CIE Psychology A-level

Psychology and Environment

Notes

Part 1: Stressors in the Environment

- Noise inhibits our concentration, meaning that the consequent lack of productivity makes us feel stressed and inadequate. This is particularly stressful for individuals who work in a hectic environment and have many tasks to fulfil. The prefrontal cortex is especially susceptible to noise and stress. [1]Research has shown that "the auditory orientating response, startle reflex and defensive response translate sound stimuli into action and sometimes into stress inducted bodily changes through 'fight or flight' neural mechanisms".
- Temperature: When our external body temperature is abnormally high, this results in an increase of the internal body temperature. Through homeostatic mechanisms, the hypothalamus detects this increase in temperature and coordinates a response, such as increasing production of sweat by the sweat glands and decreasing respiration rates. Being hot often leaves us frustrated and stressed, whilst being too cold inhibits our concentration.
- Crowding is stressful because such an environment does not respect our personal space. Crowd behaviour often involves members becoming more excitable and stressed as the crowd increases in number. In terms of biological responses, [2]crowding causes an increased concentration of plasma lactate, sharp increases in plasma glucose concentrations (physiological arousal needed to sustain the fight or flight response) and finally significant increases in plasma potassium levels.
- Significant air pollution is particularly troublesome for sufferers of asthma, where their bronchioles may become irritated, resulting in bronchiole constriction and further stress associated with this. [3]Researchers have also suggested that since chronic stress weakens the immune system (due to the attempt of prolonging the fight or flight response), then this makes individuals more susceptible to illnesses associated with high levels of atmospheric pollution.

- It has been suggested that workload and control are the two main factors associated with workplace stress, as depicted by the job demand-control model (Karasek, 1979). According to this model, the degree of control that an individual has over their work is more important than workload in terms of determining stress levels. Therefore, if two individuals have the same workload, if one is less stressed than the other, then this suggests that they have a higher degree of control over their work e.g. greater flexibility etc.

- This was demonstrated by Bosma et al (1997) who found that there was no correlation between stress-related illnesses and workload in a sample of 10,000 Whitehall civil servants, but rather a strong negative correlation between a decreasing degree of control over work and increasing levels of stress/incidence of stress-related diseases. This stood true even when

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[1] Westman JC, Walters JR. Noise and stress: a comprehensive approach. *Environmental Health Perspectives*. 1981;41:291-309.

[2] Heard M, Van Rijn JA, Reina RD, Huveneers C. Impacts of crowding, trawl duration and air exposure on the physiology of stingarees (family: Urolophidae). *Conservation Physiology*. 2014;2(1):cou040. doi:10.1093/conphys/cou040.

[3] Adler T. A Complex Relationship: Psychosocial Stress, Pollution, and Health. *Environmental Health Perspectives*. 2009;117(9):A407.

accounting for lifestyle and personality factors, using a statistical averaging technique. Therefore, this confirms the original prediction made by Karasek's job demand-control model.

