude change rather than the events themselves.

People tend to rationalise events that they cannot physically escape as in the election of an opposition candidate. Rationalisation is also linked to the "psychological realness" of the event (Brickman 1978). "When a reality is anticipated - once an official is elected but not sworn in or once a law has been approved but before it takes effect — its most important consequences are not yet occurring, and it may therefore not feel psychologically real... However, once it is no longer merely anticipated but current — once the elected official is sworn in or once the approved law takes effect — it has become undeniably psychologically real: a dynamic force in one's world that has already begun producing consequences" (Laurin 2018 p484).

Laurin (2018) showed rationalisation at work in three field studies:

1. The banning of plastic water bottles in San Francisco in 2014 - Participants in the city were asked about their attitudes towards the ban on the Tuesday before it began and on the Tuesday after. The latter group reported a more positive attitude towards the ban.

2. The banning of smoking in certain public places in Ontario in 2015 - Smokers gave their opinions on the ban two days before and two days after it came into effect. The frequency of smoking in public places before the ban was reported as less after the ban - ie: "in the days following the new law, participants rationalised it more than in the days preceding the new law, adjusting their memory in such a way that the new law would feel less upsetting" (Laurin 2018 p487).

3. Trump's inauguration - Over 1200 US residents completed a questionnaire about their attitudes towards Trump in the week before and the week after his inauguration. More positive attitudes were reported after the inauguration, particularly among anti-Trump voters. "Americans immediately felt more positively toward President Trump than they had toward President Elect Trump. This increased rationalisation was mediated by participants' feelings of psychological realness, and

emerged even among participants claiming that they had learned no new information about Trump and who disapproved of his inauguration performance" (Laurin 2018 p492).

1.5. APPENDIX 1A - ALTERNATIVE VIEW

From a Marxist perspective, Smith (2016) stated: "the imperialist division of the world into oppressed and oppressor nations has shaped the global working class, central to which is the violent suppression of international labour mobility. Just as the infamous pass-laws epitomised apartheid South Africa, so do immigration controls form the lynch-pin of an apartheid-like global economic system that systematically denies citizenship and basic human rights to the workers of the South and which, as in apartheid-era South Africa, is a necessary condition for their super-exploitation" (quoted in Bond 2018) [5].

Bond (2018) added Marini's (eg: 1972) idea of "sub-imperialism" to describe developing countries, like the BRICS (Brazil, Russia, India, China, and South Africa), to bridge between oppressed and oppressor nations.

1.6. APPENDIX 1B - POPULISM AND THE MEDIA

In its survey of political attitudes in Western Europe, the Pew Research Centre (2018) defined "populist" based on two questions - "Most elected officials don't care what people like me think", and "Ordinary people would do a better job solving the country's problems than elected officials". Agreement with both statements was categorised as "populist" as opposed to "non-populist" (disagreement with both) or "mixed" (agreement with one statement).

Individuals classed as populist trusted the traditional news media less than the non-populists in the eight countries surveyed in late 2017 [6]. The difference was statistically significant, and was larger than the difference in trust based on left-right ideology.

It was also found that in six of the countries, over half of respondents got their news daily from social media (in particular, Facebook). This trend was stronger among 18-29 year-olds (compared to older adults).

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[5] Bond (2018) was critical of the analogy with apartheid-era South Africa.

[6] Around 2000 adults telephoned in each country - Denmark, France, Germany, Italy, the Netherlands, Spain, Sweden, and the UK.

1.7. APPENDIX 1C - "GAB"

As traditional social media platforms, like Twitter and Facebook, clamp down on "hate speech", alternative sites have appeared that claim to represent free speech, but are, in fact, "echo chambers" for extreme views (eg: "alt-right") (Stokel-Walker 2018).

Zannettou et al (2018) analysed one such social media platform called "Gab" (created in August 2016 as an alternative to Twitter). The researchers analysed 22 million posts by 336 000 users between its foundation and January 2018. The main findings were the presence of "alt-right" (right wing political views) "personalities", conspiracy theorists, and "trolls", who had migrated (sometimes because of exclusion) from other platforms, and who disseminated and discussed world events. Hate speech was twice as common as on Twitter (based on the "Hatebase" database), but half as common, as found by Hine et al (2017 quoted in Zannettou et al 2018), on the small alt-right Web community, "4chan's Politically Incorrect Forum". These findings indicate that Gab resides on the border of mainstream social networks like Twitter and fringe Web communities like 4chan's Politically Incorrect (/pol/) board" (Zannettou et al 2018 p6).

1.8. APPENDIX 1D - "LONG PEACE"

World War II ended in 1945, and since then, the world has been "comparatively peaceful" (Coghlan 2018). Is this a new conflict free-free era or just a blip?

