Chapter 4 Physiological psychology

Maguire et al.

Section A questions

1. (a) Explain why Maguire et al. used taxi drivers in their study. [2]
   (b) Identify two criteria used to select the taxi-drivers as participants in this study. [2]

2. (a) Describe one finding from this study. [2]
   (b) Suggest how the findings from this study might be used. [2]

3. Outline two major ideas of the physiological approach to psychology that are in the study by Maguire et al. [4]

4. (a) Outline one control that was used in the study on brain scanning by Maguire et al. [2]
   (b) Explain why it was important to use this control. [2]

5. In the study by Maguire et al.: (a) Describe one method used to analyse the brain scans. [2]
   (b) Describe one result obtained using this method. [2]

6. Maguire et al. found a positive correlation in their study of taxi drivers’ brains. (a) Explain the term ‘positive correlation’, using examples from this study. [2]
   (b) State one conclusion that can be drawn from this result. [2]

7. In the study by Maguire et al., the taxi drivers and control participants were matched. (a) Explain how the participants were matched. [2]
   (b) Explain why it was important to match the two groups of participants. [2]

8. In the study by Maguire et al. (a) Identify one independent variable (IV) and one dependent variable (DV). [2]
   (b) Describe the effect of one of the IVs on the DV. [2]

9. In the study by Maguire et al. describe the participants involved in the study. [4]

10. In the study by Maguire et al. (a) Identify two techniques used to analyse the size of the participants’ hippocampus. [2]
    (b) Outline one difference that was found between the taxi drivers and control participants. [2]

Section B questions

(a) Answer the following question with reference to the Maguire et al. study:

(b) Outline the aim of this study. [2]

(c) Explain why this study can be considered a snapshot study. [4]

(d) With reference to this study, suggest one strength and one weakness of conducting snapshot studies. [6]

(e) Describe the procedure followed this study. [8]

(f) Suggest how the procedure followed in this study could be improved. [8]

(g) Outline the implications of the procedural changes you have suggested for this study. [8]

Section C questions

(a) Outline one assumption of the physiological approach. [2]

(b) Describe how the physiological approach could explain memory. [4]

(c) Describe one similarity and one difference between the Maguire et al. study and any other core studies that take the physiological approach. [6]

(d) Discuss strengths and weaknesses of the physiological approach using examples from any core studies that take this approach. [12]

Section A questions

1. (a) They used taxi drivers because of their extensive training required in order to acquire The Knowledge to become a licensed London cab driver. The training is usually very intense over a period of two years and then in their jobs they need to use their navigational skills at all times. It is unlikely that any other identifiable group would have undergone such intense navigational experience like this.
   (b) One criterion was age: they had to be between 32 and 62. Another criterion was mental health: they had to be healthy previously.

2. (a) One finding from this study was that the posterior hippocampus was larger for the taxi drivers than for the controls.
   (b) They can be used to help understand and help people who have suffered from brain damage. It suggests that it is possible for the brain to alter and change in response to experience which means that it is possible for stroke victims to improve given appropriate stimulation.

3. One major idea of the biological approach is that the brain reflects our experience and our behaviour. This is shown by this study as the hippocampal volume seems to reflect the experience of navigation in the two groups (taxi drivers versus controls) and the right posterior hippocampal volume correlated positively with number of years of driving. Another idea of the biological approach is that we are a complex biological machine, with many parts which are highly specialised in function. This is shown in this study, as it does not just look at ‘the brain’, or even at how one structure of the brain has a particular function. In fact, this shows that even just one structure – the hippocampus – does not have a single, uniform function or purpose. The right and left body, anterior and posterior all showed differing results, suggesting that the different parts of the hippocampus have a different purpose. This supports the biological idea that we are highly complex machines.

4. (a) One control was that the control group were matched for age. Overall the profile of the control group had the same mean age (44) and the same range (age 32–62).
   (b) It was important to have this control so that any differences between the taxi drivers’ hippocampal volume and that of the controls could not be explained by age differences and only by taxi driving.

5. (a) One common technique of brain scanning is MRI – magnetic resonance imaging. This technique essentially takes images of the brain and brain structures by making the atoms in the brain ‘spin’ by exposing the person to a massive magnetic force. Also, the machine gives out radio waves. A detector in the MRI machine reads the radio signals from the cells in the brain as the magnet is switched on and off and this is converted into images of the brain.
   (b) There were two brain regions with significantly increased grey matter; the right and left hippocampi.

