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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.

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

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1.1. INTRODUCTION

There is a tendency in the West to regard the mind and body as separate (mind-body dualism), which comes from the ideas of Descartes in the seventeenth century.

This distinction between mind and body is challenged by, for example, Merleau-Ponty (eg: 1962). "Except in certain contexts, we experience living human bodies, our own and those of other people, not as bits of machinery, but as the expression of a human person and his or her mode of being in the world, or interacting with and finding significance in the objects and people in the surrounding environment" (Matthews 2004 p194).

Bodily experience may be rooted in biology, but it is also embedded in the social world - a "life-history-in-society" (Finlay and Langridge 2007).

Two theoretical positions on the relationship between the body and society can be distinguished as "symbolic body" and "agentic body". The former focuses on the body as "a conduit of social meaning", and the latter on the body as "an active participant or agent in the social world" (Reischer and Koo 2004). The latter view is

sometimes called "embodiment" ¹.

1.2. AGEING BODY

It has been suggested that "the aged body is socially and culturally constructed, showing how cultural categories are naturalised in bodies, so that we are as much aged by culture as by physiology" (Twigg 2006 p40) (appendix 1A). But bodies are not entirely socially constructed because they age and die.

There is a desire when studying the social construction of the ageing body to resist the medical focus on ill health and physical decline. Gullette (1997), for example, emphasised that individuals are "aged by culture" (ie: the beliefs and ideas, usually negative, in society about the ageing body. Twigg (2006) observed: "Youth in this ideology is the period of fun, energy, sexuality, intensity and hope, holding all the cultural goods. In the soliloquy of age anxiety, we debate with ourselves the point at which we too have to move on to the new and unhappy aged class, reading our bodies for signs of decay that point to this transition" (p42).

Woodward (1991) emphasised the hierarchical arrangement of youth above age. "We are judged not by how old we are, but by how young we are not" (Twigg 2006 p42). This can be linked to Goffman's (1968) "spoilt identity". Featherstone and Hepworth (1991) talked of the "mask of ageing" to describe the tension between the ageing external appearance (and its low value in society), and the sense of self as still young ². Women experience this more as they move from the hypervisible young, attractive female body in cultural imagery to the invisible older form (Woodward 1999). The upshot is that women "feel pressure to look as young as possible and to hide the secret that they are old because that admission is devastating to social acceptability and self-esteem. Looking old transgresses contemporary ideals of feminine beauty" (Twigg 2006 pp43-44).

The practical upshot is the desire for techniques to change the physical appearance like "cosmetic surgery" and bio-technology. A Channel 4 documentary called "Bus Pass Boob Jobs" (2006) focused upon three older adults who wanted or were undergoing cosmetic surgery. Much of what they said about wanting the surgery related to a

¹ Embodiment is "the process or state of living in a body" (Finlay and Langridge 2007).

² "An endgame emerges with older people being at war with themselves, in a battle between a desire for youthful expression and an ageing body. Ageing, as a mask, becomes a nightmare version of the consumer dream of endless reinvention as identity emerges as a contradiction between the fixedness of the body and the fluidity of social images" (Estes et al 2003 p38).

desire to go back in time or start again.

For example, Sylvia Adams (65 years old), who was having breast implants, talked of "trying to recapture some of it" (her 30s). While Tony Day (in his 70s) wanted a facelift because he hoped that a new face would make him a different person and he could start again.

Biggs (1997) preferred to see the outward conformity of making the body look attractive as a means of protecting the mature self in an environment of conflicting messages. This "masquerade is presented as a tactical manoeuvre to negotiate the contradict between social ageism and the increased personal integration that accompanies adult ageing" (Estes et al 2003 p39).

I would want to emphasise that this process takes place at a specific time and place, and society. I have called this "consumer capitalism" (Brewer 2001), which is a distinct form of modern consumerism that thrives by selling more ³.

1.3. LISTENING TO INDIVIDUALS WITH DEMENTIA

One way to address the ageing body is through research that elicits the views of the individual. This is particularly important with dementia, where studies of the subjective experience are limited. Beard (2004) observed: "Living in a 'hypercognitive society' (Post 1995) where people are defined by their 'mind', those with something like Alzheimer's – and who are, in biomedical terms, 'cognitively impaired' – are reduced to little more than a shell" (p416).

The separation of "mind" and "body" has the potential to ignore personal meanings. It is possible that "the mechanistic model of biomedicine has precluded a systematic examination of the socio-cultural or emotional components of illness" (Beard 2004 p416). Furthermore, Beard (2004) asserted: "The dominant story told about people with memory loss is one where their speech is deemed meaningless, their memories defective,

³ "Consumer capitalism" has two key characteristics:

- i) The need to sell more products as profits must always increase each year;
- ii) The selling of consumer (non-essential) goods.

Both of these characteristics occurs within saturated markets (ie: people have enough of the products).

"Consumer capitalism" can be seen as a third stage in a series of stages of the development of consumerism. The first stage is the purchasing of goods to fulfil basic survival needs, like the availability of a greater choice of food. The second stage is based around consumer products that improve life, like washing machines or cars. The next stage, where we are today, is the selling of products that are unnecessary to basic survival needs or improving life. This could also be called a "post-basic consumerism" (Brewer 2008).

and their recollections are discounted in the planning of care" (p417).

1.3.1. Beard (2004)

Beard (2004) performed a qualitative study with a small group of individuals with dementia in the USA with early-stage Alzheimer's disease. This involved three individual interviews, and a focus group of ten people. Participant observation was also undertaken at a San Francisco hospital.

Three themes emerged about the experience of being diagnosed with "probable-AD":

1. Defining moments - The diagnosis was a defining moment in the individuals' lives and their perceptions of the self. One man referred to it as "the first time it was like something's wrong with me".

2. To tell or not to tell - The dilemma of whether to tell others about the diagnosis or not ⁴, or to try and "pass" as "cognitively intact". Whether to tell others went with a general awareness of the illness, which could range from no discussion to full acknowledgement ⁵. Some individuals spoke of "dementia as useful in justifying their behaviour, thus removing personal responsibility or blame" (Beard 2004 p423).

3. Preservation - Individuals developed strategies of impression management (eg: controlling conversations to avoid topics that gave them difficulty). This suggested that "people attempt to maintain an image, both publicly and personally, of a self that is ultimately in danger of being shattered. These people try to resist

⁴ Another illness where disclosure is a key issue is HIV/AIDS (appendix 1B).

⁵ Self-deception is where "a motivated observer's subjective evaluation of a situation and the evaluation of an external observer could come to be radically divergent" (Clegg and Moissinac 2005 p96). Put another way, it is when a person "lies to himself, that is to say, persuades himself to believe what he knows is not so" (Demos 1960 quoted in Clegg and Moissinac 2005). Furthermore, it is when an individual "believes both p and not-p at the same time" (Demos 1960), which distinguishes it from delusions where there is no conflict (Clegg and Moissinac 2005). Sackeim and Gur (1978) pointed out that the individual is not aware of holding one of the contradictory beliefs, and "which belief is not subject to awareness is a motivated act" (Sackeim and Gur 1978 quoted in Clegg and Moissinac 2005).

An alternative explanation focuses on bias or motivated information processing rather than conflict. "This approach transforms the central self-deception question from 'how can X simultaneously hold the beliefs p and not-p?' to 'how is it that X can come to believe p when the available evidence implies not-p?'" (Clegg and Moissinac 2005 p99).

A relational theory of self-deception (eg: Gergen 1985) concentrates on the use of the concept in social interactions. "If one subscribes to the idea that truth and objectivity are both accessible and desirable, then someone who is labelled self-deceived is put in a disadvantageous position by the observer who, on using the term, purports to have the definitive interpretation of events" (Clegg and Moissinac 2005 p100).

being assigned the 'master status' of a 'demented' person by preserving the social personae as was intact prior to memory loss" (Beard 2004 p425).

1.3.2. Frazer et al (2012)

Using the interpretative phenomenological approach (IPA) (appendix 1C), Frazer et al (2012) interviewed eight women in England with dementia who were living alone. Their ages ranged from 75 to 95 years old. Analysis of the transcripts of the hour-long semi-structured interviews identified four over-arching themes (and other sub-themes):

1. Living with a changing sense of self

a) Loss of past self - Many examples of past losses were reported, including of husband, mother role, and of independence.

b) Living with an unwanted self - Many of the women were living with physical problems ("disintegration of the seen body"), and there was some overlap with "physical disintegration of the unseen body" (Frazer et al 2012).

c) Adapting to a new self - Different ways of adapting were used, including acceptance, reduced expectations, or fighting against adversity. Religion and personal values also helped. The desire to pass something (non-material) on to future generations was important (eg: values - "a nice attitude to people" ("Ruby")).

2. A fluctuating awareness of memory problems

a) Living with a declining memory - The importance of coping strategies, like "to do" lists. Shame about forgetting was reported, and the women's vulnerability was apparent.

b) Dementia as loss of control of the mind - "Alice", a former medical professional, summed up the fear: "Dementia is a very emotive word anyhow, erm, you feel that you haven't got control of your mental processes, and for someone who's highly trained, this is a shock, and you wonder what is going to happen!, and you are looking into the future, and particularly with my dear friend who is in this home [...] to see what has happened to her, it really sort of worried me as you can imagine, and I was wondering whether I was going to lose my reason" (p685).

c) Denial versus despair - memory lapses were blamed

on other causes than the dementia (eg: blaming others; emphasising other physical disabilities like deafness).

3. Seeking sanctuary versus risking danger

a) Staying close to home to feel safe - Even though the women's ability to travel was limited, they reported not wanting to go far. "Emily" was worried that she "might go somewhere and then you can't get back". The desire for safety also meant control over who they saw (eg: strangers).

b) Coping alone - This was challenging, but going into a residential home was seen as "giving-up".

c) Threat of change - "Emily" outlined her fear of losing her home (the place of safety and security). "Living with memory loss had real-world practical implications that were more than just a sense of not being able to remember something. It was as though participants felt they had become stigmatised for having memory problems, then perceived as 'mad' and a threat to other residents, and so had to be even more 'well-behaved' than other residents in order to keep their homes" (Frazer et al 2012 p688).

4. Being with others: connection versus disconnection

a) Need to belong - Many of the interviewees described the importance of social activities and "company".

b) Privacy - The level of companionship was relatively superficial in the social groups as privacy was emphasised. So, "memory clubs", for example, were an ambivalent experience - "company" versus "a reluctant admission of failure" that others would know about. There was a conflict between "wanting-to-be-known" and "not-wanting-to-be-known" (Frazer et al 2012).

c) Exclusion - Participants talked about feeling excluded by others and society.

Frazer et al (2012) summed up: "The impact of memory loss on independence seemed to have a very significant impact on most of the women's lives; this appearing to be tied up with ageing and bodily decline - for example in preventing going out due to fear of not remembering how to get home, or loss of driving licence. Many of the women fought against admitting the impact of memory loss... However many were also actively involved in reappraising who they were and continued to develop their relationships with others" (p690).

1.3.3. Kontos (2004) and the Self

In terms of the self, Sabat et al (1999) presented a tripartite model:

Self 1 - personal identity, which is not reliant on others, and is expressed as "I".

Self 2 - attributes and beliefs.

Self 3 - social presentation of the self.

Problems with Self 3 have an effect on Self 2, while Self 1 may not be damaged by dementia (Sabat 2001).

Fontana and Smith (1989) talked of the self for dementia sufferers "increasingly devoid of content - it is 'unbecoming' a self", while Davis (2004) referred to "the very splintering of the sedimented layers of Being" until "there is nothing left".

On the other hand, Remen (1994) told the story of Tim's father who had become a "sort of walking vegetable" (unable to speak, feed, clothe and care for himself). Suddenly, at the moment of his death, he said: "Tell your mother that I love her. Tell her that I am all right". Remen (1994) quoted Tim (a medical student): "My father's brain was almost entirely destroyed by this disease. For many years, I have asked myself, 'Who spoke'? I have never found the slightest help from a medical textbook. I am no closer to knowing this now than I was then" (quoted in Kontos 2004). Kontos (2004) went on: "If the very notion of dementia implies the destruction of selfhood, then indeed 'Who spoke'?" (p830).

Kontos (2004) challenged traditional thinking on Alzheimer's disease and the self: "Explicit in the current construction of Alzheimer's disease is the assumption that memory impairment caused by cognitive deficiencies leads to a steady loss of selfhood. The insistence that selfhood is the exclusive privilege of the sphere of cognition has its origins in the modern western philosophical tradition that separates mind from body, and positions the former as superior to the latter. This dichotomy suggests a fundamental passivity of the body, since it is primarily cognition that is held to be essential to selfhood" (p829) (appendix 1D).

Based on an ethnographic study in Canada, she argued that "selfhood persists even with severe dementia" (Kontos 2004). The study took place at an Orthodox Jewish long-term care facility in a city in Ontario. Though the residents, most with Alzheimer's disease, did not speak, Kontos (2004) argued that they "interacted meaningfully with the world through activity and engagement rather than contemplation or reflection", and "selfhood is

embodied and characterised by an observable coherence and capacity for improvisation that is sustained at a pre-reflective level by the primordial as well as the socio-cultural significance of the body" (p831).

Kontos (2004) interpreted her ethnographic data with Merleau-Ponty's (1962) ideas of "embodied significance" and "basic intentionality". These involve the non-conscious interactions of the body in the world. Here is an example that he used: "When bitten by a mosquito, we do not need to look for the part of the body where we have been bitten. We find it straight away by reaching with our hand the itchy spot on our phenomenal body. We do not locate it in relation to axes of co-ordinates in objective space. In the natural system of our own body, we experience a direct relationship between our hand as a scratching potentiality and the part of our body bitten as a spot to be scratched" (Merleau-Ponty 1962 quoted In Kontos 2004).

The concept of "habitus" (Bourdieu 1984) was also used by Kontos (2004). Bourdieu (1984) said: "the schemes of the habitus, the primary forms of classification, owe their specific efficacy to the fact that they function below the level of consciousness and language, beyond the reach of introspective scrutiny or control by the will" (quoted in Kontos 2004). Put another way, these are the "embodiment of culture-specific conditions of primary socialisation" (Kontos 2004 p842). There is also a social class aspect to "habitus".

Kontos (2015) described her approach as "embodied selfhood" as "coherence, distinctiveness, and creativity can be discerned amongst persons with dementia through attention to the propensities and movement of the body" (p174).

This can be linked to a new approach to care "that respects individuals with Alzheimer's disease as embodied beings", and "a paradigmatic shift from viewing behaviour as a 'problem' to be controlled to understanding movements and gestures as meaningful self-expression" (Kontos 2015 p176). For example, creative expression programmes that improve quality of life with arts-based activities (eg: music, dance, visual arts) ⁶.

Such activities and a move to the individualisation of care ⁷ are a challenge to "standardised care" - what Twigg (2010) called the "hard, plastic, easy wipe,

⁶ For example, "TimeSlips", which is a group storytelling programme for individuals with middle- to late-stage dementia. Fritsch et al (2009) detailed the evaluation of such a programme at nursing homes in Wisconsin and North Carolina, USA. Compared to matched nursing homes not using the programme, residents were more engaged and alert, and staff were more positive.