Pinker (2012), for example, sees the "long peace" (Gaddis 1986) as part of a general decline in human violence throughout human history (with the spread of democracy, economic ties, and international organisations) (the "liberalism argument"). The alternative is the "realism argument" which sees that the "underlying conflict-generating processes in the modern world are stationary" [eg: Richardson 1960] (Clauset 2018).

Clauset (2018) tried to resolve the debate by statistical analysis of interstate wars between 1823 and 2003. Ninety-five wars were included from the "Correlates of War" data set (Sarkees and Wayman 2010) [7]. It was calculated that "the post-war pattern of peace would need to endure at least another 100 to 140 years to become a statistically significant trend" (Clauset 2018 p1).

[7] A war needs a minimum of 1000 deaths for inclusion.

1.9. APPENDIX 1E - TRANS-INDIVIDUAL

Identity politics can suggest a narrative that unites the elements of the self, and/or grounds the "real" identity. The idea of the "trans-individual" (Gilbert Simondon) is the opposite, presenting the self as relational and multiple. The trans-individual is also in a "rhythm of becoming" or "an activity of amplification of being" (Combes 2012).

"For the trans-individual, 'subjectivity cannot contain itself within the limits of the individual' (Combes 2012). The only relief to the 'tension' fostered by the confinement of subjective formation is found within the collective; therefore, the 'subject is a being tensed toward the collective, and its reality is that of a ''transitory way''' (Combes 2012). While identity politics searches for a defining characteristic shared amongst the collective, the trans-individual is drawn to the collective to be moved by forces generated by a multitude of characteristics" (Arroyo 2017 p198).

Plummer (1994) outlined a problem for identity politics as seen in the "gay identity politics movement": "while the movement triumphed in changing the discourse of homosexuality from one of 'sickness' into one where gay 'men could come to identify themselves as ''born like that'' and hence ''essentially'' gay', this evolution has 'really been a double-edged one', regularly affirming an essential and deterministic causality – a fixity of desire'" (Arroyo 2017 p196). While Crenshaw (1991) stated that "the problem with identity politics is not that it fails to transcend difference, as some critics charge, but rather the opposite – that it frequently conflates or ignores intra-group differences" (quoted in Arroyo 2017).

1.10. APPENDIX 1F - GROUP IDENTITY

Craig et al (2012) found that "making discrimination salient triggers social identity threat, rather than a sense of common disadvantage, among stigmatised groups members, leading to the derogation of other stigmatised groups" (p169) [8]. In an experiment, the researchers manipulated perceived sexism for 39 White female students at a northern US university. Individuals read an article about the social and economic consequences of sexism in the USA (pervasive-sexism condition) or an article about brain function (control condition) before completing a

[8] The social identity threat of perceived discrimination leads individuals "to enhance their esteem by perceiving their own group - the ingroup - more positively compared with groups to which they do not belong - outgroup", even if the outgroup is "not directly responsible for the threat" (Craig et al 2012 p170).

racial attitudes survey.

Women in the pervasive-sexism condition reported significantly less positive attitude towards ethnic minorities than controls (mean 64 vs 77 out of 100).

Craig and Richeson (2014) found that 35 US Black and Latino participants expressed more negative attitudes towards gay and lesbian individuals after racial discrimination against their ingroup was emphasised. Participants read about the economic and social consequences of racial discrimination against Blacks or Latinos (discrimination salient condition) or about a disease in their communities (control condition) [9] before completing an attitude questionnaire about sexual minorities.

The derogation of another group can be reduced by explicitly linking the ingroup and another stigmatised group (eg: emphasising common experiences). "However, making these connections salient could also backfire. Specifically, such efforts could lead individuals to contrast their discrimination with that experienced by stigmatised outgroups and, in turn, to perceive their group as the 'real' or more severely victimised group" (Craig and Richeson 2016 p23).

1.10.1. Group Conflict

In situations of intergroup conflict, presenting the other group as having "a malleable (rather than fixed) nature can lead to significant improvements in intergroup attitudes and willingness to make concessions" (Goldenberg et al 2018 p696). Halperin et al (2011) showed this with groups of Israelis and Palestinians in a laboratory experiment.

Goldenberg et al (2018) developed this work in a field experiment with 508 Israelis between October 2014 and January 2015 ("a period of extensive violence in the Israeli-Palestinian conflict"). Participants came from three locations in Israel, and they randomly received one of three 5-hour workshops:

i) Malleability intervention - focused upon how the others can change.

ii) Perspective-taking intervention - focused on the importance of taking the other's viewpoint.

iii) Coping with stress intervention (control).

[9] This study "utilised a more stringent control condition wherein participants in both conditions received negative information about their racial ingroup, but only the discrimination salient condition referred to group level racial discrimination" (Craig and Richeson 2014 p173).

The workshops were general and made no reference to the Israeli-Palestinian conflict. Two weeks and six months later, participants completed attitude questionnaires about Palestinians. Participants in the malleability intervention had significantly more positive attitudes at both time points than the control group, and showed some differences to the perspective-taking group.

Er-rafiy and Brauer (2013) found that increasing the perceived variability of the outgroup reduced prejudice towards the outgroup. "In other words, the more an individual perceives members of a given group as variable the less he or she tends to apply his/her stereotypes to members of that group" (Er-rafiy and Brauer 2013 p841).

This idea is based on the original work by Brauer and Er-rafiy (2011). A French participant each time was led to believe that they were playing a sharing game with three Chinese individuals, who were presented as homogeneous or heterogeneous. The participants allocated more money to the Chinese "players" in the heterogeneous condition.

Er-rafiy and Brauer (2013) developed this work in four experiments:

Experiment 1 - This laboratory experiment examined changes in attitude among forty-three female French psychology undergraduates towards Arabs after viewing a poster showing twelve male and female Arabs with different appearances under the heading: "what makes us the same - is that we are all different". Participants exposed to this poster (compared to one about eating more fruit and vegetables in the control condition) had significantly lower negative stereotypes and less prejudice (figure 1.1).

But there was no baseline measure of attitudes (ie: before exposure to posters).

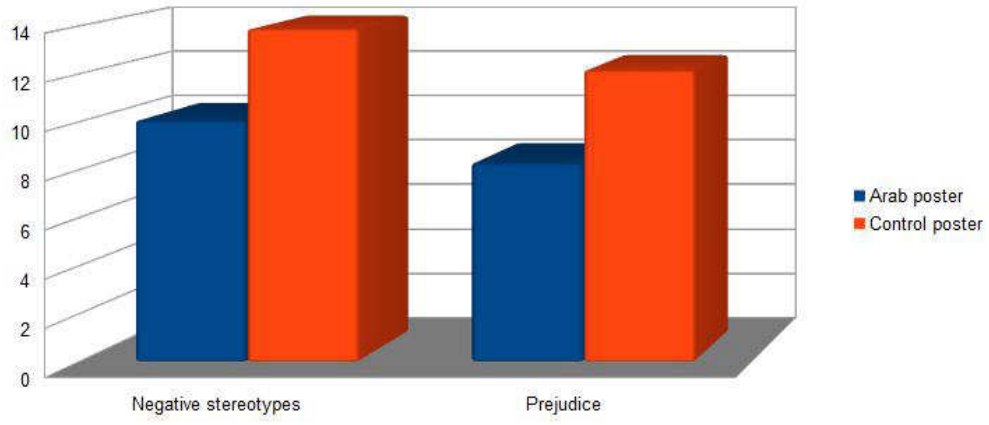


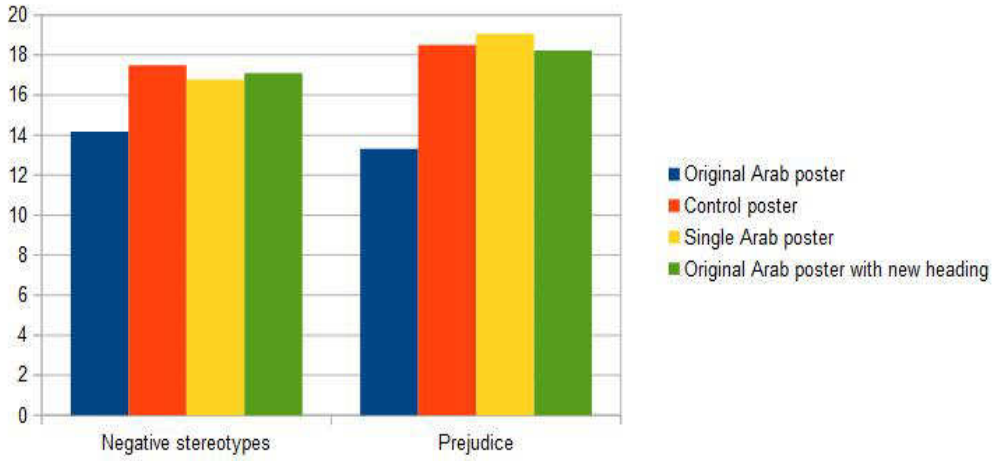
Figure 1.1 - Mean ratings (out of 28) in Experiment 1 (where a higher score shows more negative responses).

Experiment 2 - This experiment compared the "Arab" poster to the control one with fifty non-psychology students at the same French university. The findings from the previous study were confirmed.