6. (a) A positive correlation is when, usually in the same people, two measurements are taken, and that as one increases, so does the other. Maguire et al., found that as the number of years of taxi driving increased, so did the posterior hippocampal volume.
VBM stands for voxel-based morphometry which identifies differences in the density of grey matter in different parts of the brain; grey matter is linked with higher order cognitive functions. In Maguire’s study, evidence suggests that the hippocampus plays a special role in memory related to navigational tasks. The physiological approach would also suggest that a great deal of use of a particular cognitive function such as memory could cause structural changes in the brain.

(c) One similarity with Dement and Kleitman is that both studies monitor the brain. Maguire et al. use an MRI scan, while Dement and Kleitman use an EEG. Both studies use these techniques because both are interested in the relationship of the brain with psychological phenomena – Dement and Kleitman are interested in linking the biological event or REM with the psychological event of dreaming; Maguire et al. are interested in linking the biological structure of the brain (size of hippocampus) with the psychological activity of navigation.

(d) The experimental group and the control group had structural MRI scans which were then analysed using voxel-based morphometry (VBM) and pixel counting. In the VBM, differences in density of grey matter in different parts of the brain were analysed. In the pixel-counting procedure, hippocampal volume was calculated using a counting method of single points on the MRI scan images. 26 ‘slices’ of the brain were analysed at once without having to wait for changes to take place in the brains of the taxi drivers.

(e) One change in this study could be to have women participants. These would be in both the taxi driver sample and the control sample. As in the original study, they would be matched for age.

(f) It is difficult to say whether the first change would alter the results. Often, people claim (and some research has backed this up) that women are less good at navigation and mental maps than men and it is possible that conducting MRIs in this way may discover that the female taxi drivers do not have such a markedly different posterior hippocampal volume as the male taxi drivers; and that this might bring down the overall significance of the results. However, it might also be possible that female brains have slightly different areas of specialization and it might be that a different part of the brain shows changes according to years of taxi driving. Certainly, this would be an interesting change to the study and would tell us about female brains and navigation, which the original study does not.

Section C questions

(a) One assumption of the biological approach in psychology is that such of human behaviour is governed and can be explained by biology, e.g. hormones, neurotransmitters, brain structure and so on. This means we probably have less control and free will than we would like to think.

(b) The physiological approach could explain memory by arguing that particular structures in the brain are related to specific cognitive functions. In Maguire’s study, evidence suggests that the hippocampus plays a special role in memory related to navigational tasks. The physiological approach would also suggest that a great deal of use of a particular cognitive function such as memory could cause structural changes in the brain.

(c) One similarity with Dement and Kleitman is that both studies monitor the brain. Maguire et al. use an MRI scan, while Dement and Kleitman use an EEG. Both studies use these techniques because both are interested in the relationship of the brain with psychological phenomena – Dement and Kleitman are interested in linking the biological event or REM with the psychological event of dreaming; Maguire et al. are interested in linking the biological structure of the brain (size of hippocampus) with the psychological activity of navigation.

(d) One strength of the biological approach is that it is scientific. It probably represents the most scientific end of psychology. This means that it is objective, usually empirically based and widely respected. For example, in Maguire et al. the procedures use advanced technological processes and equipment and the procedures were highly controlled, with the same VBM, pixel-counting techniques and single-blind technique, so observers did not know whose scans they were analysing. Because all these aspects of the procedure increase the validity and objectivity of the research, it is widely accepted and respected.

Another strength of the biological approach is that it generally produces useful contributions to psychology – both in terms of applications and in terms of usefulness for helping further research in the area. For example, Kleitman’s work on the physiological/biological aspects of sleep and dreaming means that he is often described as ‘the father of modern sleep research’ – linking REM and dreaming has meant that the research provided a tool (both for other research and
for diagnosing people with sleep disorders) for investigating sleep. This really has changed the way that we think about sleep, work with sleep disorders, and how sleep is researched.

One weakness of the biological approach is that it can be reductionist – only looking at simple explanations. For example, in Dement and Kleitman, they are not interested in the psychological motivations for particular dreams, why people dream particular things and what they might mean. So whereas Freud would be interested in interpreting the content of the dream in terms of fears and wishes, the biological approach completely ignores this. Therefore, it could be said that it is reductionist as it only looks at the simple explanations and ignores more complex psychological explanations. Dreaming is probably a fusion of physiological activity and ‘subconscious’ activity.

Another weakness of the physiological approach is that it overlooks nurture and over-emphasises nature. For example, the implication of Dement and Kleitman’s study is that dreaming is hard-wired into humans as a result of the genetically determined physiological activity of REM and sleep stages. On the other hand, Maguire et al. avoid this by using the physiological approach to investigate how experience (nurture) can actually cause physical changes in the brain, thus showing that weaknesses of the approach as a whole is not necessarily true of all research within that approach if new and interesting directions are taken by researchers.
### Section A questions

1. Dement and Kleitman’s study on sleep linked REM activity to dreaming. **Describe two pieces of evidence that supported this link.** [4]

2. In the study of sleep by Dement and Kleitman there was some evidence that dreams also occurred in NREM sleep. **(a) Explain how they collected this evidence.** [2] **(b) How did they explain the dreams being reported in NREM sleep?** [2]

3. Dement and Kleitman used an electroencephalogram (EEG) to record sleep activity. **(a) Explain what the EEG shows.** [2] **(b) Describe one limitation of using an EEG to investigate dreaming.** [2]

4. **(a) Identify two of the controls used by Dement and Kleitman in their study of sleep and dreaming.** [2] **(b) Outline why controls are used in psychological research.** [2]

5. In the study of sleep by Dement and Kleitman, participants were told to abstain from two substances on the day of the experiment. **(a) Identify these two substances.** [2] **(b) Outline one problem with this instruction.** [2]

6. **(a) Identify one of the hypotheses of the Dement and Kleitman’s study on sleep and dreaming.** [2] **(b) Outline the results of the study in relation to this aim.** [2]

7. With reference to the study by Dement and Kleitman, **(a) Outline one piece of evidence that shows that REM sleep is linked to dreaming.** [2] **(b) Outline one piece of evidence challenges this relationship.** [2]

8. Dement and Kleitman investigated aspects of dreaming. **(a) Explain one method they used to measure the duration of a person’s dream.** [2] **(b) Explain how the reliability of this method could be determined.** [2]

9. In the study by Dement and Kleitman, describe the methods that were used to control extraneous variables. [4]

### Section B questions

Answer the following questions with reference to the Dement and Kleitman study:

(a) Briefly outline the research method used in this study. [2]

(b) Describe two examples of quantitative data recorded in this study. [4]

(c) With reference to this study, suggest one strength and one weakness of quantitative data. [6]

(d) Describe the procedures of this study. [8]

(e) Suggest how this study could be improved. [8]

(f) Outline the implications of the improvements you have suggested for this study. [8]

### Section C questions

(a) Outline one assumption of the physiological approach. [2]

(b) Describe how the physiological approach could explain dreaming. [4]

(c) Describe one similarity and one difference between the Dement and Kleitman study and any other core studies that take the physiological approach. [6]

(d) Discuss strengths and weaknesses of the physiological approach using examples from any core studies that take this approach. [12]
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Section B questions
(a) The research method used was a lab experiment with self-report techniques. It could be said to be a quasi-experiment because the participants were already in either REM or NREM sleep.

(b) Quantitative data was the number of times a participant said they had been dreaming, and the number of times a participant said they hadn’t been dreaming. [Also correct are their time estimation of the dream, and the number of words they used to describe the dream.]

(c) One strength is that it is easier to analyse numbers, e.g., drawing a bar chart to compare dreams reported in REM and NREM sleep, and the number of words taken to describe the dream could be correlated with the number of minutes in REM.

(d) Participants were asked to come to the lab just before their usual bedtime, having abstained from coffee or alcohol on the day of the study. Electrodes were attached around their eyes to measure electrical activity and therefore eye movement, and to their scalp to measure brain waves via EEG. The participants went to sleep in a darkened room. At various times in the night participants were woken by a bell by their bed. They were awoken to a random pattern either during REM or during other sleep stages. They were woken on average 5.7 times per night. They had to say into the tape recorder if they had been dreaming or not, and if so how long they had been dreaming for and what about. The participant could then go back to sleep.

(e) One change to the study is that it could be conducted on a larger sample of participants. Instead of just nine participants, they could widen it to, e.g. 20 or even 50 participants, and study each participant for two or three nights. