

PSYCHOLOGY MISCELLANY

No.143 - February 2021

"Cognitish"

Kevin Brewer

ISSN: 1754-2200

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

orsettpsychologicalservices@phonecoop.coop

This document is produced under two principles:

1. All work is sourced to the original authors. The images are all available in the public domain (most from http://commons.wikimedia.org/wiki/Main_Page). You are free to use this document, but, please, quote the source (Kevin Brewer 2021) and do not claim it as your own work.

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

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

Kevin Brewer BSocSc, MSc

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

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

CONTENTS

	Page Number
1. Memory	4
2. The AHA! Moment	12
3. Avoidant Grief and Thought Avoidance	21
4. Decision-Making and Cognitive Reflection	23
5. Not-Thinking-For-Speaking	29
6. Motion Perception and Texture	32
7. Miscellaneous consciousness	34
8. Resolutions	39

1. MEMORY

- 1.1. Autobiographical memory
- 1.2. Offline memory
- 1.3. Appendix 1A - Reminiscence bump
- 1.4. Appendix 1B - MEAMs
- 1.5. References

1.1. AUTOBIOGRAPHICAL MEMORY

Loveday et al (2020) began by stating: "Reminiscing is a natural and fundamental human activity. This ability to reflect on past events nourishes and maintains our connections with other people, enables us to make plans and imagine the future, and supports our sense of self" (p1969). Autobiographical memories vary across the lifespan with a period in adolescence and early adulthood called the "reminiscence bump" (Rubin et al 1986) (appendix 1A). This means that "memories formed during this time seem to be particularly resilient and remain disproportionately available even in very old age" (Loveday et al 2020 p1969).

Loveday et al (2020) preferred to call this the "self-defining period" (SP) to emphasise that the autobiographical memories are important in the formation of the self and identity.

Music is "inherently related to an individual's sense of personal and cultural identity" (Loveday et al 2020 p1970), and there is a preference for songs heard/popular during the SP. For example, Holbrook and Schindler (1989) asked 108 participants to rate 28 popular songs from 1932 to 1986, and found a peak in preference for songs popular when the individual was aged 24. Overall, the preference showed an inverted U-shape with age at time of hearing (Loveday et al 2020).

Critics have suggested that preference for music is linked to significant events or periods of life rather than just age, and many of these occur during the SP. El Haj et al (eg: 2012a) talked of "music-evoked autobiographical memories" (MEAMs) - highly emotional memories triggered by music (appendix 1B). So, there could be a "musical SP" (Loveday et al 2020).

Loveday et al (2020) explored this idea using the musical choices of guests on a BBC radio programme called "Desert Island Discs" ¹. Individuals are asked to choose

¹ Home page at <https://www.bbc.co.uk/programmes/b006qnmr>.

eight pieces of music with significance that they would want on a desert island. A sample of 80 participants were taken from the archives of the programme (40 female and 40 male). An estimate was made of the age of the guest when the music they chose was first heard/popular, and this "age at importance" (AaI) was divided into 10-year periods in the lifespan. The reason for the choice of music was categorised in four ways - a general memory, a specific event, emotional response, and comments about the choice of music (eg: lyrics).

Around half of the choices were linked to ages 10-19 and 20-29 years old. This was significantly more than would be expected by chance.

The main reasons for choice of a piece of music was general memories of a specific time, specific memories related to the self, and because of a strong emotional response.

Loveday et al (2020) explained the choices as linked to SP because individuals "naturally gravitated to the people, places, times, and memories from this important period of the emergence of self from childhood and adolescence. Knowledge and memories from the SP perhaps explain who we are, to ourselves and to others" (p1975).

These data were naturalistic free choices, but the AaI or reason for choice was only established for about half of the pieces of music.

1.2. OFFLINE MEMORY

Robertson and Genzel (2020) began: "Our minds are constantly active. Even once an experience, such as trying to recall the location of a lost set of car keys, has ceased, it continues to be processed 'offline', which enables inspiration to strike - and those keys to be found - at the most unlikely of times. Offline processes have reliable effects upon our memories. For example, they enhance our memories during sleep, so that performance on a skill learnt one day is improved by as much as 25-30% the next day" (p1). There is great interest in the "offline" processes.

The offline processing of a new memory involves consolidation, which, in the case of motor skills, produces an enhancement between learning and testing. "A memory may also be reorganised during consolidation, allowing people to gain insight into underlying patterns or structures within a mathematical puzzle or sequence of events, for example" (Genzel and Robertson 2015 p1). Another change during consolidation is the brain area

that the memory is reliant upon (Genzel and Robertson 2015).

In the study of conscious or explicit memory processing, there is an event that can be measured, and brain activity before and after can be recorded ("event-related design") (eg: single-cell recordings; neuroimaging). "For the offline brain, there is no event. There is no single, discrete point in time in which offline processing is initiated, or subsequently ends. It can potentially start once a memory has been formed, and continue for the subsequent hours, or perhaps days across different brain states (wakefulness versus sleep)^{2 3}. Across those many hours, there may be a single event that underlies a change in a formed memory - where a 'needle' of memory change needs to be uncovered among the 'haystack' of other changes in neuronal activity. Alternatively, a succession of events perhaps relying upon transitions from one brain state to another may be necessary for an offline change in a memory" (Robertson and Genzel 2020 p2).

One approach is to study reactivation - the same brain activity during memory formation appearing during sleep, say. This has been shown in the motor cortex of rats, for example. The brain activity pattern during the learning of a maze, say, was seen during sleep (like a "replay of events") (Genzel and Robertson 2015)⁴.

But the "extremely seductive" assumption is made than the reactivation of a similar pattern of brain activity is a replay of learning (Robertson and Genzel 2020).

Another problem is how reactivation is linked to subsequent learning improvements. Disrupting the reactivation of memories in the hippocampus has been shown to stop improvements in learning (eg: Gridchyn et al 2020). "What remains unclear is how reactivation leads to memory changes. Intuitively the notion of reactivation is appealing because it seems to provide an offline period of additional practice or training. Within this framework, reactivation leads to exactly those memory changes that would be provided by prolonged practice"

² Offline consolidation during sleep has been frequently, but not exclusively, related to NREM sleep (Genzel and Robertson 2015).

³ "Replay does not occur exclusively during sleep; however, its influence beyond the hippocampus to cortical areas may only occur during sleep" (Genzel and Robertson 2015 p7).

⁴ "Replay is greater when a motor skill is novel and requires consolidation, whereas replay is diminished as a motor skill becomes well learned and is in less need of consolidation" (Genzel and Robertson 2015 p7).

(Robertson and Genzel 2020 p4).

Robertson and Genzel (2020) ended: "Reactivation can no longer be dismissed as the mere 'echo' of earlier memory formation. It is correlated with and also critical for the development of offline memory changes. However substantial challenges remain. For instance, how reactivation drives cellular changes (synaptic to myelination), how this alters function within and across circuits, and in turn changes memory performance remains poorly understood" (p5).

1.3. APPENDIX 1A - REMINISCENCE BUMP

As well as the reminiscence bump (RB), Munawar et al (2018) noted a pattern of autobiographical memories (AMs) that included "childhood amnesia" (ie: recall over the lifespan includes few memories before 8 years old), and the "recency effect" (ie: "memories recalled by most individuals are of recent events, and the frequency of these memories decline gradually"; p1).

AMs tend to be studied by asking individuals to recall their most important memories, or by cuing recall with words (eg: school) or public events (eg: day that famous person died). The RB has also been extended to include public events (ie: those occurring between the ages 12 to 29 years old are recalled preferentially) (Munawar et al 2018). The link between AMs and public events is seen in a study by Conway and Haque (1999), which showed a second RB at 35-55 years old. Older Bangladeshi participants showed this increased recall of AMs because it coincided with the struggle for independence of Bangladesh in 1971. "It is suggested that the second bump is due to the enhanced retrieval of AMs from a period when Bengalis, as a nation, were struggling to establish their own independent country, and to uphold their collective Bengali identity" (Munawar et al 2018 p26).

In terms of the explanations for the RB, they include (Munawar et al 2018):

a) "First events" are more common during adolescence and early adulthood, and thus remembered ("cognitive account" explanation) ⁵.

b) The brain matures at this age and so more

⁵ Memories from the RB do not vary in vividness, say, from memories outside the RB period (Janssen et al 2011).

memories are retained ("cognitive abilities" explanation).

c) The "cultural life script" explanation states that "individuals recall more events from the second and third decades of life because of cultural prescriptions and expectations present in the life script" (Munawar et al 2018 p2).

d) Events important to the individual's identity occur at this time ("narrative/identity" explanation).