But this study approached individuals leaving the university library, there was not random assignment to conditions because posters could not changed. In other words, one poster was used on one day and the other on another day of study.

Experiment 3 - This study placed "Arab" posters around four secondary schools for five weeks (compared to the control posters in four schools). The schools were paired for similarity. The researchers confirmed previous findings: "Students who had been exposed to the poster highlighting the differences among Arabs evaluated Arabs more positively, felt closer to them, were less prejudiced and discriminated less against them than students who had not been exposed to this poster" (Er-rafiy and Brauer 2013 p848).

Experiment 4 - This experiment with 486 undergraduates at the same French university as before added two extra conditions in Experiment 1. These were a poster of a single Arab under the heading "stop discrimination", and the original "Arab" poster with the same heading as this. Negative stereotypes and prejudice were significantly lower in the original "Arab" poster condition compared to the other three conditions (figure 1.2).



(Data from Er-rafiy and Brauer 2013 table 1 p850)

Figure 1.2 - Mean ratings (out of 28) in Experiment 4 (where a higher score shows more negative responses).

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2. THE EDMONTON FRAIL SCALE

2.1. MEASURING FRAILTY

Perna et al (2017) began: "The main characteristics of frailty is a decrease of the reserves in multiple organ systems. The distinction between age and frailty appear to be so blurred that it has been hypothesised that everyone becomes frail when they grow old. In fact, physicians have often used the term frailty to characterise the weakest and most vulnerable subset of older adults. However, 'frail' does not mean co-morbidity or disability, so this term cannot be chosen to describe the elderly" (p2).

Perna et al (2017) noted three steps in the "frailty process" [10]:

i) "A pre-fail process" - The physiological resources are enough to respond to disease, injury or stress with the possibility of complete recovery.

ii) "The frailty state" - This is "characterised by a slow, incomplete recovery after any new acute disease, injury or stress, confirming that the available functional reserves are insufficient to allow a complete recovery" (Perna et al 2017 p2).

iii) "Frailty complications" - eg: risk of falls; functional decline.

Frailty can be measured by the Edmonton Frail Scale (EFS) (Rolfson et al 2006), which was developed in Canada in 2000.

The following domains of frailty tested are (Rolfson et al 2006):

1. Cognition - The clock drawing test (Brodaty and Moore 1997): place the numbers on a clock face drawing, and show a certain time [11].

[10] The rationale for screening for a particular disease is early detection and the ability to treat it (appendix 2A).

[11] Evaluation: Very limited test of cognition compared to other tests available. Better to have a selection of tasks.

Scored by observer as "no errors" (0), "minor spacing errors" (1), "other errors" (2).

2. General health status (2 items - self-reported):

- "In the past year, how many times have you been admitted to hospital?" (1-2 = 1 point; >2 = 2 points).
- "In general, how would you describe your health?" (5 response options - "excellent", "very good", "good" (0 points), "fair" (1 point), or "poor" (2 points)) [12].

3. Functional independence - The self-reported need for help on eight common tasks (eg: shopping, meal preparation).

Scored as no help or 1 task needing help (0 points), 2-4 tasks (1), and 5-8 tasks (2).

4. Social support - Self-reported answer to question: "When you need help, can you count on someone who is willing and able to meet your needs?" [13].

Scored with 3 response options - "always" (0), "sometimes (1), or "never" (2 points).

5. Medication use (2 items - self-reported):

- "Do you use five or more different prescription medications on a regular basis?" (Yes = 1 point/No = 0) [14].
- "At times, do you forget to take your prescription medications?" (Yes = 1 point/No = 0).

6. Nutrition - Self-reported answer to question: "Have you recently lost weight such that your clothing has become looser?" (Yes = 1 point/No = 0) [15].

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[12] Evaluation: Individuals who rate their subjective health worse will score higher, but they may be objectively "healthy", while "optimists" could rate poor health as subjectively well and thus will score lower.

[13] Evaluation: There could be a question of validity here. How is the availability of social support linked to an individual's frailty? This also links to the problem of defining frailty, where there is limited agreement.

[14] Evaluation: How is "regular" defined?

[15] Evaluation: How long is "recently"?

7. Mood - Self-reported answer to question: "Do you often feel sad or depressed?" (Yes = 1 point/No = 0) [16].

8. Continence - Self-reported answer to question: "Do you have a problem with losing control of urine when you don't want to?" (Yes = 1 point/No = 0).

9. Functional performance - The timed "Up and Go" test (Podsiadlo and Richardson 1991): The individual is asked to stand up from an armchair, walk to three metre point and return to sit down. The time taken is measured.

Scored as <10 seconds (0 points), 11-20 seconds (1), or >20 seconds (or unwilling or needs assistance) (2).

