

Laterality.

In our own environment the difference between top and bottom has been significant, you can't mistake the bottom of a tree for the top. However, the differences between left and right are less obvious.

While there is a large pressure in the environment to be symmetrical the human species is atypically asymmetrical in its behavior.

In terms of brain behavior we are also asymmetrical.

Definitions.

Inferences are then made as to behavior from artefacts that hominids have left behind.

This can be done through analogy, looking at primitive tribes that are in existence in modern day, such as certain tribes in New Guinea who are stone-age in their development. For instance looking at how they make tools, inferences can then be made as to how hominids made their own tools back in prehistoric times.

Another way would be to get someone to try and make the tool that has been found and making inferences from that.

Looking at hominid evolution, people are finding new species of hominids as new discoveries are made.

Investigations were made to see what Australopithecus Africanism's brain was doing at this time using endocasts; which is taking rubber casts of the inside of the skull to see what asymmetry's, particularly with the frontal and posterior patalia. The patalia are particular bones in the skull which stand out more than others and look like petals of sorts. In Homo sapiens the right frontal patalia is slightly more extended and the left occipital patalia sticks further out.

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Holloway compared the patalia of Australopithecus, Homo erectus, homosapien and chimpanzees. In chimpanzees only 24% of them showed this particular patalia pattern; 66% of the found Australopithecus skulls were patterned in this way; Homo erectus all showed this pattern as did Homo sapiens. This showed that

Elizabeth looked at children who suffered a unilateral lesion as well as children who had no such damage and compared them to adults with either a unilateral lesion or were normal.

She had the subjects come in for an interview, which was very structured and noted down the errors they made throughout the interview. It was found that the children with lesions made slightly more errors compared to the children without lesions; however, there was no difference between children who had left-sided lesions or children who had right-sided lesions.

The adults show a greater difference; where the adults with the left-sided lesions, the side responsible for language made a lot more errors; whereas the adults with the right-sided lesion made fewer errors. This indicates that when it comes to adults, damage to the left

Kamura hypothesised that because the left sided sound has to cross through the corpus colossum, there is decay and delay in the signal being processed. Consequently it would then be easier to give the sound presented to the right ear than the left.

This is actually what adults generally show (roughly 80%).

Enters then conducted an experiment with infants where he reinforced behaviour by producing interesting noises.

The behaviour was sucking. This is similar to a rat pressing a bar for food or a pigeon pecking to receive food, it is the food-getting instinct.

2 different types of sounds were presented to the infants, speech and music.

Whereas for the controls there does not appear to be a relationship.

This may indicate that there may have been a developmental issue that arose, affecting the growth of the left temporal plenum, so there are the associated performance deficits.

There are Problems with this study though as the dyslexics have smaller brains overall so the comparison may not be valid. Finally there is an issue regarding how the perception of speech has anything to do with dyslexia as it is predominantly about writing.

Stuttering is defined as speech that is not fluent, due either to verbal or non-verbal repetitions of syllables.

This can occur due to verbal production centres being dominant on both sides of the brain rather than being on one side.

A study by Jones used sodium barbitol to essentially anaesthetise part of the brain in order to identify which part of the brain was their language centre.

They found that out of 5 people who were stutterers, 4 of them were bi-lateral for their language production.

They also found that when one side of the brain was anaesthetised that stuttering ceased.

The amygdala is also affected, which is also important for emotional expression and finally the hippocampus which is particularly important for memory.

A lot of studies into schizophrenia have simply looked at handedness and schizophrenia.

Dragovich and Hammond proposed to ask through a meta-analysis of other studies, whether there was a higher percentage of schizophrenics who are mixed handed or is there a higher preference for sinistrality?

In the meta-analysis, it showed that there were more sinistral in the schizophrenia group than the control group.

They went onto do a further study and found that a higher proportion of sinistral were likely to graduate compared to dextral.

However these studies have a poor definition of handedness and no control group.