⁷ For example, clothing choice (appendix 1E).

easycare polyester world" of nursing homes.

McKeown et al (2010) reported the use of "life story work" (LSW) with four individuals with dementia, their family carers and care staff in northern England. LSW involves the collection of materials and production of a book with photographs, say, of the person's life. LSW helped the care staff see "the person with dementia beyond being a patient", and for family members "to 'show' the personhood of their relatives" (McKeown et al 2010). The researchers also noted: "Although participants with dementia did not overtly express that they enjoyed the activity, the pride they experienced in their life story and other people's interest was evident" (McKeown et al 2010 p154).

But how to offer individualised (or person-centred) care (appendix 1F), which is probably expensive, at a time when saving money seems to dominate?

1.4. FUTURE OF DEMENTIA

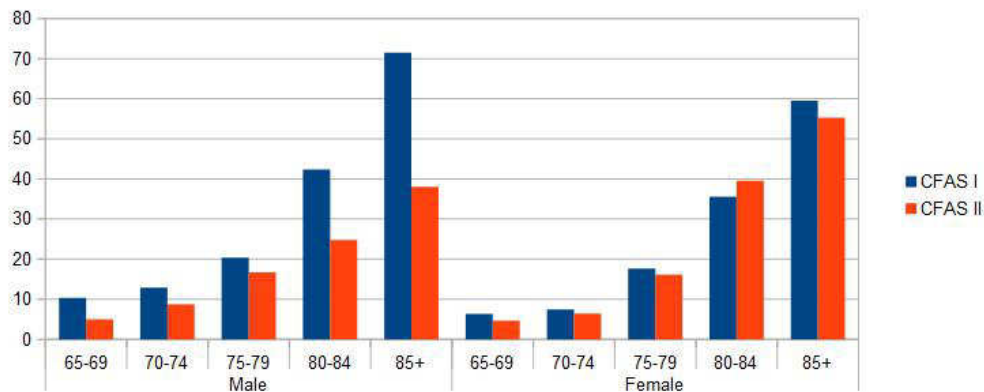
The World Dementia Council has been formed to deal with the predicted rise in dementia cases as the 21st century progresses. But "new emerging studies provide data that dementia occurrence might be changeable across generations with both decreases and increases reported" (Matthews et al 2016 p2).

Comparisons of data over decades is a challenge because diagnostic and methodological practices have changed, "which themselves could easily drive any changes seen in prevalence and incidence" (Matthews et al 2016). So, studies need to use identical diagnostic methods, which is what Matthews et al (2016) reported with the Cognitive Function and Ageing Study (CFAS) I and II.

CFAS I took place in the 1990s with samples from areas of England, and CFAS II in the 21st century. CFAS I screened individuals in 1991-3 and again in 1993-5, while CFAS II was undertaken in 2008-11 with follow-up in 2011-13. Over 5000 over 65 year-olds were involved in each CFAS.

The same diagnostic criteria for dementia was used throughout (based on DSM IIIR; APA 1987). The overall incidence rate (ie: number of new cases) was 20.0 per 1000 person years in CFAS I and 17.7 in CFAS II (figure 1.1). The reduction in incidence was calculated as an incidence rate ratio of 0.8⁸. This decline appears to be due to less new cases of men as the incidence for women was unchanged between CFAS I and II.

⁸ The findings are similar to Qiu et al (2013) in Sweden, for example.



(Data from Matthews et al 2016 table 1 p3)

Figure 1.1 - Incidence rates per 1000 person years by age and sex.

Matthews et al (2016) summed up: "These findings provide the first multi-area evidence of a drop of 20% in incidence in the population aged 65 and over measured directly, mostly observed in men. Our findings suggest that in the UK there are just under 210,000 incident cases of dementia per year, 74,000 in men and 135,000 in women. This represents a far smaller increase than would have been expected from extrapolation of earlier estimates" (p3).

This study has some key methodological strengths:

1. Three areas (Cambridgeshire, Newcastle, Nottingham) chosen to sample included urban and rural areas, and "diversity of geography". More areas were not fundable.

2. The use of primary care registers for age stratified sampling.

3. The response rate after two years was similar in CFAS I and II (76% and 74% respectively).

4. The stability of the interview method and diagnostic approach in both CFAS. However, since CFAS I diagnostic criteria have been refined.

1.5. INTERGENERATIONAL TRANSFER

When older adults become severely ill, their children provide upstream intergenerational transfers in the form of time, money, and residential space (Soldo and Hill 1993).

In terms of wealth, adult children suffer if their parent(s) requires long-term care (LTC) for dementia (Arora 2016). The costs of LTC include outgoings to pay for formal care as well as loss of income from time off work to care.

Arora (2016) analysed data from the Health and Retirement Study (HRS) in the USA between 1998 and 2010 concentrating on unmarried adult children. Two groups were created for comparison - individuals with parent(s) with dementia and individuals without. The conclusion was that "parent's dementia leads to a decrease in wealth accumulation for a broad share of unmarried adult children, with the strongest effects concentrated among less wealthy individuals" (Arora 2016 p163). In particular, individuals who were between the 55th and 75th quantiles of wealth were hardest hit. In other words, individuals with wealth above the median, but not the most wealthy.

1.6. APPENDIX 1A - NAMES, IDENTITY AND BODY

Pilcher (2016) emphasised the importance of names as "the nucleus of our individual identity and of our family affiliation, as well as our social and civil-legal identities" (p765). She argued that as well as experiencing the world through our bodies, our "embodiment and identity are also inextricably intertwined with naming: above all else, forenames and surnames effectively 'label' or identify an individual's body" (Pilcher 2016 p766).

The uniqueness of the individual is not the forename or surname, nor them together, but, as Pilcher (2016) described, "my individuality, arises instead from the coincidence of my forename-plus-surname as a label applied to my face and body as the visible, tangible and distinctive surfaces of myself" (p766). She recommended the term "embodied named identity". Pilcher (2016) continued: "For me, the concept of embodied named identity is necessary because existing concepts such as 'identity' or 'embodied identity' do not adequately capture or help us better understand the kinds of practices and experiences of the names-body-identity nexus that have been the focus of this article, including the intangible characterisations and the corporeal fleshiness of names, and the social consequentiality of names in the contexts of power structures of gender and ethnicity" (p774).

Pilcher (2016) pointed out the different aspects of naming in any society:

a) Legal - eg: when and how - register in UK by 42 days after birth with a forename and a surname.

b) Gender - "Androgynous forenames are rarely used" (Pilcher 2016).

c) Ethnicity - "Names carry strong ethnic and religious connotations and reveal an individual's affiliation to a specific group" (Khosravi 2012 quoted in Pilcher 2016).

d) "Nicknames" - These are free from legal restriction (usually), and can be a sign of individual choice (compared to names, at least). They may signal affiliation and belonging, or ridicule and "outsider" status. They are often linked to the physical body in some way (eg: "Little John" for a very large man).

e) "Nameless bodies" - eg: in the USA unidentified corpses are called "John Doe" or "Jane Doe"; prisoners given numbers as an expression of the power and control of the authorities.

f) "Body-less names" - eg: "user names" in cyberspace.