The maximum score is 17, and a higher score is a sign of greater frailty. Three groups are usually distinguished - 0-5 points (no frailty), 6-11 points ("apparently vulnerable"), and 12-17 points (severe frailty) (Perna et al 2017).

In the original study with the EFS by Rolfson et al (2006), 158 over-65s referred to hospitals and clinics in Edmonton, Alberta, were the sample. The mean score was 7.6.

Perna et al (2017) reported the use of the EFS with 366 older adults in Northern Italy. Among the sample, 20% were classified as not frail, two-thirds as "apparently vulnerable", with the remainder as frail (14.6%). This compares to 8% of Mexican American over-65s (Graham et al 2009), 11% of female 70-79 year-olds (Bandeen-Roche et al 2006), and 25% of over-85 year-olds (Fried et al 2004).

Comparing the not-frail and severe-frailty groups in the Perna et al (2017) study, the latter were significantly older, and had less physical strength and poorer memory, for instance, based on other measures.

Frailty is a concept, and this needs to be operationalised (ie: defined in a way that can be measured), which is what tests/scales/measures like the EFS do. But an operationalised test needs to show reliability and validity (table 2.1).

1. Reliability - The consistency/stability of the test, which only changes if the test-take changes. Test-retest reliability is commonly used, where the same individuals take the test at two different points in time, and the scores are correlated.

The EFS was administered to eighteen individuals

[16] Evaluation: How is often is "often"?

Reliability:

- External (stability across time): test-retest; parallel forms.
- Internal (internal consistency of test): split-half method; Cronbach's alpha and item analysis [17].

Validity:

- Face/Content
- Criterion (concurrent/predictive)
- Construct

Table 2.1 - Main types of reliability and validity of tests and scales.

twice within 24 hours, and a correlation of +0.77 was found (Rolfson et al 2006).

2. Validity - This refers to whether the test measures what it claims to measure. There are different types of validity, including face validity - ie: on the face of it, do the questions or items appear valid?

Construct validity, for example, involves correlation of the scores on the test with those of an established measure of the same concept. In the case of the EFS, the Geriatrician's Clinical Impression of Frailty (GCIF) (Rolfson et al 2001), the Barthel Index (Mahoney and Barthel 1965), and the Mini-Mental State Examination (MMSE) (Folstein et al 1975) were used (table 2.2). It was expected that there would be a positive correlation between the EFS score and the GCIF score, but negative correlations between the EFS score and the other two measures [18]. These were found (table 2.3) (Rolfson et al 2006) [19].

- GCIF - Clinician rated different areas related to future independence (eg: physical frailty; physiological frailty).
- Barthel Index - Scoring of ability to perform daily activities (eg: grooming; climbing stairs).
- MMSE - Cognitive tests including name objects, follow simple instructions, recall, and calculations.

Table 2.2 - Measures used for validation of EFS.

[17] Evaluation: Coolican (2004) noted a "circularity" to methods used here.
[18] This is because the MMSE and Barthel Index see a lower score as lower ability.
[19] Apicella and Barrett (2016) referred to "cultural validity" - ie: "whether a measurement device developed for one culture measures the same underlying factor in another" (p95).

Test	Correlation	Significant	Sample size
GCIF	+0.64	p<0.001	158
Barthel Index	-0.58	p = 0.006	21
MMSE	-0.05	not	30

Table 2.3 - Correlations between EFS scores and other similar measures.

2.2. APPENDIX 2A - SCREENING FOR DEMENTIA

In the case of dementia, screening looks for "pre-dementia" or mild cognitive impairment. Le Couteur et al (2013) argued that there is a risk of overdiagnosis with "potential adverse consequences for individual patients, resource allocation, and research" (p1).

The assumption of early diagnosis is that a disease passes through mild to severe symptoms, and interventions will be more effective for the mild symptoms. But this may not be the case with dementia, as "only 5-10% of people with mild cognitive impairment will progress to dementia each year, and as many as 40-70% of people do not progress or their cognitive function may even improve. Interestingly, this may also be accompanied by reversal of structural changes found in the brain. Furthermore, many people who develop dementia do not meet definitions of mild cognitive impairment before diagnosis. Some studies have even shown that the development of dementia is higher in people who don't have symptoms of mild cognitive impairment than in those that do. It is also evident that the neuropathology of mild cognitive impairment does not support the concept that most people with this condition are in the early stages of Alzheimer's disease" (Le Couteur et al 2013 p2).

The success of screening also depends on the accuracy of the diagnosis process. Based on a meta-analysis of fifteen studies of dementia, Mitchell et al (2011), for instance, calculated that, with the current diagnostic criteria, of 100 patients and a prevalence of dementia of 6%, four individuals would be correctly diagnosed and 23 would be incorrectly identified with dementia.

2.2.1. Cognitive Training and Memory

Cognitive training may be beneficial for individuals with memory problems as in amnestic mild cognitive impairment (aMCI), which can be a symptom of future Alzheimer's disease. Evidence of success is not straightforward as can be seen in these two studies both

published in the same year.

1. Savulich et al (2017)

Forty-two individuals in Cambridgeshire, England, with aMCI participated in a randomised clinical trial (RCT) of an iPad-based memory game called "Game Show". This involves learning different geometric patterns associated with different spatial locations to win "gold coins" with the encouragement of a "host". Half the participants played for eight one-hour sessions over four weeks.

The intervention group showed significantly better performance than the control group in episodic memory after training.

A key methodological limitation of the study was that the control group simply did not do anything rather than being an active control group (eg: non-memory-related game). The researchers admitted that it was "also possible that increased contact time and interaction with the research team, particularly with the elderly, positively impacts cognitive performance, raises self-esteem, or offers some other confounding social benefit not controlled for here" (Savulich et al 2017 p631).

2. Kable et al (2017)

Three hundred and ninety-five healthy adults aged 18-35 years old in the USA participated, and 166 received cognitive training via an internet-based game (50 x 30-minute sessions over ten weeks).

No difference was found between the intervention and control groups at the end of the study (ie: both groups improved since baseline). The researchers concluded that "commercial adaptive cognitive training appears to have no benefits in healthy young adults above those of standard video games for measures of brain activity, choice behaviour, or cognitive performance" (Kable et al 2017 p7390).

This study had an active control group playing video games.

These studies are not comparable because of methodological differences (table 2.4).

Both studies have a number of methodological strengths and weaknesses, including:

(+) Use of standardised measures.

(+) Randomisation of participants to intervention or control group.

Issue	Savulich et al (2017)	Kable et al (2017)
Sample	Older adults (average age in 70s) with mild cognitive problems recruited via memory clinics	Healthy young adults
Length of study	4 weeks (8 hours of training)	10 weeks (25 hours of training)
Cognitive training	Specifically designed for adults with aMCI	Commercially available - eg: "speed match" (whether next the symbol is the same or different to previous one)
Aims of study	To test "Game Show" and "gamification"	To understand cognitive training and risky choices
Outcome measures	Cognitive tests	Cognitive tests and neuroimaging
Control group	Passive (ie: no iPad task)	Active (ie: video games)

Table 2.4 - Key methodological differences between the two studies.

(+) Design of study that allows comparison between groups (independent design) and comparison of individuals between baseline and post-study (repeated design).

(-) No control over what happens in lives of participants during study period that could be relevant to the outcome (eg: general internet use).

2.2.2. An Alternative

Older adults with larger social networks show less cognitive decline, as seen in longitudinal and cross-sectional studies (eg: Haslam et al 2015). Establishing the exact effects of more social contacts on the brain can be achieved with non-human animal studies, as in Smith et al (2018).

Female adult mice were kept in cages as pairs (low social network condition) or as groups of seven (high social network condition) for three months. This was the independent variable. Memory (the dependent variable) was tested with the novel object recognition (NOR) test. Individuals were placed in a cage with two novel objects for ten minutes, then removed for five minutes, before returning to the cage where one of the objects had been moved or changed. Mice investigate novelty, so they should pay attention to the change if they can remember the objects previously. Money was also tested with the Barnes Maze test, which is a platform with an escape

tube. The speed of finding of the escape route when returned to the maze is taken as the measure of memory. After the experiment, the mice were killed to examine their hippocampus, which is the area of the brain associated with memory.

The group-housed mice spent significantly longer investigating the moved object on returning to the cage, but there was no difference on the Barnes Maze test.

Why might having a larger social network help in age-related cognitive decline? Smith et al (2018) offered three hypotheses from the literature:

i) Larger social networks lead to more support and better physical health.

ii) Improved emotional support and stress buffering.

iii) More daily interactions stimulate the brain (cognitive enrichment hypothesis). This is the explanation that Smith et al (2018) favoured.

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3. NARWHALS: STUDIES OF TWO BEHAVIOURS

3.1. INTRODUCTION

Narwhals (Monodon monoceros) (figures 3.1 and 3.2) are cetaceans classed as toothed whales (Odontoceti), which also includes sperm whales, dolphins, and porpoises (Cooke et al 2008).

In males the left tooth, of the two, grows into a long tusk, which is used to advertise strength to females (Cooke et al 2008).

Greenland is home to many narwhals. However, "[N]arwhals from the east and west sides of Greenland have been separated at least since the end of the last glaciation, more than 10,000 years ago, enough time to have led to genetic differentiation" (Blackwell et al 2018 p2).

(Source: Kristin Laidre - NOAA Photolib Library; http://www.photolib.noaa.gov/bigs/anim1112.jpg; in public domain)

Figure 3.1 - Pod of narwhals surfacing.

(Source: Kristin Laidre - NOAA Photolib Library;
http://www.photolib.noaa.gov/htmls/anim1111.htm; in public domain)

Figure 3.2 - Aerial photograph of pod of narwhals off Greenland in 2006.

3.2. ACOUSTIC REPERTOIRES

Narwhals have a vocal repertoire of clicks, burst pulses, and whistles. Most data have been collected with dipping hydrophones, or short-term animal-borne acoustic recorders (eg: hours) (Blackwell et al 2018).

Blackwell et al (2018) summed up the acoustic researchers' problem: "Narwhals are skittish and cannot be approached at sea for tagging. Instead, it is necessary to live-capture the whales in nets in order to instrument them. Such operations can only be conducted in certain locations, where narwhals are known to pass during their migrations and where field facilities, including accommodation and boats, can be maintained. Additionally, to study the vocal behaviour beyond the first day after tagging, when the whale may be in a different part of its range and performing different behaviours, long-term deployments are necessary" (p2).

These researchers concentrated on five females and one male (table 3.1) in Scoresby Sound, East Greenland,

with animal-borne acoustic recorders for seven days, along with satellite tags (figure 3.3).

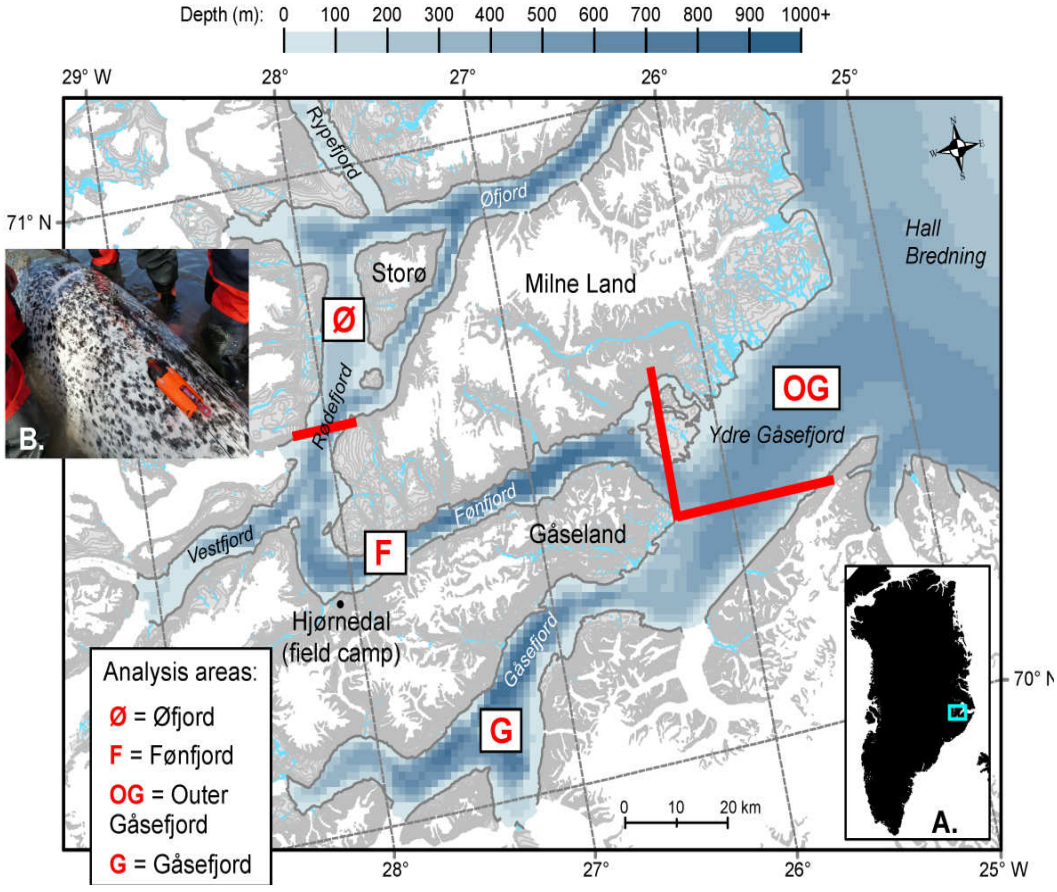
Whale (sex)	Length (cm)	Fluke width (cm)	Mass (kg)	Year	Record start	Record end	Record duration hh:mm (d)
Freya (F)	420	93	1045	2013	8 Aug. 16:41	11 Aug. 12:55	68:14 (2.8)
Thora (F)	341	84	560	2014	11 Aug. 15:32	15 Aug. 22:19	102:47 (4.3)
Mára (F)	390	95	824	2014	11 Aug. 16:15	12 Aug. 02:15	10:00 (0.4)
Frida (F)	380	85	762	2015	15 Aug. 18:31	19 Aug. 05:12	82:41 (3.4)
Eistla (F) [a]	~360 [c]	-	650	2016	24 Aug. 13:16	28 Aug. 19:47	102:31 (4.3)
Balder (M) [b]	372	90	685	2016	24 Aug. 12:50	31 Aug. 11:54	167:04 (7.0)
SUM:							533:17 (22.2)

[a] Accompanied by a calf
[b] Tusk length 74 cm
[c] Estimated

https://doi.org/10.1371/journal.pone.0198295.t001

(Source: Blackwell et al 2018 table 1)

Table 3.1 - Details of the six narwhals studied.



(A) Position of Scoresby Sound on East Greenland.
(B) Acoustic equipment attached to Freya.

(Source: Blackwell et al 2018 figure 1)

Figure 3.3 - Details of Scoresby Sound.

In total, 533 hours of sounds were recorded between 2013 and 2016. Three components of the acoustic repertoire were studied:

i) Clicking behaviour - About a quarter of the sampled time involved this behaviour, which is used for echolocation.

ii) Buzzing behaviour - A total of over 16 000 buzzes were recorded. This behaviour was used during feeding to aid in "the last moments preceding prey capture" (eg: Arctic cod, squid).

iii) Calling behaviour - Over 1600 calls in total recorded ("made by both tagged whales and other nearby whales"). Most calls occurred near the surface, which is where narwhals are likely to meet conspecifics (ie: calls linked to social interactions).

Blackwell et al (2018) noted that the tagged individuals abstained from clicking and buzzing for around 24 hours after release from capture, which suggested that silence may be their response to a stressor.

3.3. PREDATOR-PREY INTERACTIONS

The "consumptive effects" or "density-mediated effects" of predators on a population refers to "the mortality incurred when predators kill and consume prey during predation events" (Breed et al 2017 p2628). The alternative is "non-consumptive effects" or "trait-mediated effects", and these "can similarly affect prey populations by altering species' behaviour and space use under perceived or real predation risk, which are associated with decreased fitness through loss of access to key foraging areas, disrupted social structure, increased energy expenditure and stress imposed by persistent vigilance and escape behaviours, and decreased reproductive success" (Breed et al 2017 p2628). Though the latter are not directly lethal, their cumulative effect may impact on a population more (eg: lost foraging opportunities leading to starvation).

Researchers can study these effects with electronic tagging of animals, which shows the prey's use of space, and the adjustment of behaviour under predator threat. Breed et al (2017) reported the synchronous tracking of seven narwhals (prey) and one killer whale (Orcinus orca)

(predator) in Admiralty Inlet [20], Baffin Island, Eastern Canadian Arctic in August 2009, which showed that the "persistent interaction with killer whales induces changes in both behaviour and habitat use of narwhal" (p2628). The mere presence of the predator in the area changed the prey's behaviour.

When the orca was present in the area, the narwhals were "almost entirely constrained to a narrow band of water directly adjacent to shore, with the mostly highly used region within 500 m of coastline" (Breed et al 2017 p2630). When the orca was not present, the narwhals moved offshore (4 - 10 km). "Dive behaviour was also affected by the presence of killer whales, which caused narwhal to perform deeper dives about 10% more frequently and shorten dives by about 25 s (14%). Although these differences were small, they were significant and could impact energetic expenditure and foraging opportunities more than the differences might suggest" (Breed et al 2017 p2631).

Avoidance behaviours of animals exposed to a threat, like a predator, tend to be flight or fight, or freezing. The flight or fight responses involve physiological changes that increase activity (eg: more blood to the muscles; increased heartbeat) mediated by the sympathetic part of the autonomic nervous system, while the freezing response is controlled by the parasympathetic part to reduce activity (eg: lowered heart rate). Because two systems in the body are involved, animals cannot "simultaneously freeze and flee when frightened" (Williams et al 2017 p1328).

However, narwhals show a "paradoxical escape response" after release from net entanglement or stranding that involved both down-regulation of the physiological processes (as in freezing) and up-regulation (as in flight or fight). This physiological behaviour has high energetic costs for the animal (3-6 times the resting rate of energy expenditure) (Williams et al 2017).

Williams et al (2017) collected their data from nine narwhals in Scoresby Sound, East Greenland in 2014-15, who were fitted with monitoring equipment via a suction cup (eg: depth monitor; electrocardiograph).

3.4. REFERENCES

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