A subsequent study by wood and angleton found that roughly 10% were left handed which is the norm.

A subsequent study removed any idea that response bias was the cause of their results.

Intellectual ability and handedness.

There are beliefs that sinistral have increased cognitive ability or are gifted.

Nichols found in general that sinistral have reduced cognitive ability.

In a longitudinal study, left and mixed handed children performed worse in general than dextral.

Lecture 7

Circadian rhythms.

Circadian rhythms are our 24 hour rhythm, our physiological state of awareness and behaviours that take part on a 24-hour basis.

Delayed sleep wake phase disorder is a more severe type of sleep onset insomnia.

Advanced sleep wake phase disorder where they fall asleep about 6 or 7 pm in the evening and waking at 2 or 3 am in the morning.

Jet lag can also have this sort of effect. The best thing to do is to go out in the sunlight as this helps the most to re-synchronise the body and the SCN.

Season Affective disorder.

This is where during Autumn, people begin to suffer depression.

The best treatment for this type of disorder is morning bright light.

There is a lot of s.a.d particularly in the northern hemisphere where there is not much sun at all during the winter months.

Delayed sleep/wake phase disorder is the most common sleep phase disorder.

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This is where the person is delayed up to 3 hours in their circadian rhythm.

This is particularly prevalent in adolescence and usually shows up as the individual having problems getting to school on time.

Presentation of bright light before core body temperature minimum has been found to delay the body clock. Presenting the bright light after core body temperature minimum has the effect of pushing the body clock back. This effectively means that people with DSPD can be treated with bright light therapy.

Drew dawson showed that a four hour pulse of 10000 lux. This was then used to treat people and test whether their body clock has changed through the application of the light. For those with DSPD with late morning wakeup, the light would need to be presented early in the morning to delay the body clock. For those with early DSPD, they would need to be presented in the evening to delay their sleep phase.

Another treatment is the administration of melatonin.

The last measuring tool is the mg or the electromyogram which measures movement in muscles.

The different stages of awareness.

Awake.

The person is consciously aware of the external environment. This means you are subjectively aware of it and are able to respond to cues in the environment.

Memory consolidation works while you are awake, but it does not work while a person is asleep.

During this time a person will naturally produce alpha waves that are picked up by the EEG.

They range from $\frac{1}{2}$ Hz to 3 Hz

Stage 3 is characterised by delta waves being present 20 to 30 % of the time.

When a person reaches 50% delta waves that is then classified as stage 4.

At this point the neurons below the skin which the EEG is measuring from become synchronised in their positive and negative amplitude output.

This is an indication that the brain is no longer processing or doing any work.

The last stage of sleep is rapid eye movement sleep or paradoxical sleep.

The EEG activity is that of stage 1 sleep as if the person was alert and awake.

You are behaviourally asleep but your brain is awake.

Cortical blood flow only drops off roughly 10% during sleep.

Blood flow is actually higher in rem sleep than in quiet wakefulness.

There is a theory that people will remember dreams if they are more interested in them and are more reflective in the morning. However, if they are concentrating on what they are going to do in the day, then the memory of the dream may be swamped by what the person is paying attention to.

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Dreams are usually temporally accurate.

Sleep tends to get lighter with age and the number of awakenings increase.

Lecture 11 Napping.

However napping has been shown to have a great effect in reducing excessive day time sleepiness.

Napping can affect the homeostatic process: the process also known as process s which is what makes us gradually sleepier and sleepier during the day as we approach our sleep time.

Therefore naps need to be long enough to affect this homeostatic process and reduce sleepiness.

However this is difficult to estimate in individuals.

Sleep inertia or Process w ; this is where we feel sleepy or groggy just after waking from sleep.

This is also dependent on the amount of slow wave sleep gained in the sleep period just prior.

Sleep deprivation can also lead to depressed mood and more psychological issues.

The more sleep deprivation suicidal ideation can occur.

As of yet there is no definitive answer as to how much sleep an adolescent needs.

DSPD d prevalence is around 7-16%

Lecture 13.

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Behavioural Genetics

Human characteristics are highly variable.

Selective breeding is where humans have taken advantage of a certain genetic phenotype, particularly in agriculture and animal husbandry.

Not only have humans bred for size and colour but also temperament in animals.

Galton was the first person to use Darwinian principles in psychology.

He also designed the first behavioural genetic study.

The study he looked at success in men and decided that success was heritable.

This was also the first time that a researcher showed that behaviour has a normal distribution.

The more genes that are involved in a certain effect the smaller effect size there is.

A.C.E method is additive genetics and common environment.

Little to no shared environment is seen in most traits.

Lecture 15.

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DNA comprises of 4 base sugar phosphate molecules adenine, guanine, thiamine and cytosine.

A always matches with T and G always matches with C.

The DNA strand runs anti parallel, which forms the double helix.

There are 3 billion nucleotides in the genome.

A D.N.A strand is 5 microns in length but is super-coiled.

A chromosome is only a chromosome during mitosis; otherwise it is wrapped up into what is known as a chromatid.

Each chromosome has a centromere with a P arm which is the shorter arm and a Q arm which is the longer arm.

Each DNA strand is made up of a combination of both parents.

There are 2 laws that Mendell proposed the law of segregation and the law of independent assortment.

The first law states that there are 2 pairs of chromosomes 2 from the mother and 2 from the father.

There are germ line mutations, which are mutations that you inherit.

then there are denovo mutations which are new mutations specific to you. These occur after fertilisation.

Then there are somatic mutations which are important in cancer and they happen in a particular cell.

Polymorphism has a more than 1% frequency in the population, while a variant has less than 1%

Denovo can be inherited while somatic cannot be inherited.

S.N.I.P.S or single nucleotide polymorphisms are single base pairs that have been changed

There are 3 types of snips.

Silent types where there is no discernible change in the phenotype

There is a miss-sense snip which does change amino acids which can change expression.

Then there is a non-sense snip which causes a premature stop in the protein which then shortens the function and is the most destructive.

Repeats are where alleles repeat this can be twice or more, depending on the number of alleles are repeated and this differs from snips which is just 1 pair.

Then there are copy number variants which are quite a bit larger segments of DNA that is repeated or deleted.

Then there is a positional variant which is where a gene sequence can be flipped or transplanted to another segment of DNA.

This looks at snips only and using an algorithmic program, imputes what should then be there normally.

This is hypothesis free as it turns out that candidate studies are not effective for psychiatric conditions other than Alzheimer's.

Another advantage is it has great coverage and those which are not covered can be imputed.

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However there are limitations, such as multiple testings.

Currently schizophrenia has over 108 loci of genes that are affected which puts it up with other complex physiological disorders.

The effects of each gene are actually additive to the prevalence of the disorder.

75% of the genes were actually protein coding genes and many of the genes were candidates that had been looked at individually before.

Because there was such rigorous controls put in place, a genetic risk score was all that could be used.

However someone came up with a polygenic risk score which looked at the genes that were at risk and then looked at the predictive value of these genes in an independent sample. However as of this moment this only counts for 18 to 23% of the genetic variance of a disorder which is 70 to 80% heritable.

Stress is an environmental factor that can affect methylation as it is a dynamic process occurring within the cell environment.

So epigenetic marks could become biomarkers and targets for treatment in the future for psychological disorders.

Early life stress and genes have been associated with adult depression.

40% of mental health disorders have an early childhood stress component.

23% of depression cases have been associated with early childhood stress.

individuals who have experienced childhood maltreatment.

Further this methylation has also been associated with trauma associated changes in the brain.

The methylation of the serotonin transporter gene has been found in sufferers of depression and these have actually been in those who carry the 1 allele and supposedly have protection from this.

Genome wide studies have shown reduced methylation of the 5-HTT promoter and so expression of this gene.

But all of these studies have had very small sample sizes and have not had much in the way of replication.