- Such a theory can also be demonstrated in a natural setting/experiment, as shown by Johansson et al (1978). These researchers, when studying a Swedish timbre production factory, that the 'finishers' (with little control over their work, high levels of responsibility and undertaking roles which required high levels of skill and concentration, even with repetitive work) had higher levels of adrenaline and noradrenaline in their urine samples, compared to the 'cleaners' working in the same factory (with high control over their work and low levels of responsibility, due to being reliant upon the finishers). The concentrations of these hormones increased throughout the day for the finishers (as shown by consecutive urine samples) in accordance with increasing rates of absences and stress-related illnesses, whilst the opposite was true for the cleaners. Therefore, this again provides further support for Karasek's model and the idea that control is more important than workload as a source of stress.
- Black and Black (2007) used a cross-sectional study (plus a matched control group) and assigned a questionnaire to 26 households located around Sydney airport. The questionnaire covered concerns such as quality of life, noise stress and noise sensitivity. The researchers found that whilst there was no significant difference in terms of hypertension between the two groups, the high noise-exposure group reported lower levels of health, and particularly mental health. Therefore, this supports the idea that chronic noise exposure is associated with chronic noise stress, and this has significant health impacts, particularly on hypertension.
- Criticisms of this study include: ethnocentrism, utility, self-report measures (social desirability bias, memory decay, honesty of respondent), and a lack of control over extraneous and confounding variables [4](making it harder to draw a reliable 'cause and effect' relationship between the two variables or outcomes).
- Environmental stress can be reduced through extending curfew hours (thus reducing congestion within peak hours because airlines have a larger window for flying), building noise insulation barriers around airports (thus reducing the risk of chronic stress and hypertension) and changing runway usage (so that airplanes are flying at a constant rate across the whole day, as opposed to periods of significant congestion).
- The two drugs mainly used to cope with stress are Benzodiazepines (e.g. Xanax) and Beta Blockers (e.g. Propranolol).
- Benzodiazepine molecules attaches to GABA neurotransmitters (an inhibitory neurotransmitter which reduces the likelihood of an action potential being triggered in the postsynaptic neuron) and this combination then binds to GABA-A receptors on the post-synaptic neuron. This triggers the opening of voltage-dependent chloride ion channels in the postsynaptic neuron, causing chloride ions to diffuse into the neuron down a concentration gradient, thus increasing the negative charge inside the neuron and making it more difficult for repolarisation and resting potential to be established. This results in a decreased frequency of nervous impulse transmission within the synapses of the brain, thus reducing the psychological (stress) effects associated with the fight or flight response.
- Beta blockers affect the sympathomedullary pathways in the body, as opposed to exclusively synapses within the brain. Beta blockers bind to beta-adrenergic receptors on the postsynaptic membrane, preventing depolarisation and thus reducing the frequency of nerve impulse along motor neurons to the effector muscles or glands. Thus, through preventing the action of adrenaline and noradrenaline (which would usually bind to these beta-adrenergic receptors), the physiological effects of the fight or flight response are weakened. This results in decreased heart rate, the rectum relaxing, vasodilation and pupil constriction.
- The key difference between these two drug therapies are the area of the body upon which they act (i.e. either the brain or the sympathomeduallary pathways), the neurotransmitters or hormones they affect (i.e. wither GABA or adrenaline/noradrenaline) and whether this causes unconsciousness (as is the case with benzodiazepines due to acting on the brain).

— Drug therapies can only treat the proximal symptoms of stress i.e. anxiety. Therefore, such therapies do not address the main cause of stress (i.e. the distal cause) which is the activation of the fight or flight response. This means that for patients with chronic stress, alternatives may be a more viable option, especially considering the potential 'paradoxical outcomes' associated with

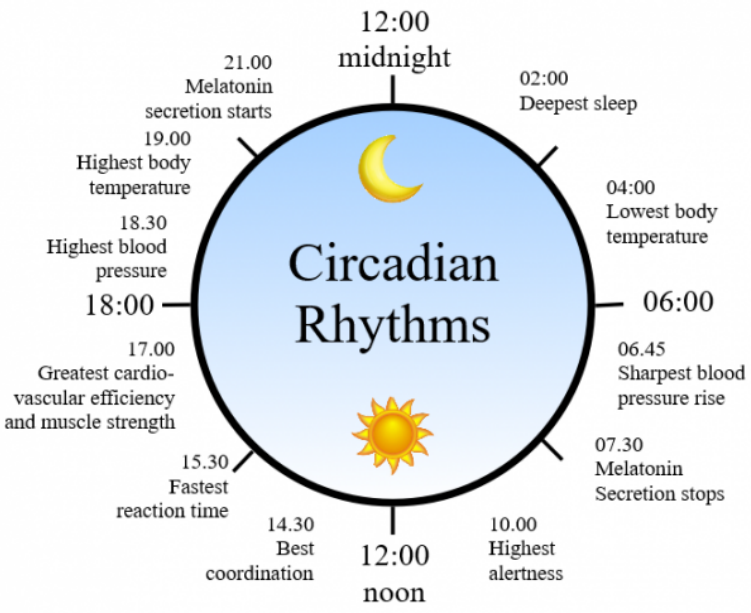
[4] https://www.ocr.org.uk/qualifications/as-a-level-gce-psychology-h167-h567-from-2015/delivery-guide/Images/123-246085-pysch-a-dg-environ-app-1.pdf

the use of drug therapies i.e. where the drugs only aggravate the condition which they are trying to treat.

— A major issue associated with the use of drug therapies is the risk of dependency and side-effects, as suggested by Gaind and Jacoby (1978). For example, weight gain, drowsiness and unconsciousness (specific to the use of benzodiazepines) are all serious issues to consider. Dependency on such drugs can lead to tolerance, whereby the body and synapses, specifically the voltage-dependent calcium ion channels embedded in the postsynaptic membrane, become less responsive to the effects of the drug. Therefore, this may lead to side effects with an increased severity (due to the overuse of drugs) or patients becoming frustrated and stopping treatment altogether. Regardless, side effects and dependency may mean that drug therapies are more suitable for treating short-term stress conditions, as opposed to chronic example.

Part 2: Biological Rhythms

- Biological Rhythms = [5]"Periodic biological fluctuations in an organism that corresponds to, and is in response to, periodic environmental change". These include changes in core bodily temperature, attention (such as a circadian trough at 6 AM) and the sleep-wake cycle. Biological rhythms can be endogenous (controlled by internal clocks e.g. the suprachiasmatic gyrus) or exogenous (controlled by external, environmental factors e.g. exposure to sunlight). The three types of biological rhythms are circadian, infradian and ultradian.
- Exogenous zeitgebers = External changes in the environment which affect or 'entrain' our biological rhythms.
- Circadian Rhythms = A type of biological rhythm which completes one full cycle every 24 hours e.g. the sleep-wake cycle. Like other biological rhythms, it is affected by both endogenous pacemakers and exogenous zeitgebers.
- The main example of an exogenous zeitgeber would be light. Changes in light exposure can trigger desynchronisation of a 'pre-set' sleep-wake cycle.
- This was extensively studied by Siffre (1962), who descended into a cave on July 16th 1962, completely devoid of natural light. He finished his experiment on September 14th, believing it to be August 20th! This demonstrates that prolonged exposure to a strong exogenous zeitgeber such as light, the sleep-wake cycle becomes disrupted and there is a disconnection between psychological time and the clock. His sleep-wake cycle did not conform to a cyclical 24 hour-period, but was around 24 hours and 30 minutes, with Siffre himself determining when to sleep and when to eat. Therefore, this demonstrates that [6]"there was an internal clock independent of the natural terrestrial day/night cycle". This describes a 'free-running' circadian rhythm i.e. one which is not affected by exogenous zeitgebers.
- A second example of a free-running circadian rhythm was demonstrated by Aschoff and Wever (1967). 55 participants were deprived of natural light whilst



[5] `Biological Rhythm', Encyclopaedia Brittanica, Date Published: 14.05.15, Access Date: 07.08.17, https://www.britannica.com/science/biological-rhythm

[6] 'Caveman: An Interview with Michel Siffre' (2008) , J.Foer and M.Siffre, Cabinet, Issue 30: The Underground Summer

spending 4 weeks in an underground bunker. The researchers found that [7]"all subjects showed free-running circadian rhythms, with the average periods of wakefulness and sleep ranging from 23.9 to 50.0 hours. 36 subjects remained internally synchronized during the whole experiment".

- Therefore, these findings demonstrate that although the free-running circadian rhythm is more than 24 hours long, as a society we have specific exogenous zeitgebers which entrain the rhythm to conform to a 24 hour cycle.
- Circadian rhythms may not and do not always have to conform to cyclical 24 hour periods. For example, Dr. Espie, a Professor of sleep medicine at Oxford University, delayed the starting time of Monkseaton High School to 10 AM, instead of the usual 8AM. The researchers noted that [8]"GCSE results went up from 34% of pupils scoring 5 A*-C grades including English and Maths, to 53%. For disadvantaged students, the rates of scoring 5 A*-C grades increased from 12% to 42%". Therefore, this is a real-life example of how the circadian rhythms of teenagers specifically are not always in line with that of adults, and so an appreciate of this can improve educational attainment.
- As demonstrated by Czeisler et al (1999), artificial lighting can create shifts in circadian rhythms by up to 6 hours. Siffre's research was conducted at a time where researchers believed that artificial lighting had no effect on biological rhythms. The use of artificial light meant that over 2 months, Siffre could have entrained his own circadian rhythm through signaling sleeping and waking times by using the light, meaning that the conclusions made about his 'free-running' circadian rhythm may not be entirely accurate.

Part 3: Recycling and Other Conservation Behaviours

- The theory of planned behaviour was proposed by Ajzen, which suggests that behaviour (including recycling) is motivated by the intention to carry it out. These intentions are determined by attitudes, subjective norms and perceived behavioural control. Therefore, norms and attitudes may encompass the negative associations that some may have with people who actively recycle e.g. being 'hippies' or even 'tree-huggers'.
- The Hovland-Yale Model suggests that process of change occurs in a set sequence of stages. This includes attention (noticing the message), comprehension (understanding the message), reactance (acceptance or rejection) and finally, an attitude change.
- Pledges can be made to show commitment, and are particularly used by governments to demonstrate their dedication towards environmental issues as part of their campaigns.
- Using the principles of operant conditioning, recycling behaviours can be encouraged through the use of positive and negative reinforcement. For example, positive reinforcement would include rewarding residents for recycling by offering them a discount at nearby shops, whilst negative reinforcement would involve issuing harsh financial fines for those who fail to regularly recycle. These would be implemented by the council.
- Lord (1994) - Motivating recycling behaviour: A quasiexperimental investigation of message and source strategies. These researchers used observational data and questionnaires from 140 randomly-selected households to test the effectiveness of various source strategies, such as personal and advertising. The researchers found that [9]"although positive appeals yielded most favourable levels of beliefs and attitudes towards recycling, the greatest increase in recycling behaviour came in response to a negatively framed message conveyed by a personal acquaintance".
- Research has demonstrated, as suggested by Festinger (1957) that since people do not always act in line with their expressed beliefs, then an effective strategy would be most effective in increasing recycling and conservation behaviours because this technique involves both behavioural and cognitive strategies.

Part 4: Ergonomics - Human Factors (Cognitive)

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[7] Aschoff, J., Gerecke, U. and Wever, R. (1967), Desynchronization of Human Circadian Rhythms, The Japanese Journal of Physiology, 17 (4), pp.450-457

[8] 'Major study of teenage sleep patterns aims to assess impact on learning', Sally Weale, The Guardian, Published on: 09.10.14, Accessed On: 07.09.17, https://www.theguardian.com/lifestyle/2014/oct/09/study-teenage-sleep-patterns-asses-impact-learning

[9] Lord, K. R. (1994), Motivating recycling behavior: A quasiexperimental investigation of message and source strategies. Psychol. Mark., 11: 341–358.

- Bell et al suggested that there are 4 main aspects involved in environmental overload: we only have a limited capacity for environmental stimuli (as the central executive has a very limited processing capacity of less than half a second, according to the working memory model!), meaning that overload occurs when the rate of incoming stimuli is larger than our information processing rate. The use of attentional filters means that we are pre-disposed to attending to events which are intense or uncontrollable. However, these attentional filters and resources can be weakened through the consequences of continual information processing, leading to cognitive overload.
- Drews and Doig - Evaluation of a configurable vital sign display for intensive care unit nurses: Alarms are used to both monitor and support the cognitive work undertaken by nurses. However, ICU nurses had been noted to have less diagnostic accuracy when using a graphical display, compared to the use of a traditional display. The researchers asked nurses to interpret either numerical data or data using a CVS display, using 42 registered nurses in an independent groups design (half in each condition). The researchers found that nurses who used a CVS display were able to more accurately track the vital signs of patients and also identify trends more quickly. This suggests that nurses' performance can be significantly improved with the use of ergonomically-designed configured sign displays.
- The following [10]article gives useful suggestions about how improving workplace design can improve workplace productivity. The techniques mentioned include having a clear vision/goal, working smarter by analysing work patterns and being aware of when you are most productive, working in a well-lit and well-ventilated area, having support systems in place and also ensuring that private and well as public work can be completed.

Part 5: Psychological Effects of Built Environments

- Traffic, density and noise pollution are all associated with built environments and can have significant impacts on stress, as demonstrated by the Pruitt-Igoe urban renewal project in the 1950s.
- Gifford (2007) demonstrated that the main fears associated with living in high-rise buildings were fear of crime, children and suicide, whilst on average, accounting for other extraneous socioeconomic factors, satisfaction rates of residents were significantly below satisfactory.
- Urban overcrowding can be seen in the examples of traffic jams, homelessness and overcrowded urban areas.

These problems are exclusive to cities, where large groups of people are grouped together. This is not due to abnormally high reproduction rates (where in fact, rural areas have significantly higher fertility rates), but rather because urban areas (and especially those undergoing renewal) attract people from all across the country. Social problems are prominent when the infrastructure designed to uphold such an enormous population fails. Nevertheless, these areas continue to become overcrowded because cities often have numerous jobs, higher education prospects, good healthcare and rich culture.

- Ulrich (1984) - View through a window may influence recovery from surgery: 46 cholecystectomy patients were used, between the ages of 20 and 69. 23 patients had rooms overlooking a natural scene, whilst the other 23 had rooms facing a large brick wall. Daily records were kept for each patient using the same nurses. The researchers found that the first group (natural scenery) spent an average of 1.01 fewer days in the hospital, whilst also experiencing 'better spirits' and an overall better attitude towards recovery. This suggests that in order for hospitals to increase patient recovery rates and decrease the time which patients spend in hospital, it

[10] http://economia.icaew.com/features/august-2015/the-link-between-wellbeing-and-productivity

may be useful to strategically place those most ill in rooms facing natural scenes. This has practical and economical implications for hospitals and national health services. Further efforts can be made to reduce environmental sources of stress, such as noise, pollution, temperature and crowding. [PRACTICAL APPLICATION FOR SPEC].

Part 6: Territory and Personal Space:

- According to Somner (1969), there are 4 zones of personal space: intimate space, personal space, social space and public space, with invisible boundaries separating these different zones. Respect shown towards these boundaries minimises stress and so is likely to increase sales within a retail environment, as demonstrated by Felipe and Somner (1966), who showed that individuals are likely to remove themselves from a social situation if their personal space has been invaded by another.
- Personal space is linked with the concepts of overload, arousal and behavioural constraint. For example, if another person invades our personal space, then we are faced with an overload of information (i.e. the other person's facial features, expression etc), experience more arousal and also question the freedom we have over our own behaviour.
- A [11]recent article has challenged the idea that being territorial at work enhances leadership, pride and commitment, as suggested by Professor Robinson. However, being overly territorial at work may have its drawbacks, such as when trust is high, territorial people are more likely to be judged for their behaviour.
- Wells (2000) - Office clutter or meaningful personal displays: The role of office personalisation in employee and organisational well-being. The model used by the researchers suggested that employee well-being was the consequence of the following sequence of stages: organisational personalisation policy, workplace personalisation, satisfaction with the physical work environment and job satisfaction. This all culminates in organisational well-being. The researchers used two self-report measures (for employees and then for co-ordinators) using 20 companies in Orange Country. The employee survey covered topics such as workplace personalisation, satisfaction with physical work environments, job satisfaction and general well-being. Case studies were used to add particular depth in interesting cases. Out of the 652 eligible replies, the researchers found that women tend to personalise their workspaces more than men, and so benefit from improved well-being. Lenient personalisation policies often result in companies where there is a greater employee satisfaction and a more positive organisational atmosphere, resulting in increased productivity.
- APPLICATION = The general consensus is that employees should be allowed to personalise their work space, particularly if this results in increased employee satisfaction and productivity rates. However, as suggested by Smith (1981), policy changes may need to be made for men who prefer larger territories over the possibility of personalisation. Therefore, hot-decking may be a solution to this, where very little space is wasted. In terms of acknowledging the research into personal space, it would be useful to separate male pairs at a greater distance than female pairs, as suggested by Aiello (1987). This is especially important considering that altruistic behaviour is dependent upon the size of an individual's territory (key to organisational success and a non-disruptive working environment), as suggested by Newman and McCauley (1977).

[11] https://news.ubc.ca/2013/08/21/territorial-behaviour-at-work-can-be-a-mistake/