Pilcher (2016) summed up: "the concept of embodied named identity portrays bodies as the objects of ongoing and reciprocal social practices of naming, undertaken by embodied agents (for example, parents, friends, administrators, officials and potential employers) who, through 'speech acts', 'performative sentences' (Austin 1962) and cultural artefacts or identity documents, name, and are, in turn, named. Practices of embodied named identity draw upon culturally specific mutual knowledge and taken-for-granted understandings about names and bodies and take place in a range of institutional and organisational contexts, such as families, workplaces, border controls, registry offices and criminal justice systems" (p775).

1.7. APPENDIX 1B - DISCLOSURE OF HIV STATUS

The ageing of the HIV population means that there are older adults among people living with HIV (PLWH). As with younger PLWH there are issues of managing the illness, and dilemmas related to disclosure of HIV status. There is little research on the latter for older adults (Rosenfeld et al 2016).

Rosenfeld et al (2016) found that older PLWH had particular concerns over HIV disclosure (and stigma ⁹),

⁹ Earnshaw and Chaudoir (2009) distinguished three types of HIV-related stigma:

i) Anticipated stigma - expectations of future discrimination, stereotyping or prejudice from others;

especially to ageing parents and to children. This research was based on 123 PLWH over 50 years old in the UK, who were interviewed alone (qualitatively and quantitatively) or in focus groups between 2011 and 2013.

The qualitative interviews, lasting 90-120 minutes, were semi-structured life history interviews, which included social relationships, personal history, and history with HIV among the topics covered.

The stigma of HIV was reported by interviewees. One man said: "the big burden I carry is not a health burden, it's the stigma" (p84), while a woman reported that even her friends saw PLWH as "people who sleep around, that are drug addicts" (p84). Many of these PLWH's generation had been influenced by health messages in the 1980s when HIV first gained public recognition, and this reinforced stigma with the emphasis on sexual transmissibility and the fatal consequences. "These messages had not, participants said, been followed by widely distributed public health campaigns informing the public about new developments in HIV care and the diversification of the HIV population, or seeking to combat the stigmatisation of PLWH" (Rosenfeld et al 2016 p84).

Rosenfeld et al (2016) went on: "As a result, the vast majority of participants described investing a significant amount of time, energy, and thought into maintaining control over who knew about their HIV status, and the decision to disclose as a complex one requiring careful consideration and planning" (p85). Interviewees used certain criteria in deciding whether and how to disclose to their children and older parents, and others. These were:

a) Relevance of knowledge about HIV status to relationship;

b) The individual being disclosed-to's knowledge about HIV;

c) The likelihood of the disclosure causing distress to the hearer.

d) Whether the disclosed-to person would keep the information private.

Specifically, in relation to disclosing to older

ii) Enacted stigma - discrimination, stereotyping or prejudice that has already occurred from others;
Internalised stigma - self-endorsing others' negativity about HIV.

parents, several interviewees had not because of fear of worry and distress it would cause. One man said about his mother - "any slight cough or sneeze, it would be, are you all right? If she knew I was HIV positive, she'd be ringing up every single day, literally" (p86).

Disclosing to their children was influenced by the age of the offspring and their perceived knowledge of HIV. "The question 'does this child need to know?' became, in practice, 'does this child need to know now, and if not, then when?' Participants who were parents identified four overlapping time frames that directed when to disclose to their children: children should be disclosed to only when they were mature enough to understand, before learning about their parents' status from others, when the disclosure would be least disruptive, and before discovering it on their own" (Rosenfeld et al 2016 p87).

Rosenfeld et al (2016) concluded that "when deciding whether, and when, to disclose to specific others, participants engaged in lifecoursing¹⁰: here, considering these others' age and presumed circumstances, trajectories, and age-related capacities to understand the information disseminated during disclosure and the importance of keeping that information from others" (p89).

1.7.1. Stigma Generally for PLWH

Stigma can have an impact on medication adherence for PLWH of all ages (Sweeney et al 2015). Variable et al (2006), for example, found a significant relationship between negative behaviours experienced related to HIV status and poor medication adherence. This study used a single measure of stigma (Sweeney et al 2015). In terms of studies using multiple measures of stigma, "measures of internalised and anticipated stigmas have been found to be more consistently associated with adherence difficulties... than enacted stigma measures" (Sweeney et al 2015 p97).

What is the mechanism that links stigma to poor medication adherence? Sweeney et al (2015) offered the following answers:

- a) Disclosure concern - ie: efforts to hide illness,

¹⁰ Rosenfeld and Gallagher (2002) described "lifecoursing" as "using the typified life course as an interpretive resource for human actions and states" (quoted in Rosenfeld et al 2016). Rosenfeld et al (2016) expanded: "Actors of varying ages conduct this interpretive work within both formal organisational settings (ie: education and psychiatry) and less formal settings (ie: the family and daily interactions) to assess their own and others' capacity to engage in particular actions, including those related to the management of personal and potentially stigmatizing information" (p82).

and avoid anticipatory stigma, can interfere with medication adherence. Fear of inadvertently disclosing HIV status was the most common reason given for missing medication (Mepham et al 2011).

b) Depression - internalised stigma can lead to depression, and thus lapses in medication adherence. "Internalised stigma may have a stronger link to cognitive depressive symptoms, such as depressed mood, loss of interest, worthlessness, and poor concentration. In contrast, vegetative depressive symptoms, such as fatigue, loss of appetite, sleep disturbance, and psychomotor agitation, may overlap with HIV-related symptoms and inaccurately represent depressive symptomatology" (Sweeney et al 2015 p98).

1.7.2. Stigma and Mental Illness

A mental illness diagnosis (MID) is often linked to stigmatisation: "A label of mental illness engenders broadly negative stereotypes, adverse treatment in interactions, avoidance by others, and various forms of discrimination" (Hipes et al 2016 p16). One area where this is seen is employment, as shown by (Hipes et al 2016):

a) Statistics - Higher rates of unemployment and underemployment for individuals with a MID than the general population.

b) Self-reports - Sufferers report being passed over for jobs for which they are qualified, being demoted, or being fired because of their MID. Employers, anonymously, report negative attitudes towards workers with MID.

"Employment discrimination is difficult to directly demonstrate. In part because such discrimination is illegal, employers are unlikely to say they discriminate against persons with mental illnesses. Further, persons with mental illnesses will rarely have direct knowledge of discrimination against them, because the reasons for a failed application are seldom known. Approaches to identifying discrimination, such as comparing the employment rates of mentally ill and other persons, suggest labour market discrimination but are difficult to interpret because of the large number of potentially confounding variables" (Hipes et al 2016 p17).

Thus the need to use field experiments. The basic method involves sending two matched pairs of applicants for the same job (either in person or via letter) with the one difference being studied. This has been used to study discrimination in hiring practices based on race/ethnicity, and sexual orientation, for instance

(Hipes et al 2016).

Recent studies have made use of online applications, which is what Hipes et al (2016) did. They used the online classified posting website "Craigslist", and jobs for software engineering and software design. An appropriate application was created for a well-qualified fictitious man, which was varied with a history of mental illness or physical injury (independent variable). There were four conditions in an independent groups design:

1 - History of mental illness applying for standard job. This statement was included in the application email: "As you will see on my resume, I have not been working since [DATE]... I was hospitalised for mental health treatment. The issues that led to my treatment are behind me, and I look forward to again beginning full-time employment" (Hipes et al 2016 p19).

2 - History of mental illness applying for job working from home (tele-commuting). Same statement as above included.

3 - History of physical injury applying for standard job. In the statement, "mental health treatment" was replaced by "serious physical injury".

4 - History of physical injury applying for job working from home (tele-commuting). Statement as Condition 3.

Condition 3 was a control of 1, and Condition 4 was the control for 2¹¹. It was predicted that "applicants with a history of mental illness will receive fewer call-backs from employers than applicants with a history of physical injury" (Hipes et al 2016 p18). Also it was expected that the negative effect of MID will be less for a job working from home.

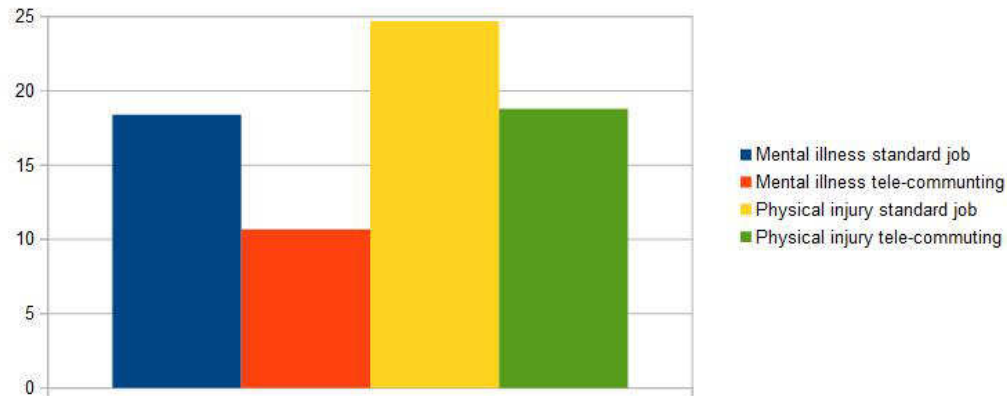
Applications were emailed to 635 jobs in the USA between June 2011 and May 2012. Matched pairs of applicants were not sent to the same job "because our fictitious applicant has either suffered from a physical injury or mental illness, sending two applications per job might arouse suspicion" (Hipes et al 2016 p19).

The employer showing interest in the application was scored as a "call-back" (dependent variable). The call-back for Conditions 1 and 2 (mental illness) was 15%, which is significantly less than the 22% for Conditions 3 and 4 (physical illness). There was no significant difference related to working from home (figure 1.2).

The study only investigated the initial phase of the

¹¹ There was no control group without a statement (ie: a test of the appropriateness of application qualifications etc).

hiring process, and with a male applicant. Gender of the mental illness sufferer has been found to effect stigmatisation (Wirth and Bodenhausen 2009).



(Data from Hipes et al 2016 table 2 p21)

Figure 1.2 - Percentage of call-backs in each condition.

1.8. APPENDIX 1C - PHENOMENOLOGY

The core ideas of the phenomenological approach (Ph) include:

i) Individuals are unique (in terms of their own meanings from experience), and are actively choosing their lives.

ii) "Being-in-the-world" ("Dasein"; Heidegger 1962)

The individual is not separate from the world, their experiences though personal are part of being in the world. This is further enforced by the term "lifeworld" for "the inseparability between the world which forms the setting for one's life and the subjective experience of that life" (Hollway 2007 p131). What is studied in Ph is the "lifeworld in its appearing" (Ashworth 2003).

iii) The methods used are qualitative, but specifically guided by certain principles (Husserl 1970):

- Epoche (bracketing) - the researcher must bracket off their assumptions and attempt neutrality when interviewing, though it will always be imperfect;
- Focus on describing subjective experience not

explaining it ¹². But, for Ashworth (2003), all Ph P is interpretive in the sense of "elucidation";

- "Horizontalisation" - treating all information from the participant equally and, as a researcher, not to prioritise some above others.

Two ideas in embodiment are bodily consciousness, and the body-world interaction.

a) Bodily consciousness

There is a difference between the subjective body ("body-subject") which is the "body-as-it-is-lived" (Merleau-Ponty 1962), and the "body-object". The first is the subjective experience of our bodies, and the latter, the public version - the body peered at leered at, admired, criticised, or investigated by others (Finlay 2006).

Sartre (1969) made a third distinction - bodily self-consciousness: "I exist for myself as a body known by the Other" (p351). Awareness of the body through an awareness of the view of others.

b) Body-world interconnection

The interaction between the body and the world does not stop at the skin boundary, but the "bodiliness" extends beyond the physical boundaries. For example, an object thrown is part of the bodiliness even though it is physically separate from the individual. There is a complex intertwining between the body and the world.

1.8.1. Example of Research: Ashworth and Ashworth (2003) Lifeworld of an Alzheimer's disease sufferer

Ashworth and Ashworth wanted to discover the experience of a woman suffering from Alzheimer's disease, even when such individuals are treated as beyond understanding. A desire to "thoroughly humanise the way elderly people with dementia are envisioned" (p180).

The sufferer continues to be a person with a unique lifeworld, and is a self "in the sense of being the

¹² Knowledge of the world originates in different ways (Parahoo 1997):

- i) Traditional - passed down through the generations;
- ii) Intuition - "a form of knowing and behaving not apparently based in rational reasoning" (Parahoo 1997);
- iii) Personal experience;
- iv) Research.

If knowledge is the facts about, then belief systems are the explanations for the facts (eg: mystical/supernatural, metaphysical (eg: four humours), scientific) (Parahoo 1997).

centre - the point of view - on her physical and psychological world" (p191) despite how bad the illness becomes.

Understanding another to be a "person" requires three features of sociality, which are challenged by dementia:

- To know that another person is "a minded being like myself". The assumption of the other as an "alter ego";
- The world is shared by all - it is intersubjective;
- Taking the position of another person ("reciprocity of perspectives").

The Ashworths argued, with great conviction, for listening to what the Alzheimer's disease sufferer says. It is not a question of the factual accuracy of the words, but the insight that it gives to the lifeworld. For example:

When the sufferer from dementia routinely asserts that "nobody has been" - though it is objectively the case that there has been a succession of visitors to the house - we may have an expression of loneliness in the face of lack of constant companionship (p186).

To ignore the factual accuracy and listen to what is said is part of the bracketing process by the researcher (or carer). Bracketing also requires the setting aside of expectations from medical science about dementia, and to pay attention to the current experience of the experiencer.

1.9. APPENDIX 1D - ALZHEIMER'S DISEASE AND ZOMBIES

Behuniak (2011) argued that the stigma associated with Alzheimer's Disease (AD) is "of a specific sort - it is dehumanisation based on disgust and terror" (p70). In particular, she highlighted the use of the zombie metaphor in both academic and popular literature (eg: books entitled "Alzheimer's Disease: Coping with a Living Death", and "The Living Dead: Alzheimer's in America").

She went on: "I argue that the frightening celluloid images of fictional characters called zombies have leaked into the popular and scholarly discourse about real people who have Alzheimer's disease, constructing them as animated corpses and their disease as a terrifying threat to the social order" (p72).

The characteristics of zombies applied to individuals with AD include:

- Appearance - "slow shuffle, the inarticulate moans, the relentless walking, the dishevelled appearance" (p79).
- Loss of self - the shared question of "if the person no longer exists, who or what is left?" (p80).
- Inability to recognise others.

Behuniak (2011) concluded: "What may help to dislodge the zombie metaphor, then, is to replace a 'minoritising' view of AD with a 'universalising view' (Sedgwick 1990). In this perspective, AD is not constructed as a disease of the unfortunate few but as a disease that affects us all. This point is echoed in zombie scholarship: 'in a literal sense, we are all, as living beings, "Undead"' (Greene and Mohammad 2006). Given this, the constituency needed for advancing socially-compassionate responses to those with AD should not be limited to those most affected, but expanded to include all of society. Thus understood, AD is no longer a private problem but a social issue. Only in this way will what Nussbaum (2010) calls a 'politics of disgust' be replaced by a 'politics of humanity'" (p88).

1.9.1. Alzheimer's Disease and Contagion

Jaunmuktane et al (2015) reported the cases of individual's injected with growth hormone derived from the adrenal glands of human cadavers that had been contaminated with a prion linked to Creutzfeldt-Jakob disease (CJD), and led to the death of the recipients ¹³. These recipients also had plaques in the brain typical of Alzheimer's disease, and this was taken as "the first evidence that Alzheimer's could be transmitted from one person from another" (Abbott 2016) ¹⁴. In other words, "seeds" of amyloid-beta-protein, which is involved in Alzheimer's, could somehow be transferred in blood transfusion or organ transplant, say ¹⁵.

Researchers are now investigating whether the "seeds" can be transferred in medical procedures ¹⁶, and whether they cause Alzheimer's disease in the recipient

¹³ Between 1958 and 1985 approximately 30 000 people around the world received such injections to treat growth problems, and about 220 of them had died from CJD due to contamination (Abbott 2016).

¹⁴ One newspaper report of the findings suggested that Alzheimer's disease was contagious, and inferred a risk for carers and family members, which, of course, is not what was found (Abbott 2016).

¹⁵ Proteins have no genetic material, and so have "no obvious way to self-replicate" and cause disease (Abbott 2016). But the discovery of prions in 1982 (Prusiner 1982), and, in particular, an infectious form as in CJD, has challenged this view (Abbott 2016).

¹⁶ "Amyloids stick like glue to metal surgical instruments, and normal sterilisation does not remove them, so amyloid seeds might possibly be transferred during surgery" (Abbott 2016 pp296-297).

In terms of animal studies, Luk et al (2012) found that injecting certain "pathological" proteins into healthy mice produced neurodegeneration (as seen in Parkinson's disease in humans). But "mouse models of neurodegenerative diseases do not mimic human disease very closely" (Abbott 2016 p296)¹⁷.

1.10. APPENDIX 1E - CLOTHES AND HAIR AND DEMENTIA

Hughes (2003) described the person as a "situated embodied agent" - ie: "situated in a culture with its own traditions and norms; in a personal history and in a social context of friends and family; in a space of moral values and field of spiritual concerns. This person is an embodied agent, a being who physically acts, but is situated; so that actions are meaningful in a specific narrative and environment" (Twigg 2010 p225).

Clothing and dress are relevant here, but Twigg (2010) noted that these are assumed to be unimportant for the old and frail, and for individuals with dementia. Based on interviews with carers, she argued that this was not the case. "What we wear is... more than just how we present ourselves in terms of outward appearance, but part of how we enact our being" (Twigg 2010 p225).

For example, comfort for individuals with dementia in care homes is assumed to be loose clothes and/or which are easy to remove (eg: jogging pants with elastic tops), but this ignores the embedded meaning of the clothes, as one woman preferred elegant dresses to "informal" clothing. Her carer said: "Comfort isn't only physical, it's being mentally at ease also" (p226).

In care homes the "washing regime" can dictate clothing (eg: no garments needing dry cleaning). But clothes are part of the "environment closest in" - they "surround and envelop the body directly; they are immediate to see and touch, as the person looks down, or feels and moves within their clothing" (Twigg 2010 p226).

The clothing of institutions, from care homes to prisons, can be seen through Michel Foucault's (eg: 1977) ideas of disciplinary power imposed upon the body. Clothes are a means of control and a signal of status. But embodied identity can clash with this as the

¹⁷ One issue is whether amyloids are "prion-like", and whether prion diseases and neurodegenerative diseases are part of "a single spectrum of conditions involving proteins that misfold and misbehave" (Abbott 2016 p297).

¹⁸ There is more evidence for a genetic basis to Alzheimer's. For example, recently, Chang et al (2016) reported that children carrying a version of the APOE e4 gene showed differences in the brain at an early age. This was based on a study of over one thousand 3-20 year-olds, but less than thirty children were in the highest risk group, which has a fifteen-fold risk of developing the disease (Knapston 2016).

individual "may refuse to don certain clothes, 'choose' bizarre or aberrant dress, or appear to find sloppy, informal clothes more comfortable than the smarter, more formal dress of their past. This presents a fundamental philosophical problem in dementia care relating to the degree to which the wishes and views of sufferers can be elicited or imputed" (Twigg 2010 p228).

Twigg (2010) concluded with a note of caution: "We should not exaggerate the significance of clothing here. Many people with dementia lose all interest in dress - indeed indifference is a classic sign of the advance of the condition - and caregivers may face struggles attempting to maintain this dimension of the person's life. However, I would suggest that clothing and dress provide a field in which we can explore new concepts of personhood in relation to dementia..." (p229).

Twigg and Buse (2013) developed on these ideas, including past clothing as "memory prompts" (eg: "knitted bathing costumes" and "1960s' fashion mistakes").

From a different perspective, Reed-Danahey (2001) found that care workers could take pride in helping residents to dress for outings to "pass" as individuals without dementia.

1.10.1. Hair

Caring for individuals has been called "body work", which Twigg et al (2011) defined as "work that focuses directly on the bodies of others: assessing, diagnosing, handling, treating, manipulating and monitoring bodies, that thus become the object of the worker's labour" (quoted in Ward et al 2016). "Body pampering trades" are examples of "body work", which are different to care work - "each involves a rather different worker/client dynamic; the 'privileged' body of the recipient of beauty work stands in marked contrast to the often stigmatised and disempowered body of the recipient of care" (Ward et al 2016 p1288).

Caring for individuals with dementia, say, is often seen as "dirty work" as disgust or discomfort are overcome to perform "an intimate and taboo-laden undertaking" (Ward et al 2016). Lee-Treweek (1997) described this experience as care workers performed the "behind the scenes" activities in bedrooms to make the residents "lounge standard". This "revealed how an assembly-line approach to care imposed a fixed standard of presentation on residents, functioning primarily to signify the quality of care provided. Thus, it was the suitably coiffed and neatly dressed 'end product' of this work that was subject to scrutiny within the care system rather than the doing of the work itself" (Ward et al

2016 p1288).

In relation to body pampering, the "body work" of hairdressers has been studied. Holmes (2015), for example, emphasised the "craft" ¹⁹ in the "doing of hair".

Ward et al (2016) combined both aspects of "body work" in a study of care-based salons. This was part of the Hair and Care project in north-west England between 2010 and 2013. Over a period of ten months the researchers observed eight different care-based salons in hospitals, day centres and care homes, and visiting individuals' homes, and focused on 23 individuals with a diagnosis of dementia.

The hairdressers, who were all women, had to work in a variety of less than ideal situations. One person reported: "I don't even have a room, I'm in the hallway doing their hair. I'm in the laundry. I'm in a room with a toilet when I'm cutting" (p1291).

The individuals with dementia benefited from the experience. An occupational therapist described the response of clients: "Whereas in other activities of personal care or even meals and things like that, and medication, you'd have to give them lots and lots of cues and prompts - it's more of an automatic kind of reaction [in the salon]; they see what's there, they recognise what's there. Somewhere within that they have an awareness of what's expected of them, and they will sit down, they'll accept the towel round them, they'll adjust the towel [...] and without being asked they'll bend their heads forward, and sometimes I'll go 'oh!' because it's so unexpected" (pp1292-1293).

The general interaction between the hairdresser and the client encouraged the latter to talk, particularly "steering conversations into territory connected with happier recollections" (Ward et al 2016). Another benefit was that "the on-going exchange of compliments was actively encouraged by the hairdresser: 'What do you think ladies... doesn't she look lovely?' This work of prompting and facilitating the acknowledgement of one another's appearance ensured each client was noticed and received attention during her visit, and was often coupled with efforts to counter their more negative self-evaluations" (Ward et al 2016 pp1294-1295).

Ward et al (2016) commented: "In the care system hairstyling is perceived as a low-status service that delivers a transient and thereby 'inconsequential' product (Holmes 2015)... We argue that such inattention to this distinctive form of body work has led to a

¹⁹ "A distinction is made between skills, which are often defined by the level of formal education they require, and craft which is borne out of situated, embodied practice" (Ward et al 2016 pp1288-1289). This is linked to Sennett's (2008) concept of "craft worker".

failure to recognise its significance or achievements" (p1297). Put in a simple way, in the salon chair, the individuals with dementia were treated as "normal" in a way that was not the case in their everyday lives.

"Care-based hairdressers are required to balance the more symbolic properties of hair with awareness of the material conditions of care and the bodily limitations of their clients. Hence, their work is not only concerned with preserving or maintaining aspects of self and identity (expressing the gendered, classed and age-related preferences of their clients), but is a situated achievement, helping to tell a story of that person in the here and now. Understanding body work in this way as a form of 'embodied narrative support' casts it in a rather different light to the instrumental and task-oriented approach to appearance work that currently characterises much care provision" (Ward et al 2016 p1298).

1.11. APPENDIX 1F - PERSON-CENTRED CARE

"Person-centred care" (PCC) in care homes is seen as the ideal and it "stresses the resident's perspective in defining experiences and needs... [including] getting to know the person, participation in care, offering choice and a focus on the relationship between residents and direct care staff" (Stranz and Sorensdotter 2016 p70).

Brooker (2004) outlined four components of PCC in relation to dementia:

- Importance of relationships;
- Treating people as individuals;
- Taking the perspective of the individual;
- Having an environment that encourages well-being.

But how is PCC manifest in practice? Ethnographic work by Stranz and Sorensdotter (2016) in England and Sweden showed similarities as well as differences.

The structure and organisation of care homes influence the interaction between the staff and residents. Stranz and Sorensdotter (2016) outlined two theoretical aspects:

a) Materiality - "While care is embodied and comprises both the residents' and the staff's bodies, it is also important to highlight the relational aspect of all the care work performed in residential care: relational work and bodywork are intertwined. Relational work involves the emotional encounter between the care worker and the care recipient, as well as the encounter between their bodies... In care work the bodies (of both the care workers and the residents) become the raw

material through which philosophies of care and materiality are implemented..." (p71).

b) Power and discipline - "Nursing homes are places where subjects and materiality are disciplined by the discourses within which they are situated, and which cannot be considered separately from their social and economic contexts. In nursing homes for people with dementia, disciplining and surveillance of bodies are often part of the caring practice..." (Stranz and Sorensdotter 2016 p71).

Stranz and Sorensdotter (2016) found similarities between the two care homes studied in "offering a home-like environment and meaningful relationships", but differences in relation to calmness. The English care home emphasised cheerfulness and activity, while in Sweden calmness was more important (table 1.1).

Areas of comparison	"Oak Hill" (England)	"North Garden" (Sweden)
Approaches to care	Stimulating and staff like "butterflies" (moving from person to person).	Keeping residents calm and reducing anxiety.
"Matters of materiality"	Brightly painted and decorated environment. The researchers' first impression was "entering some kind of doll's house or fairyland".	Light colours including staff in pastel coloured uniforms.
"Performance s of care"	Physical interaction between care workers and residents to stimulate, and encourage autonomy.	Calmness - "staff move their bodies slowly, talk quietly and often sit down with the residents. Words like silent, tranquil and calm appear frequently in the field notes about the atmosphere in this nursing home" (Stranz and Sorensdotter 2016 p77).

Table 1.1 - Three areas of comparison between the English and Swedish care homes.

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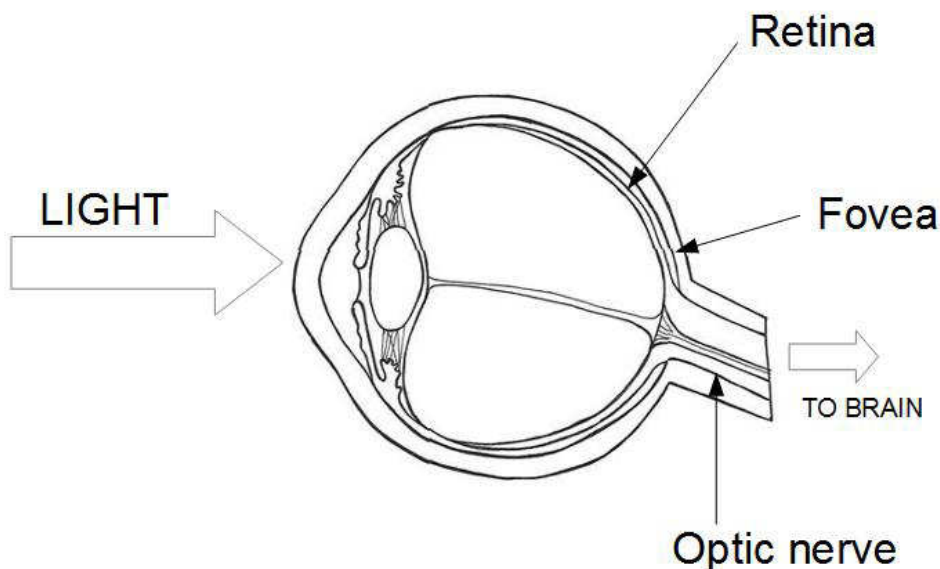
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2. BINOCULAR OR STEREOSCOPIC VISION

- 2.1. Binocular vision
- 2.2. Studying binocular vision
 - 2.2.1. Disorders and brain damage
- 2.3. Appendix 2A - Symmetry/asymmetry
- 2.4. References

2.1. BINOCULAR VISION

The forward-facing eyes of humans means blindness to what happens above and behind, and certainly compared to animals eyes laterally or insects with eyes on stalks. Furthermore, humans have only small regions of the fovea of each eye with high acuity (figure 2.1). Together, only 0.2% of the viewing sphere around an individual is seen with high resolution, and this involves 30% of the primary visual cortex ²⁰ (figure 2.2) (Parker 2016).

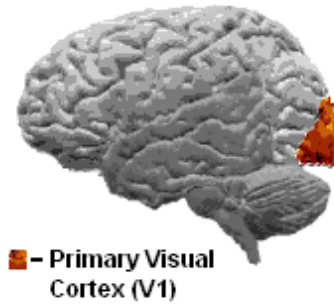


(Original drawing of eye by Magda Kralovenska)

Figure 2.1 - Key areas at back of the eye.

But this is compensated by highly mobile eyes, and "the capacity to use both eyes in conjunction to give us

²⁰ This is because complex computational processes are involved in dealing with the two different retinal images. Thus, there must be an evolutionary advantage to binocular vision because of the cost in terms of brain capacity needed (Nityananda et al 2016).



(Source: Chavez01; in public domain)

Figure 2.2 - Primary visual cortex.

a sense of depth" (Parker 2016). This is stereopsis, binocular vision, or vision of a three-dimensional (3D) world. Small differences between the images received by each eye (known as binocular disparity) are combined in the brain to give depth perception ²¹. Inferring 3D depth perception from 2D retinal images is key in hand-eye co-ordination, and in navigating through a crowded environment (Murphy et al 2016).

There are four main stages to processing stereoscopic depth perception (Bridge 2016):

- i) Both eyes aligned and functioning ²².
- ii) Control over eye muscles to bring images into alignment.
- iii) Initial matching in the brain of the retinal images from each eye.
- iv) Integration of information from the two eyes to produce depth perception.

Stereoscopic information is used by the two major cortical processing pathways to the visual cortex (Parker 2016):

a) Dorsal visual pathway ("where?-pathway") - from eyes to back of brain via inferior parietal lobe, and is associated with visuo-motor co-ordination and perception of the organisation of visual space.

b) Ventral visual pathway ("what?-pathway") - via inferior temporal lobe, and is associated with pattern

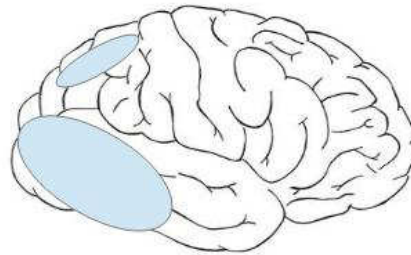
²¹ Information to each eye is an example of symmetry as opposed to asymmetry (appendix 2A).

²² Anomalous retinal correspondence is a form of depth perception when the eyes are not aligned (Bridge 2016).

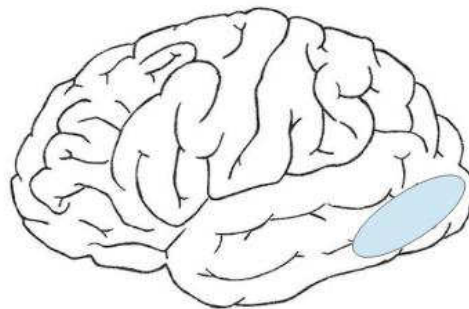
discrimination and object recognition.

Normal binocular vision activates a number of areas at the back of the brain (visual cortex) rather than a specific area, which is different to the perception of colour or motion, say (Bridge 2016) (figure 2.3).

Right hemisphere



Left hemisphere



(Original drawing of brain by Magda Kralovenska; additional information based on Bridge 2016 figure 1)

Figure 2.3 - Main areas of brain active in binocular vision.

2.2. STUDYING BINOCULAR VISION

Studies of non-human animals has and does play a key role in understanding binocular vision and depth perception. For example, the neuronal mechanisms of stereoscopic vision were explored by recording single nerve cells in the visual cortex of anaesthetised animals (eg: cats; Nikara et al 1968).

Macaque monkeys are commonly used to study depth

perception, often inducing deliberate brain injury by lesions to particular areas. For example, Cowey and Porter (1979) damaged five areas in the visual cortex (ie: damage to one area in an individual monkey). The animals in such experiments are tested after surgery and recovery, but there has to be an element of assumption of what can be seen by the animals based on the behaviour performed.

Some animals, particularly predators, show aspects of stereoscopic vision, like the praying mantis to aid strikes at prey (Nityananda et al 2016), or in others to break camouflage in their prey (Parker 2016).

Nityananda et al (2016) studied the binocular vision of female praying mantises (*Sphodromantis lineola*) using 3D glasses (an "insect 3D cinema"). An object similar to prey was presented at 10 cm away, but the perception of distance was altered by the glasses. The mantises preferred targets appearing to be 2.5 cm away (ie: they attacked most often at this distance). "Stereo vision thus enables them to judge prey distance without moving and to strike only when prey is at the right depth" (Nityananda et al 2016 p7). Mantises tend to be ambush predators (ie: sit and wait for prey to come to them).

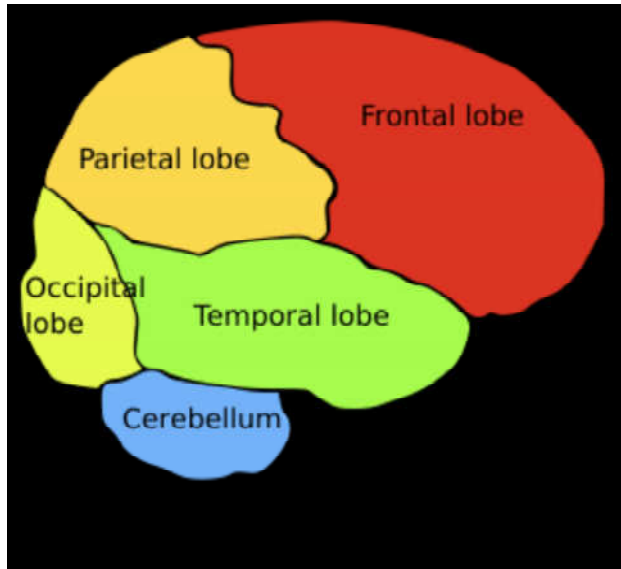
2.2.1. Disorders and Brain Damage

Studies with humans where brain injury is deliberately created are not performed for ethical reasons, so researchers depend on individuals with brain surgery for epilepsy, say (eg: temporal lobectomy²³; Ptito et al 1991). Schaadt et al (2015) reported the case of a man with damage to the right occipito-parietal cortex, who described the world as "flat" with all objects appearing equal distance away.

The posterior parietal cortex (PPC) (figure 2.4) is involved in "the transformation of visual information into action-oriented responses", as seen in individuals with damage to that area of the brain (Murphy et al 2016).

Murphy et al (2016) found that stereopsis was "severely compromised" in individuals with damage to the right, but not left, PPC. There was no problem with motion perception by the participants. These conclusions were based on a study of five patients with damage to areas of the parieto-occipital cortex, and a comparison group of healthy controls.

²³ Removal of part of the temporal lobe.



(Source: Joint effort on English Wikipedia; last part: King of Hearts; in public domain)

Figure 2.4 - Lobes of brain.

Depth perception is compromised by the cutting of the corpus callosum, which transfers information between the two hemispheres of the brain (Bridge 2016).

There is a disorder of binocular vision called amblyopia, where 2-4% of individuals "cannot acquire depth from binocular inputs" (Parker 2016).

2.3. APPENDIX 2A - SYMMETRY/ASYMMETRY

"From the nano to the macro, the man-made to the natural and the simple to the complex, the world we inhabit is rich in pattern. Although there is extensive variance in the intricacy and magnitude of the patterns that surround us, they fundamentally stem from only two core motifs: symmetry and asymmetry... At first glance, symmetry may appear to be the predominant pattern in nature; indeed, animal cognitive systems have evolved sensitive symmetry detectors that function during mating choice and predator detection. However, organisms ranging from protists to plants to vertebrates possess a fascinating collection of asymmetries within their body structures" (Levin et al 2016 pp1-2).

Asymmetry in the physical body can be seen in respect of the left-right (L/R) axis, in many animals, but also in anterior/posterior and dorsal/ventral (Levin et al 2016). Asymmetry in the L/R axis is evident in many different aspects of animals, varying from claw size in lobsters and crabs, and direction of coiling of gastropods, to sound-producing structures in katydids. In

the example of gastropod coiling, three versions (alleles) of a single gene have been found to be involved (Levin et al 2016).

Heterotaxy (or situs ambiguus) is a disorder of the L/R axis where some of the body develop normal asymmetry and others do not. Foetal or early death often occurs because of complex heart defects (Levin et al 2016).

There is another disorder of the L/R axis called situs inversus, "in which all organs are concordantly (mirror-image) reversed with respect to the other two body axes" (Levin et al 2016 p2). There can be respiratory, kidney and reproductive problems for affected individuals (Levin et al 2016).

If symmetry is the default position in nature, doing development what is the symmetry-braking event and when does it occur? One answer is inside the cell and a very early stage of development of the foetus (Levin et al 2016). But the question is then, "how large-scale body plans arise from the activities of single cells" (Levin et al 2016)?

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