Munawar et al (2018) reviewed the studies on the RB (from 1988 to 2017), and 68 relevant quantitative studies were found. A thematic analysis produced four themes from the research:

i) Method of memory activation - Two main methods were used by researchers: the cuing method, and important memories method. "Word cuing methods yield unbiased sampling of memories across the entire life span, whereas the important memories method focuses on eliciting the most important memories of a person's life, and tends to produce a narrative-based search" (Munawar et al 2018 p24).

ii) Types of memory recalled - Three of them: AMs, memories for public events, and "life script" events (eg: first date).

iii) Age of RB - Depending on the method used to elicit memories and the type of memory, the RB varied: "approximately 10-30 years for memories for important events, approximately 5-30 years for memories that were induced by word cues, and 6-39 years for studies using life scripts" (Munawar et al 2018 p1).

iv) Theoretical explanations of RB - The narrative/identity and cultural life script explanations "received the most support" (Munawar et al 2018 p1).

Applying the RB to films/movies and music, two main methods are used to investigate it. With "self-generated cue studies", participants recall their favourite films or songs, and the age when first encountered is then attributed. For example, "era-defining" and favourite films were first watched in the 20s (eg: Schulster 1996). "Experimenter-generated cue studies" test the recognition of media presented by researchers. For example, Janata et

al (2007) found that recognition of and triggering of memories of US chart songs peaked in adolescence.

Rathbone et al (2017) investigated the RB in terms of personally significant and non-significant memories. In Study 1, 172 online participants aged 40-80 years old were presented with 56 Oscar-winning movie titles, and asked to pick five that were "most personally important", and likewise with 56 UK music chart number ones. The AaI was calculated for the chosen items.

There was no RB for films and most choices were recent, while the songs had a RB peaking in the teenage years.

The movies and songs not chosen were classed as personally insignificant, and they did not show a RB. However, the researchers accepted that classing non-selected items as personally insignificant was problematic. They admitted that "we did not know how many of the songs and films that were not selected as personally significant were actually known to each participant" (Rathbone et al 2017 p143).

In Study 2, participants were asked to rate every item as known or unknown. This study involved 151 online participants aged 40-65 years old who chose their five songs as in Study 1. They were also asked if particular memories were attached to half of the songs randomly selected.

Once more, there was a RB for personally significant songs, peaking in the teenage years, but no RB for the other songs that were known to the participants. "Personally significant songs were significantly more likely to be associated with episodic memories, compared to personally non-significant songs" (Rathbone et al 2017 p137).

Both studies showed that "items in memory that are more connected to the self (in this case, songs rated as high in personal significance) are organised in a reminiscence bump distribution, in contrast to items in memory that are recognized but not connected to the self. This finding supports the idea that the self plays an important role in the formation of the reminiscence bump" (Rathbone et al 2017 p147).

1.4. APPENDIX 1B - MEAMs

Much of the work on MEAMs relates to individuals with Alzheimer's Disease (AD). The basic design of experiments involves comparing recall of AMs between

individuals who hear music or not. Among mild to moderate AD sufferers, recall is greater in the music conditions (El Haj et al 2012b).

El Haj et al (2012b) emphasised that MEAMs are involuntary AMs - ie: "conscious memories of personal events that come to mind spontaneously" (Johannessen and Berntsen 2010 quoted in El Haj et al 2012b). El Haj et al (2012b) stated: "Even though they pop into awareness without any attempt to retrieve them, these memories are believed to be elicited in response to a cue in the environment" (p239).

El Haj et al (2012b) reported their study with sixteen older adults with mild AD in France. Participants produced AMs after listening to their favourite music or silence. "As expected, music-evoked autobiographical memories were found to be more specific, to be accompanied by more emotional content and impact on mood, to be retrieved faster, and to induce less executive control than memories evoked in silence, which are all characteristics of involuntary memories" (El Haj et al 2012b p243).

In terms of explanation, theories of memory suggest two types of cue and retrieval (eg: Moscovitch 1995). "Strategic retrieval", which is used in voluntary recall, is where a cue acts as a starting point for a memory search, but in "associative retrieval" "the cue alone is sufficient for retrieval" (El Haj et al 2012b p243). The latter is the basis of involuntary memories, and perceptual cues, like music, are important (El Haj et al 2012b).

1.5. REFERENCES

Conway, M.A & Haque, S (1999) Overshadowing the reminiscence bump: Memories of a struggle for independence Journal of Adult Development 6, 1, 35-44

El Haj, M et al (2012a) Music enhances autobiographical memory in mild Alzheimer's disease Educational Gerontology 38, 1, 30-41

El Haj, M et al (2012b) "The involuntary nature of music-evoked autobiographical memories in Alzheimer's disease Consciousness and Cognition 21, 238-246

Genzel, L & Robertson, E.M (2015) To replay, perchance to consolidate PLoS Biology 13, e1002285 (Freely available at <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1002285>)

Gridchyn, I et al (2020) Assembly-specific disruption of hippocampal replay leads to selective memory deficit Neuron 106, 2,

Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

291-300

Holbrook, M.B & Schindler, R.M (1989) Some exploratory findings on the development of musical tastes Journal of Consumer Research 16, 1, 119-124

Janata, P et al (2007) Characterisation of music-evoked autobiographical memories Memory 15, 845-860

Janssen, S.M.J et al (2011) The temporal distribution of autobiographical memory: Changes in reliving and vividness over the life span do not explain the reminiscence bump Memory and Cognition 39, 1, 1-11

Johannessen, K.B & Berntsen, D (2010) Current concerns in involuntary and voluntary autobiographical memories Consciousness and Cognition 19, 847-860

Loveday, C et al (2020) The self-defining period in autobiographical memory: Evidence from a long-running radio show Quarterly Journal of Experimental Psychology 73, 11, 1969-1976

Moscovitch, M (1995) Recovered consciousness: A hypothesis concerning modularity and episodic memory Journal of Clinical and Experimental Neuropsychology 17, 276-290

Munawar, K et al (2018) Understanding the reminiscence bump: A systematic review PLoS ONE 13, 12, e0208595 (Freely available at <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0208595>)

Rathbone, C.J et al (2017) The tracks of my years: Personal significance contributes to the reminiscence bump Memory and Cognition 45, 137-150

Robertson, E.M & Genzel, L (2020) Memories replayed: Reactivating past successes and new dilemmas Philosophical Transactions of the Royal Society B 375, 20190226

Rubin, D.C et al (1986) Autobiographical memory across the lifespan. In Rubin, D.C (ed) Autobiographical Memory Cambridge: Cambridge University Press

Schulster, J.R (1996) In my era: Evidence for the perception of a special period of the past Memory 4, 2, 145-158

2. THE AHA! MOMENT

- 2.1. Introduction
- 2.2. Incubation
- 2.3. Priming
- 2.4. References

2.1. INTRODUCTION

The creative process or problem-solving "Aha! moment" has a series of stages. Wallas (1926) listed four: preparation, incubation, illumination, and verification (Bryce 2019).

Nearly a century later, Bryce (2019) suggested five phases from the research:

- i) Explore - Collecting information in an open-minded way.
- ii) Focus - Build up experience of the area of concern.
- iii) Incubate - Not thinking about the problem consciously (eg: sleeping on it).
- iv) Insight - Increased activity in the right hemisphere is associated with this.
- v) Follow-through - Check that the solution works (eg: asking another person).

2.2. INCUBATION

Doing something different for a while (the incubation period) before returning to the problem is well supported. For example, a meta-analysis of 117 studies found significant benefits compared to working continuously on a problem (Sio and Ormerod 2009). But the reason for incubation's benefits is unclear.

Gilhooly et al (2013) offered four possible explanations:

- i) "Intermittent conscious work" - The individual is still consciously thinking about the problem to be solved while doing another task. This would mean that performance of the alternative task would be impaired. Gilhooly et al (2012) did not find this with anagram and Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

mental rotation tasks as the "incubation task". So, this explanation is discounted (Gilhooly et al 2013).

ii) "Beneficial forgetting" - Doing another task is an opportunity to forget "misleading strategies, mistaken assumptions and related 'mental sets'" about the target problem, and "thus a fresh start or 'set shifting' is facilitated when the problem is resumed" (Gilhooly et al 2013 p139).

iii) "Attention withdrawal" - Similar to the previous explanation, but the break from the problem is an opportunity to change attention on aspects on the problem when it is resumed.

iv) "Unconscious work" - Active unconscious processing of the task continues during the conscious switch to another activity.

Gilhooly et al (2013) concentrated on the similarity of the incubation task to the target task. The "unconscious work" hypothesis predicts that performance in the target task will be impaired by a similar incubation task because the same mental resources are being used. The "attention withdrawal" hypothesis predicts no effect, while the "beneficial forgetting" view "predicts that activities during incubation similar to the target task would produce more forgetting (through interference) and hence generate larger incubation effects than would dissimilar activities, which would cause less interference" (Gilhooly et al 2013 p140).

Gilhooly et al (2013) tested these predictions in an experiment.

Participants worked on a target task for five minutes, then an interpolated activity for five minutes, and a return to the target task for another five minutes. The target task was either a verbal "alternative uses task" (as many alternative uses for a brick as possible), or a spatial "mental synthesis task" (combining five shapes in imaginative ways). These were both creative thinking tasks.

The interpolative task was either verbal (63 anagrams to solve) or spatial (the mental rotation of pairs of shapes to see if they are the same). There were six independent experimental conditions (table 2.1) performed by 120 students in England.

Condition:	1	2	3	4	5	6
Target task	Verbal	Verbal	Verbal	Spatial	Spatial	Spatial
Interpolated task	Verbal	Spatial	None	Verbal	Spatial	None
Tasks	Similar	Different	Control	Different	Similar	Control

(Target task - verbal = alternative uses; spatial = mental synthesis
 Interpolated task - verbal = anagrams; spatial = mental rotation)

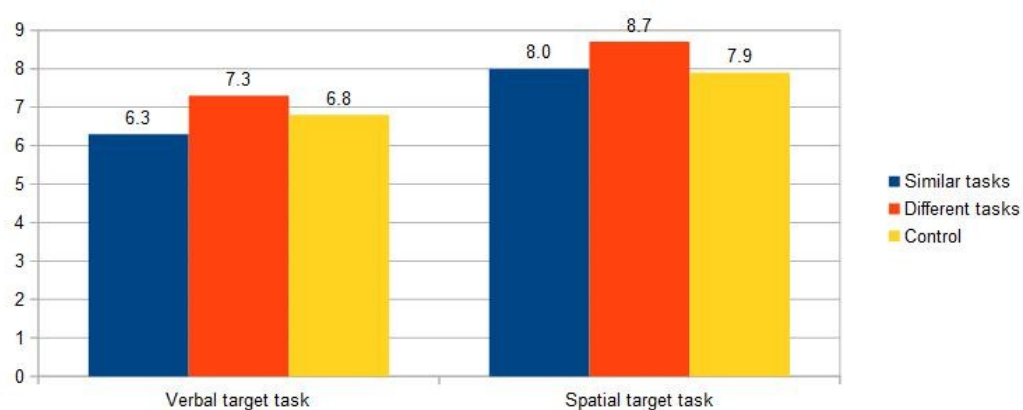
(My numbering of conditions)

Table 2.1 - Six experimental conditions in Gilhooly et al (2013).

All tasks were scored:

- Target tasks - number of responses;
- Interpolated tasks - number of correct answers.

Gilhooly et al (2013) summed up their findings as "an interpolated incubation activity of a dissimilar nature to the target task led to stronger benefits for incubation as compared to an interpolated activity which was similar to the target task" (p145). Based on table , the number of responses was significantly more in conditions 2 and 4 than in conditions 1 and 5 (figure 2.1). The results supported the "unconscious work" hypothesis.



(Data from Gilhooly et al 2013 table 2 p145)

Figure 2.1 - Mean total number of responses on the target task based on the condition.

2.3. PRIMING

A great deal of research has focused on the cognitive processes prior to insight, whereas Slepian et al (2010) investigated "whether insight can be catalysed by a cultural artefact, an external object imbued with learned meaning. Specifically, we exposed participants to an illuminating light bulb - an iconic image of insight - prior to or during insight problem-solving" (p696). This is an example of priming or automatic activation of behaviour. It is suggested that the primer activates relevant concepts.

Five studies were performed by Slepian et al (2010).

Study 1

1. Aim - To see if exposure to a light bulb increased insight on a lexical decision task.

2. Participants - Seventy-three US college students,

3. Procedure - The participants were asked to say if a stimulus that appeared on a computer screen was a word or a non-word as quickly as possible. The stimuli were ten words associated with insight (eg: create), ten neutral words, and 20 non-words.

4. Independent variable (IV) - The room was lit by a light bulb or a fluorescent light, which was turned on early in the experiment.

5. Dependent variable (DV) - Reaction time to respond to stimulus.

6. Design - Independent measures.

7. Findings - The overall mean reaction time was faster in the light bulb condition (583 milliseconds (ms)) than in the fluorescent light condition (619 ms) ($p < 0.05$). This difference was stronger for insight words compared to neutral ones.

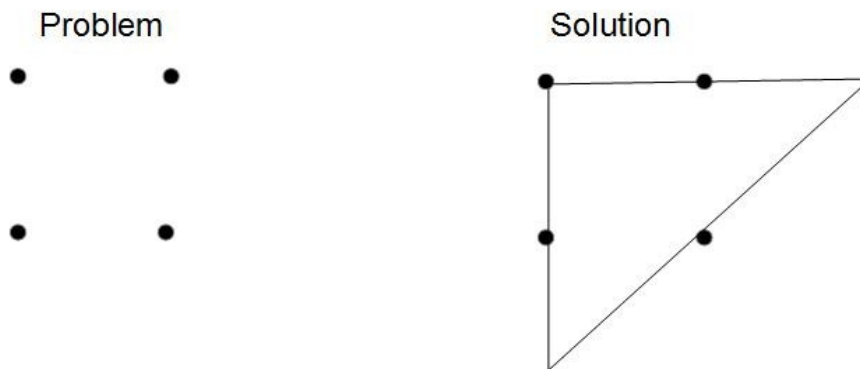
8. Conclusion - "This study thus suggests that an illuminating light bulb activates concepts associated with achieving an insight" (Slepian et al 2010 p697).

Study 2

1. Aim - To see if exposure to a light bulb increased insight on a spatial problem.

2. Participants - Seventy-nine US college students.

3. Procedure - The participants had three minutes to solve a problem where they had to "connect four dots arranged in a square by drawing three connected straight lines without either lifting the pencil from the page or retracing a line, and while ending the drawing at the same dot it was begun" (Slepian et al 2010 p697) (figure 2.2).



(Based on figure 2 p698 Slepian et al 2010)

Figure 2.2 - Problem and solution used in Slepian et al 2010) Study 2.

4. Independent variable (IV) - As Study 1.

5. Dependent variable (DV) - The solving of the problem or not.

6. Design - Independent measures.

7. Findings - Significantly more participants solved the problem in the light bulb than fluorescent light condition (44% vs 22%; $p < 0.05$).

8. Conclusion - So, "exposure to the illuminating light bulb enhanced spatial insight problem-solving" (Slepian et al 2010 p698).

Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

Study 3a

1. Aim - To investigate an alternative explanation for the findings in Studies 1 and 2, namely that "the light bulb emitted pleasant (or different) lighting, relative to the fluorescent light control, and the resulting positive mood led to insight" (Slepian et al 2010 p698).

2. Participants - Thirty-eight US college students.

3. Procedure - The participants were given the Remote Associates Test to complete. This is where three words are presented (eg: sense, courtesy, place) and the task is to provide a word that goes with all three (eg: common) (Slepian et al 2010). There were fifteen stimuli.

After the light was turned on, but before completing this task, participants rated their current mood (on a scale of 1-9).

4. Independent variable (IV) - As Study 1.

5. Dependent variable (DV) - Number of correct answers.

6. Design - Independent measures.

7. Findings - Significantly more correct answers were provided in the light bulb than the fluorescent light condition (mean 4.88 vs 2.86; $p < 0.05$). There was no significant difference in mood ratings between the two light conditions.

8. Conclusion - The type of light had no impact on mood.

Study 3b

1. Aim - To investigate whether the level of lighting influences insight.

2. Participants - Fifty-seven US college students.

3. Procedure - The participants undertook the Remote Associates Test as in Study 3a in the presence of a light bulb (of 25-W (unshaded) or 40-W (shaded)).

4. Independent variable (IV) - The level of

Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

lighting.

5. Dependent variable (DV) - Number of correct answers.

6. Design - Independent measures.

7. Findings - Significantly more correct answers were achieved in the unshaded light bulb condition (mean 6.08) as compared to the shaded light bulb condition (mean 4.60) ($p = 0.05$).

8. Conclusion - Exposure to the light bulb (ie: unshaded) influences insight rather than the level of lighting.

Study 4

1. Aim - To investigate whether the light bulb improved performance on non-insight problems.

2. Participants - Sixty-nine US college students.

3. Procedure - The participants had one minute each to solve four mathematical problems, of which three involved non-insight (ie: they could be calculated), and one insight, in the presence of an illuminated light bulb or an overhead fluorescent light.

4. Independent variable (IV) - As Study 1.

5. Dependent variable (DV) - Number of correct answers.

6. Design - Independent measures.

7. Findings - Overall, participants performed better in the light bulb condition than in the fluorescent light one (37% vs 24% correct; $p < 0.05$), but there was a difference depending on the type of problem. "Compared to participants exposed to fluorescent light, those exposed to the illuminating light bulb solved the insight problem more often..., but did not solve the non-insight problems more often..." (Slepian et al 2010 p699).

8. Conclusion - It seems that "the problem-solving benefits of exposure to an illuminating light bulb are specific to insight problems" (Slepian et al 2010 p699).

Overall, these studies showed that exposure to an illuminating light bulb improved insight. Slepian et al (2010) stated: "These findings add to the growing body of research showing that perception of objects in our environment can subtly influence our behaviour. They demonstrate in particular how visible symbols can influence the generation of insightful solutions to problems; as participants associate an illuminating light bulb with achieving insight, the mere perception of an actual illuminating light bulb brought about mental processes that facilitated the insight process" (p699). This fits with Wallas (1926) who talked of a "flash of illumination".

The five studies made use of the rigorous controls of the experimental method, but they were limited, in terms of generalisability, by their sample (students from one private university in the north-eastern USA studying psychology). The participants were asked in the post-experiment debriefing if they had seen the problems beforehand, and, if so, their data were removed from the analysis. But it is possible that the participants had no recollection of the problem, yet had a general knowledge about their solving. There are other types of problems that could have been used.

The participants may have gleaned the purpose of the study by the experimenter's behaviour. Fifty-five seconds after setting up an individual participant in front of the computer, they said: "I just noticed it's a little dark in here; let me turn this on for you" (Slepian et al 2010 p697). But because these studies used the independent measures (or unrelated) design, this is less of an issue than with a related or repeated measures design. The participants did not know what was happening in the other condition. Slepian et al (2010) stated at the end of Study 1: "No participants in this study (or any of the four studies) indicated suspicion of the experimental manipulation during debriefing" (p697).

Other points of evaluation of the studies include:

(-) The gender make-up of the participants - more females in all but Study 4. Total participants were 316, of which 180 were female, 127 male, and nine unreported (my calculations).

(-) Participation in the studies was based on the reward of "partial course credit".

(+) Standardised instructions and procedures including the use of a computer to control tasks, timings, and reaction time measures.

(+) Random assignment of participants to experimental conditions.

2.4. REFERENCES

Bryce, N (2019) The Aha! moment Scientific American Winter (special edition), 52-57

Gilhooly, K.J et al (2012) Don't wait to incubate: Immediate versus delayed incubation in divergent thinking Memory and Cognition 40, 966-975

Gilhooly, K.J et al (2013) Incubation and creativity: Do something different Thinking and Reasoning 19, 2, 137-149

Sio, U.N & Ormerod, T.C (2009) Does incubation enhance problem-solving? A meta-analytic review Psychological Bulletin 135, 94-120

Slepian, M.L et al (2010) Shedding light on insight: Priming bright ideas Journal of Experimental Social Psychology 46, 696-700

Wallas, G (1926) Art of Thought London: Jonathan Cape

3. AVOIDANT GRIEF AND THOUGHT AVOIDANCE

"Avoidant grieving" (AG) is "a grief style aimed at preventing thoughts of loss from occurring and suppressing them out of consciousness when they do... Avoidant grievers show more difficult grieving and, paradoxically, more frequent thoughts of loss... By contrast, those who have less frequent thoughts of loss without exerting effort to do so have better outcomes... The ongoing effort and failure to prevent thoughts of loss therefore comprise a central dynamic in avoidant grieving" (Schneck et al 2018 p163) (appendix 3A).

AG involves a hypervigilant monitoring of the environment for potential reminders, and of self-generated thoughts (during mindwandering). "This type of attempted control over the mind relies on what has been termed an ironic process, which searches the mental state for undesired or inconsistent content, which the person can then attempt to suppress from reaching consciousness" (Schneck et al 2018 p164).

Schneck et al (2018) recruited 29 adults in the USA who had been bereaved of a first-degree relative or partner (mostly by suicide) in the previous 3-14 months. Grief severity and avoidance were measured by standardised scales, and individuals underwent a brain scan while performing a version of the Stroop task. In this task, words were presented in different colours and the participants had to state the colour of the ink as quickly as possible. The words related to death, living, and unrelated items. It was predicted that individuals will be distracted by the meaning of the words related to death, and take longer to name the colour if suppressing thoughts about the loved one. Other tasks related to attention were also performed during scanning, as well as a period of mindwandering, after which participants were asked if they had thought of the loved one.

From their data, the researchers distinguished three "states of deceased-related processing in avoidant grief":

i) Task focus - Non-AG individuals were able to focus on tasks and were less likely to be distracted.

ii) Suppression - Individuals with AG showed evidence of brain activity about the loved ones when trying not to think about them. This was a below-conscious level monitoring of thoughts to avoid conscious thoughts.

iii) Intrusion - Spontaneous thoughts of loss reached conscious awareness, and distracted the individuals on attention tasks.

Using machine learning, Schneck et al (2018) were able to distinguish the patterns of brain activity for these states. In terms of the brain activity, the network of information representing the deceased ("deceased-related mental representations"; d-MRs) is more active as well as areas of "deceased-related selective attention" (d-SA). In the words of Schneck et al (2018): "Sustained monitoring over mindwandering transpired through interactions between the d-MR basal-ganglia circuit and the d-SA frontotemporoparietal network" (p170).

This research showed that AG leads to unwanted thoughts about the loved one frequently, and distraction of attention and performance task as the individual tries not to think about the deceased.

APPENDIX 3A - DEATH

"Humans will die like all living things do, but we have the added burden of knowing that we will" (Olshansky 2012 p47). Cave (2012) argued that four "narratives" have emerged in human societies from this knowledge:

- Plan A - To stay alive as long as possible (eg: motivating developments in medical science).
- Plan B - Resurrection (eg: the basis to some religious beliefs, and cryonics).
- Plan C - Soul - The human body may die, but some part of us lives on, as seen in many religious beliefs.
- Plan D - Legacy - Leave something of ourselves after we have gone (eg: arts; monuments).

REFERENCES

- Cave, S (2012) Immortality: The Quest to Live Forever and How It Drives Civilisation London: Biteback
- Olshansky, S.J (2012) To live forever New Scientist 7th April, p47
- Schneck, N et al (2018) Ongoing monitoring of mindwandering in avoidant grief through cortico-basal-ganglia interactions Social Cognitive and Affective Neuroscience 14, 2, 163-172
- Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

4. DECISION-MAKING AND COGNITIVE REFLECTION

Individuals differ in their use of "cognitive reflection" (CR) (ie: "slower, more thoughtful deliberation") when making decisions (Littrell et al 2020). This is "Type II" thinking as opposed to intuition/"gut reaction" ("Type I" thinking) in the dual process model of cognition (Evans and Stanovich 2013).

A number of associations have been found with the use of CR in decision-making including (Littrell et al 2020):

- Cognitive ability.
- Logical reasoning.
- Less susceptibility to "pseudo-profound bullshit" (Pennycook et al 2015) (appendix 4A).

Littrell et al (2020) lamented that there was little research on personality traits and CR, and this led them to investigate narcissism (Na) and impulsiveness (Im).

Na is characterised by "domineering, excessive egocentrism and self-admiration" (Littrell et al 2020 p354), with two sub-types: "grandiose", and "vulnerable" (eg: hypersensitive, insecure, defensive).

It was predicted that Na would negatively correlate with CR. "Engaging in cognitive reflection seemingly... requires a level of inward criticality that might be less available in individuals higher in narcissism, particularly given their propensity for biased introspection and exaggerated self-assessment" (Littrell et al 2020 p354). Im will be likewise correlated with CR.

Littrell et al (2020) performed three online studies.

Study 1

One hundred participants recruited via Amazon's Mechanical Turk (MTurk) completed a series of questionnaires, including the Narcissism Personality Inventory (NPI-13) (Gentile et al 2013), which involves thirteen items (eg: "I find it easy to manipulate people"), the Hypersensitive Narcissism Scale (HSNS) (Hendin and Cheek 1997) (with ten items, like "My feelings are easily hurt by ridicule or the slighting remarks of others"), and the Barratt Impulsiveness Scale (BIS-11) (Patton et al 1995) (items eg: "I do things without thinking").

CR was measured by the Cognitive Reflection Test-Long (CRT-L) (Primi et al 2016). Mathematical word puzzles with an intuitive (incorrect) and a reflective (correct) option, like: "A bat and a ball cost \$1.10. The bat costs \$1.00 more than the ball. How much does the ball cost?". The intuitive answer is 10 cents, while the correct one is 5 cents (Littrell et al 2020).

The findings partly supported the researchers' predictions:

- Grandiose Na was negatively associated with CR (as expected).
- Vulnerable Na showed no relationship to CRT-L score (unexpected).
- Im was not associated with intuitive or reflective thinking (unexpected).

Studies 2a and 2b

These two studies replicated Study 1 with more participants from MTurk (200 and 202 respectively). Different problems were used to measure CR. Study 2B also asked participants to rate their level of confidence that their answers to the problems were correct. This provided a measure of over-confidence. The findings were similar to Study 1.

Overall for the three studies, high grandiose Na scores were associated with low CR (and high over-confidence in Study 2B). So, "while grandiose narcissists may view themselves as highly intellectual, critical thinkers, their excessive overconfidence in their own mental prowess is likely unwarranted" (Littrell et al 2020 p372).

Vulnerable Na showed no relationship to CR, which meant that they used both Type I and II thinking to make decisions. Littrell et al (2020) noted that such individuals are "highly neurotic" and self-doubting. "Therefore, it could be the case that when vulnerable narcissists detect conflict related to an intuitive response... and attempt to engage in cognitive reflection, they experience self-doubt in their own decisional competence, which prompts them to disengage from reflection and revert to their initial 'gut instinct'" (Littrell et al 2020 p373).

The lack of negative association between Im and CR, Littrell et al (2020) explained as due to the BIS-11,

Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

which "might not capture 'cognitive impulsivity'", and "given that impulsiveness was measured via self-report..., there exists the possibility that an individual's belief that he/she is impulsive (in a general sense) is not necessarily indicative of actual cognitive or behavioural impulsivity when engaged in problem-solving tasks" (p374).

APPENDIX 4A - PSEUDO-PROFOUND BULLSHIT

Bullshit can be defined as "something that is designed to impress but that was constructed absent direct concern for the truth. This distinguishes bullshit from lying, which entails a deliberate manipulation and subversion of truth (as understood by the liar)" (Pennycook et al 2015 p549).

Buekens and Boudry (2015) used the term "obscurantism" to describe "[when] the speaker... [sets] up a game of verbal smoke and mirrors to suggest depth and insight where none exists" (quoted in Pennycook et al 2015).

Pennycook et al (2015) concentrated on this as "pseudo-profound bullshit" (PPB) - ie: "it attempts to impress rather than to inform; to be engaging rather than instructive" (p550) - and an individual's receptivity. Two cognitive biases are important (Pennycook et al 2015):

a) The tendency to accept a statement as true initially, and then to evaluate it.

b) The confusing of vagueness for profundity.

Pennycook et al (2015) performed four studies on PPB receptivity.

Study 1

Two hundred and eighty students in Canada were presented with ten novel meaningless statements involving vague buzzwords to make them seem profound (eg: "Imagination is inside exponential space time events")⁶. Each statement was rated on a five-point scale, from (1) "not at all profound" to (5) "very profound". Participants also completed other measures including of

⁶ These ten statements became the Bullshit Receptivity Scale (BRS).
Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

cognitive reflection (CRT), and "ontological confusions"⁷. The latter describes the tendency to confuse categories of meaning, like literal and metaphorical statements (eg: "flowing water is a liquid" (literal) vs "an anxious person is a prisoner to their anxiety" (metaphorical)). Rating the latter statement as literal is high ontological confusions, and this is linked to PPB receptivity, it is predicted.

The mean profoundness rating for the ten statements was 2.6 out of 5, and about a quarter of the sample gave mean ratings of three or above. Pennycook et al (2015) stated: "These results indicate that our participants largely failed to detect that the statements are bullshit" (p553). High PPB receptivity was negatively correlated with cognitive reflection, but positively associated with high ontological confusions.

Study 2

This study involved 198 participants recruited from MTurk, who were presented with twenty meaningless statements from the Internet (eg: Nature is a self-regulating ecosystem of awareness")⁸. The other questionnaires were completed this time before rating the profoundness of the statements.

The findings were similar to Study 1, and the mean rating of profoundness was 2.5 for the BSR scale and 2.8 for the others.

Study 3

One hundred and twenty-five more participants from MTurk were given the twenty statements from Study 2, as well as ten mundane ones (eg: "Newborn babies require constant attention"), and ten motivational quotations (eg: "A wet person does not fear the rain").

The mean rating for the mundane statements was 1.4, compared to 3.1 for the motivational quotations, and 2.7 for the BSR scale items. But there were some individuals who rated the mundane statements as higher in profoundness, along with all other statements, and these participants were less likely to cognitively reflect. So, there are a small number of individuals who respond with "gut reactions" to all statements, and consequently are

⁷ The ontological confusions scale (Lindeman and Aarnio 2007) has fourteen items rated as (1) "fully metaphorical" to (5) "fully literal".

⁸ Ten statements from the BSR scale and ten new ones.

PPB receptive.

Study 4

A further 242 participants from MTurk were presented with the BSR scale and the motivational quotations as well as a measure of conspiracist ideation⁹ (eg: "A small, secret group of people is responsible for making all major world decisions, such as going to war").

The mean profoundness score was 2.3 for the BRS scale items and 3.1 for the motivational quotations. High scores here were associated with high conspiracist ideation.

Overall, the studies showed that some individuals have PPB receptivity, or "bullshit receptivity" as Pennycook et al (2015) called it. "Those more receptive to bullshit are less reflective, lower in cognitive ability (ie: verbal and fluid intelligence, numeracy), are more prone to ontological confusions and conspiratorial ideation, are more likely to hold religious and paranormal beliefs, and are more likely to endorse complementary and alternative medicine" (Pennycook et al 2015 p559). Pennycook et al (2015) saw a "general gullibility factor" as part of this receptivity.

In simple language, some individuals have an "uncritically open mind" (p559). Pennycook et al (2015) noted that "it is worthwhile to distinguish uncritical or reflexive open-mindedness from thoughtful or reflective open-mindedness. Whereas reflexive open-mindedness results from an intuitive mindset that is very accepting of information without very much processing, reflective open-mindedness (or active open-mindedness...) results from a mindset that searches for information as a means to facilitate critical analysis and reflection. Thus, the former should cause one to be more receptive of bullshit whereas the latter, much like analytic cognitive style, should guard against it" (560).

REFERENCES

Brotherton, R et al (2013) Measuring belief in conspiracy theories: The generic conspiracist beliefs scale Frontiers in Personality Science and Individual Differences 4, 279

Buekens, F & Boudry, M (2015) The dark side of the long: Explaining the temptations of obscurantism Theoria 81, 126-142

⁹ The fifteen-item general conspiracy beliefs scale (Brotherton et al 2013).

Evans, J.B.T & Stanovich, K.E (2013) Dual process theories of higher cognition: Advancing the debate Perspectives on Psychological Science 8, 3, 223-241

Gentile, B et al (2013) A test for two brief measures of grandiose narcissism: The Narcissistic Personality Inventory - 13 and the Narcissistic Personality Inventory - 16 Psychological Assessment 25, 4, 451-482

Hendin, H.M & Cheek, J.M (1997) Assessing hypersensitive narcissism: A re-examination of Murray's Narcism Scale Journal of Research in Personality 31, 4, 588-599

Lindeman, M & Aarnio, K (2007) Superstitious, magical and paranormal beliefs: An integrative model Journal of Research in Personality 41, 731-744

Littrell, S et al (2020) Overconfidently underthinking: Narcissism negatively predicts cognitive reflection Thinking and Reasoning 26, 3, 352-380

Patton, J.H et al (1995) Factor structure of the Barrett Impulsiveness Scale Journal of Clinical Psychology 51, 6, 768-774

Pennycook, G et al (2015) On the reception and detection of pseudo-profound bullshit Judgment and Decision-Making 10, 6, 549-563

Primi, C et al (2016) The development and testing of a new version of the cognitive reflection test applying item response theory (IRT) Journal of Behavioural Decision-Making 29, 5, 453-469

5. NOT-THINKING-FOR-SPEAKING

"Linguistic relativity" is the theory that the language spoken influences the way an individual thinks (or more accurately, "the structure of language shapes non-linguistic thinking"; Bowers and Pleydell-Pearce 2011 p1).

This would mean that speakers of different languages would perceive the world differently. For example, when using terms to describe the relative locations of objects, in English, speakers say "the book is left/right of the pen". But in Tzeltal (a Mayan language spoken in a mountainous area of Mexico), speakers would say "the book is uphill of the pen" (Bowers and Pleydell-Pearce 2011). "The question of interest is whether speakers of English and Tzeltal differ in their reasoning about space when language is not engaged" (Bowers and Pleydell-Pearce 2011 p1). This evidence is contradictory (Bowers and Pleydell-Pearce 2011).

A weaker version of linguistic relativity is "thinking-for-speaking" (Slobin 1987 quoted in Bowers and Pleydell-Pearce 2011), where "speakers organise their thinking to meet the demands of their language during speech" (Bowers and Pleydell-Pearce 2011 p1). For example, in English the word "friend" can describe a male or a female, but, in Spanish, two words exist - "amigo" (male friend) and "amiga" (female friend). "Accordingly, when talking about a friend, Spanish speakers need to contemplate their sex, whereas for English speakers, it is optional. To the extent that this morphological contrast leads speakers of the two languages to think differently while conversing, thinking-for-speaking is manifest" (Bowers and Pleydell-Pearce 2011 p1). Pinker (1994) summed up this idea: "one's language does determine how one must conceptualise reality when one has to talk about it" (quoted in Bowers and Pleydell-Pearce 2011).

A variation is "thinking-for-potential-speaking", where attention is focused on certain aspects of reality because of the language spoken (Bowers and Pleydell-Pearce 2011). Bowers and Pleydell-Pearce (2011) described an example with an English and a Tzeltal speaker: "A speaker of English may not remember whether his/her friend approached from the South, or in the direction of a distant landmark such as a mountain or the sea, as this information is not critical for the sake of conversing. By contrast..., a speaker of Tzelal would be more likely to notice and remember this aspect of their encounter. Indeed, the speaker is motivated to attend to these

aspects of the world even when not speaking, as he/she must mentally encode experiences in such a way that he/she can describe them later in language, if necessary" (p2).

Bowers and Pleydell-Pearce (2011) developed the idea of "thinking-for-potential-speaking" by considering how the "structural features of a language may discourage specific thoughts. That is, people may avoid thinking (and conversing) about certain topics in order to avoid producing aversive word forms associated with the topic (eg: saying aloud taboo words). On this view, it is not topic per se that is perceived as aversive, but rather, the potential need to say aloud a given word that is" (p2). The researchers called this "not-thinking-for-speaking", and studied it with taboo words and euphemisms.

The starting point is that a taboo word evokes a negative emotional response (via verbal conditioning), but the use of an euphemism overcomes this conditioning. Bowers and Pleydell-Pearce (2011) explained: "That is, we argue that euphemisms are often useful because they allow the speaker to replace the trigger (the offending word form) by another word form that expresses the same (or similar) idea but that is not itself associated with a conditioned response. This in turn allows speakers (and listeners) to think about issues that might otherwise be avoided" (p2).

In their experiment, Bowers and Pleydell-Pearce (2011) recruited twenty-four volunteers at a university in England. Four pairs of words were used:

- Taboo words - "fuck" and "cunt"
- Euphemisms for taboo words - "f-word" and "c-word"
- Neutral words - "glue" and "drum"
- Euphemisms for neutral words - "g-word" and "d-word".

The words were presented on a computer screen and the participants read them aloud while their emotional response was measured as electrodermal activity (the skin conductance of a tiny electrical change based on micro-sweat).

The real swear words invoked the strongest emotional response, followed by their euphemisms. Bowers and Pleydell-Pearce (2011) summed up: "The results of the study are clear-cut and perhaps unsurprising; people find it more stressful to say aloud a swear word than its corresponding euphemism" (p4). They continued: "In our Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer

view, euphemisms are effective because they replace the trigger (the offending word form) by another word that is similar conceptually. This, in turn, might allow us to discuss the same issues without the offending words, making conversation, associated thoughts, and related behaviour more likely than otherwise would be the case. Such an outcome satisfies the definition of linguistic relativity: "Word forms, in and of themselves, exerting some control on affect and cognition in turn" (Bowers and Pleydell-Pearce 2011 p7).

REFERENCES

Bowers, J.S & Pleydell-Pearce, C.W (2011) Swearing, euphemisms, and linguistic relativity PLOS ONE 6, 7, e22341 (Freely available at <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0022341>)

Pinker, S (1994) The Language Instinct New York: W Morrow

6. MOTION PERCEPTION AND TEXTURE

The sense of touch tells us about the shape and texture of an object, but also about motion, "as evidenced by the fact that (blindfolded) subjects can distinguish the direction and speed of which objects move across the skin" (Delhaye et al 2019 p2).

Delhaye et al (2019) investigated this by asking fifty blindfolded US participants to judge the speed of a variety of textural surfaces scanned across the fingertips using a circular drum (at speeds from 40 mm per second to 120 mm/s) (table 6.1). The ten textures were vinyl, metallic silk, huck towel, nylon, city lights, wool blend, micro-suede, stretch denim, thick corduroy, and chiffon.

"Critically, the perception of speed was highly influenced by texture: although all surfaces were perceived as moving faster as speed increased, some surfaces were systematically perceived as moving faster than others. For example, vinyl always felt slower than metallic silk" (Delhaye et al 2019 p3).

- "For all experiments, subjects sat in front of the drum with their right arm supinated and resting on a support such that the hand was placed under the drum. The index finger was strapped on a support such that the drum precisely made contact with the same portion of the fingertip and with the pre-specified amount of force on each trial. A curtain prevented the view of the textures and the drum. White noise was played through computer speakers, and subjects wore sound-blocking headphones to mask sounds from the motors or from the skin's interaction with the surface" (Delhaye et al 2019 p13).

Table 6.1 - Detailed description of procedure.

Next, participants were presented with two different surfaces moving at different speeds, and had to judge which was faster. The five pairs of textures were thick corduroy/stretch denim, corduroy thin/thick ridges, stretch denim/micro-suede, metallic silk/wool blend, and vinyl/micro-suede. Again the texture influenced the perception. "For instance, denim was almost always perceived to be faster than thick corduroy; thin corduroy was judged to be slightly faster than thick corduroy" (Delhaye et al 2019 p3).

The researchers ended: "The main conclusion of this study, then, is that speed coding relies on a heuristic: the stronger the skin vibrations, the faster a surface is

perceived as moving across the skin" (Delhaye et al 2019 p13).

REFERENCE

Delhaye, B.P et al (2019) Feeling fooled: Texture contaminates the neural code for tactile speed *PLoS Biology* 17, 8, e3000431 (Freely available at <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000431>)

7. MISCELLANEOUS CONSCIOUSNESS

- 7.1. Case study 1
- 7.2. Case study 2
- 7.3. Case study 3
- 7.4. Explaining agency
- 7.5. Infero-temporal cortex
- 7.6. References

7.1. CASE STUDY 1

Schubert et al (2020) reported the case of a man, "RFS", who had category-specific metamorphopsia (distorted perception) for Arabic digits. "When presented visually with a digit in the range 2 to 9, RFS was completely unable to recognise the digit or even perceive its shape. Instead, he reported seeing a tangle of black lines. Critically, the distorted percept also affected overlapping, embedded, or immediately-adjacent visual stimuli, disrupting his awareness of these stimuli" (Schubert et al 2020 p16055).

RFS was 60 years old when first studied in 2011. He was diagnosed with a progressive neurological disease (cortico-basal syndrome).

His visual perception of non-digit stimuli was mostly unimpaired, and "he had no difficulty naming, copying, comprehending, or otherwise processing the digits 0 and 1" (Schubert et al 2020 p16056). There was mild perceptual distortion for some letters (eg: M, N, Z). In one of the tests, RFS was presented with simple visual shapes (eg: x/+) or words embedded in a large "8" or "H". It was a forced choice test - for example, is "x" or "+" embedded in the "8"? RFS was almost 100% correct within the "H", but around 50% correct within the "8" (ie: similar to guessing).

The electrical activity of the visual areas of the brain were measured to see if basic perception was taking place for the digits even if there was no conscious (or complex) perception of them. There was evidence of neural processing (ie: the brain responded to the number stimuli, as shown in healthy brains) despite RFS's lack of conscious perception/awareness.

The findings fit with a model of conscious perception based on the integration of different elements of a stimulus, and including stored memories. "Under typical circumstances, all aspects are tied together: The identity of a symbol or word is linked to its location and its physical properties like colour and size. It is

by virtue of this integration of visual, identity, and position information that one becomes aware of visual stimuli" (Schubert et al 2020 p16061). What is happening with RFS, Schubert et al (2020) assumed, is that "the to-be-integrated signals are abnormal in some way, and consequently cannot be properly integrated with the visual information about the digit or other stimuli at the same spatial location. Consequently, RFS becomes aware of an unrecognisable (distorted) percept at the location of the digit. On this account, the stored representation of the correct digit is activated but the outcome of this process is not available to awareness" (p16061).

Though the case study is focused on one individual with impairment, and so generalisability of the findings is not advised, such a method allows a very detailed investigation of the cognitive impairment. The case study is able to shed light on the normal brain, particularly when experiments with healthy controls would not be feasible, possible, or ethical.

7.2. CASE STUDY 2

Odours arriving at the nose are changed by olfactory receptor neurons into neural signals that travel to the olfactory bulb (OB), the specialised area in the brain at the end of the nasal passage. It is assumed that the OB is necessary for smell perception. But Weiss et al (2020) discovered two healthy women ("NAB1" and "NAB2") with "no apparent OBs", yet "normal odour awareness, detection, discrimination, identification, and representation" (p35).

The finding of the women was serendipitous as they were undergoing MRI (magnetic resonance imaging) scans as controls in a different study.

The researchers were able to perform many tests in odour perception, but not to see if the women were impaired in olfactory learning and memory, for example.

Weiss et al (2020) offered five possible explanations for olfaction without OBs:

- i) An intact OB is located elsewhere in the brain.
- ii) Cells that would develop normally in the OB have developed elsewhere in the cortex.
- iii) The women have OBs that are exceptionally tiny,

and were missed in the MRI scans.

iv) That "humans somehow use trigeminal and perhaps other chemosensory nerve endings in order to compensate for their OB loss" (Weiss et al 2020 p42).

v) Human olfaction is different to rats, say, where experiments have surgically removed the OB and produced a loss of smell, and humans do not rely on the OB.

Weiss et al (2020) admitted: "Our methods could not decidedly favour any particular one of the above five interpretations, and therefore we are forced to conclude in this respect that humans can retain olfaction without apparent OBs, and we don't know how they achieve this" (p42).

7.3. CASE STUDY 3

Hamzelou (2020) publicised a case of a female 18 year-old (known as "C1") born without the entire left hemisphere of her brain ("hemi-hydranencephaly"; HHE). Detailed study was made by Asaridou et al (2020), who followed C1 from 14 months to 14 years old at time of their report. She was compared to typically developing children (n = 64), a younger sibling, and three children with left hemisphere stroke damage.

Asaridou et al (2020) summed up: "Despite difficulty getting language off the ground during pre-school, by the time C1 was 14 years old, her language performance was average for children her age on many standardised language tests, and exceptional in phonology (word repetition, elision) and word reading" (p304). She was rated as "average-to-high IQ as a teenager, intending to study at university (Hamzelou 2020).

Scans of the brain at 14 years old showed changes to the right hemisphere to compensate for the HHE (ie: "reorganisation for language in the spared right hemisphere resembled the activation seen bilaterally in the typically developing brain with more engagement of prefrontal regions"; Asaridou et al 2020 p305).

7.4. EXPLAINING AGENCY

Physicists faced with human agency struggle to fit it into their theories. Physicist Sean Carroll stated: "We see agents that make choices and exert a causal

influence on what happens in the world, and then science comes along and says, 'You're actually a bunch of particles or atoms and you're just obeying differential equations'... What we want to figure out is how those things can both be true at the same time" (quoted in Webb 2020).

One solution is "emergence". "This is the idea that behaviours and properties that are inscrutable when you look at single components of a complex system pop into existence when you view things as a whole" (Webb 2020 p36).

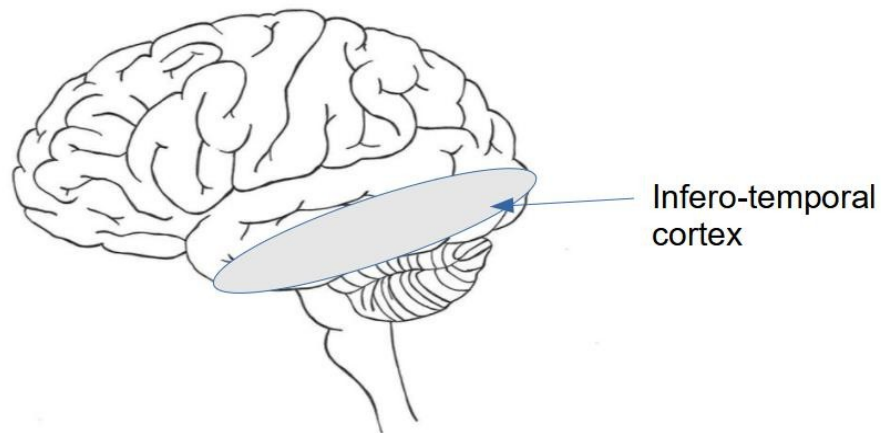
Another factor may be the ability to manipulate information. Through memory we have access to information about the past that can be applied to predict (and change) the future (Webb 2020). "We collect influences from our past, we subject those influences to reflective process, we somehow extract things like hope and dreams and bring them to bear on behaviour to mediate between the influences impinging on us" (Jenann Ismael quoted in Webb 2020).

7.5. INFERO-TEMPORAL CORTEX

The infero-temporal (IT) cortex (figure 7.1) is involved in object recognition (ie: "the process by which distinct visual forms are assigned distinct visual identity labels"; Bao et al 2020 p103)¹⁰, with specialist areas for faces, for example, as well as large parts without "any known specialisation" (Bao et al 2020).

Bao et al (2020) investigated the latter areas using functional magnetic resonance imaging (fMRI) and electrical micro-stimulation with macaques. They mapped four networks of connecting cells within the IT cortex, and three hierarchical stages of object recognition.

¹⁰ Object recognition "underlies many neural processes that operate on objects, including consciousness, attention, visual memory, decision-making and language" (Bao et al 2020 p103). Psychology Miscellany No. 143; February 2021; ISSN: 1754-2200; Kevin Brewer



(Original drawing by Magda Kralovenska)

Figure 7.1 - Approximate position of infero-temporal cortex in side view of left hemisphere.

7.6. REFERENCES

Asaridou, S.S et al (2020) language development and brain reorganisation in a child born without the left hemisphere Cortex 127, 290-312

Bao, P et al (2020) A map of object space in primate infero-temporal cortex Nature 583, 103-108

Hamzelou, J (2020) Teenager excels with half a brain New Scientist 15th February, p10

Schubert, T.M et al (2020) Lack of awareness despite complex visual processing: Evidence from event-related potentials in a case of selective metamorphopsia Proceedings of the National Academy of Sciences, USA 117, 27, 16055-16064

Webb, R (2020) Finding our place in the universe New Scientist 15th February, 34-39

Weiss, T et al (2020) Human olfaction without apparent olfactory bulb Neuron 105, 35-45

8. RESOLUTIONS

Dai et al (2014) used the term "fresh start effect" to describe how individuals choose a temporal milestone, like the New Year, as the start of a change in behaviour. Nearly half of the individuals surveyed in the USA were thinking about having New Year's resolutions (NYRs) for the coming year (and this compared to less than 20% in Sweden, for example) (Oscarsson et al 2020).

There are limited studies on NYRs (Oscarsson et al 2020). Norcross and Vangarelli (1989), for example, followed 200 New Year resolvers, mostly weight loss or smoking cessation. By the end of January, one-quarter had failed, and over half by three months, but about one-fifth of individuals had maintained their NYRs at a two-year follow-up. Individuals who reported "a greater use of stimulus control, greater willpower, and the more consistent use of self-reward achieved greater success rates" (Oscarsson et al 2020 p2).

Oscarsson et al (2020) investigated the factors associated with success in their study, along with the most common resolutions and the success of different types of NYRs. Losing weight had the lowest success rate in previous studies (Oscarsson et al 2020). But, Oscarsson et al (2020) argued that, "questions could be raised regarding the categorisation in previous studies. It is often unclear how many categories have been applied and whether the categories have been formulated a priori or from current data. These issues persist in polls and market-research reports, wherein participants are often asked to make a selection from a set number of options. Alternatively, responses are categorised by the interviewer, who in some cases leaves half of the responses in a 'miscellaneous' category" (p2).

Over 1000 volunteers in Sweden were recruited via social media in December 2016 by Oscarsson et al (2020). The participants were randomly assigned to one of three conditions:

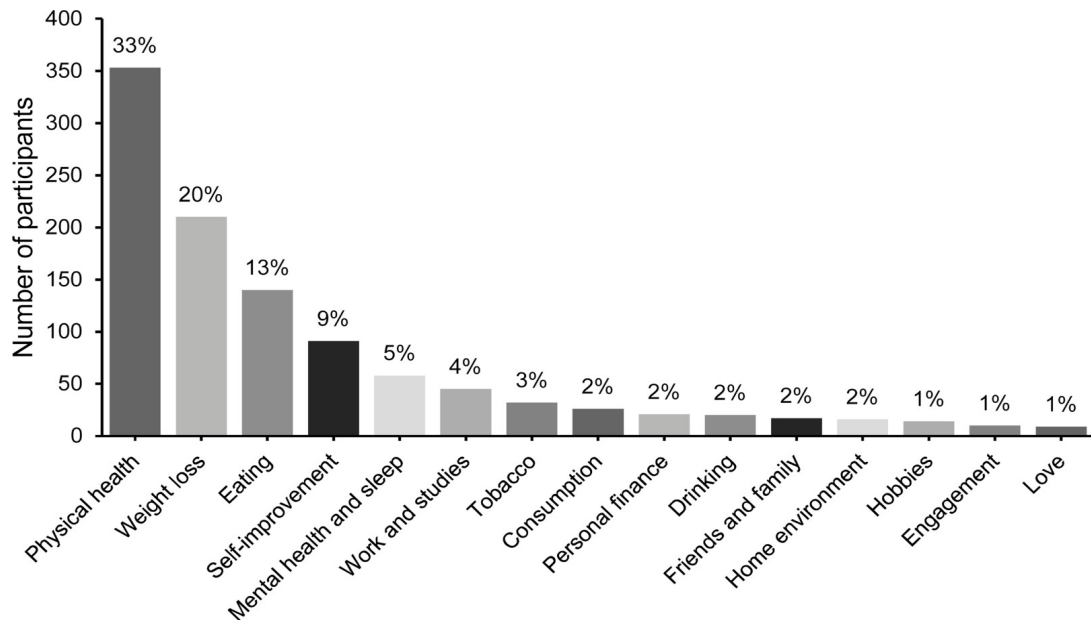
- Group 1 - "no support" (control): Completed survey only and contacted at follow-ups.
- Group 2 - "some support": Told about benefits of social support in achieving goals.
- Group 3 - "extended support": Told about social support, and "about the value of goal-setting that

is specific, measurable, achievable, realistic/relevant, and time-framed" (Oscarsson et al 2020 p4).

The outcome measure was a ten-point self-rating scale, from 0% ("I have fully and completely abandoned my New Year's resolutions") to 100% ("I am sticking to my New Year's resolutions fully and completely according to plan"). Other measures, like self-efficacy, were also taken.

The findings were presented in terms of the three research questions:

i) Most popular resolutions - Concerning physical health, followed by weight loss (figure 8.1).

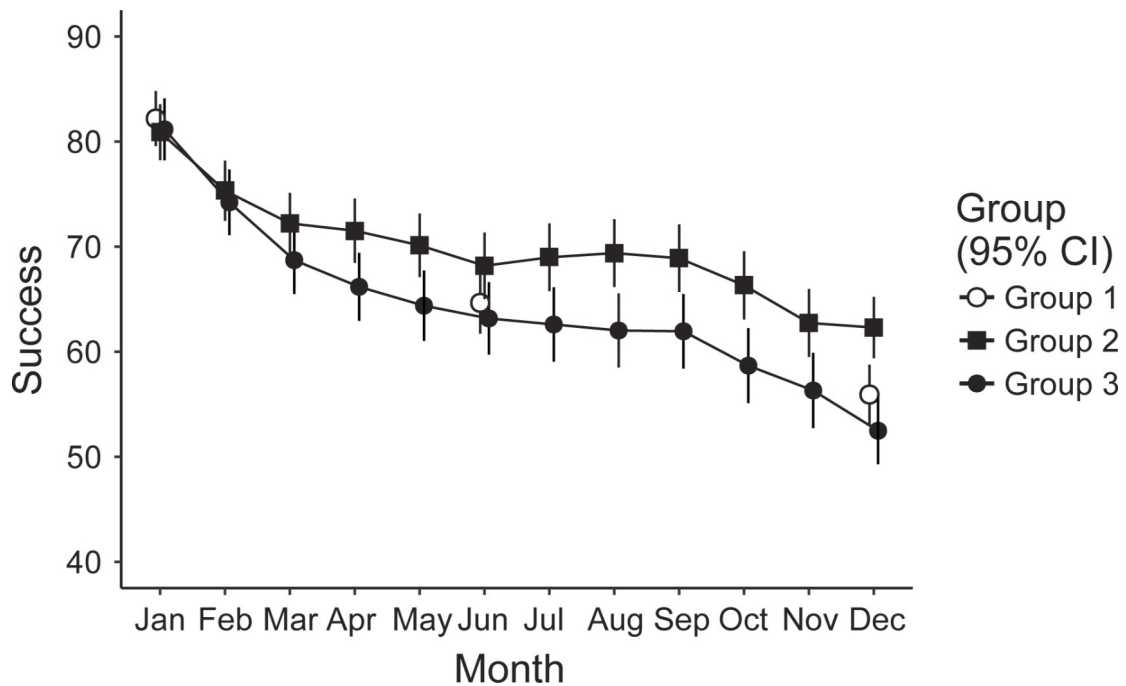


(Source: Oscarsson et al 2020 figure 1)

Figure 8.1 - The popularity of different NYRs (%).

ii) Type of resolution and success - There was no difference.

iii) Three different conditions - Group 2 was the most successful at one year follow-up (figure 8.2).



(Source: Oscarsson et al 2020 figure 2)

Figure 8.2 - Success of maintaining resolutions throughout the year (%).

This was a surprise, and Oscarsson et al (2020) looked for a possible explanation. One possibility was the advice given to Group 3 participants - ie: "how effective goals are specific and time-framed. A specific goal is beneficial because it affords more information about what one is supposed to do to make progress toward one's goal. However, a specific goal also clarifies when one is not doing what one is supposed to do. A participant with a vague resolution (eg: to take better care of one's health) may consider oneself rather successful if he/she has made some changes in that general direction. Conversely, a participant with a specific resolution (eg: to exercise twice a week) might consider oneself unsuccessful if he/she has not fully adhered to that pledge. This possible effect may be reinforced if a goal or resolution has a set deadline, which might lead to questions about whether one is unsuccessful if a resolution has not been met on time" (Oscarsson et al 2020 p10).

This also showed the problem of using a participant self-rating measure of success. The authors continued: "The level of possible objectivity when assessing successful behavior change varies depending on the subject of the aspiration. Successful behavior change for

a person striving to quit smoking or lose weight may be easily measured through the number of cigarettes smoked or body mass index. Success for a person striving to 'take better care of themselves' may, however, be highly subjective, and possibly impossible to measure. In this study, any behavior change among participants was not objectively confirmed" (Oscarsson et al 2020 p11).

In terms of other methodological issues, Oscarsson et al (2020) accepted that "the sample was not random, as a self-sign-up process was used for recruitment. A reasonable assumption is that participants in the current study was, on average, more motivated than those in some of the previous studies" (p10).

Even Group 1 were reasonably successful, and the contact from the researchers at three points in the year could have acted as "some support in maintaining their resolutions" (Oscarsson et al 2020 p10).

REFERENCES

Dai, H et al (2014) The fresh start effect: Temporal landmarks motivate aspirational behaviour Management Science 60, 10, 2563-2582

Norcross, J.C & Vangarelli, D.J (1989) The resolution solution: Longitudinal examination of New Year's change attempts Journal of Substance Abuse 1, 2, 127-134

Oscarsson, M et al (2020) A large-scale experiment on New Year's resolutions: Approach-oriented goals are more successful than avoidance-oriented goals PLoS ONE 15, 12, e0234097 (Freely available at <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0234097>)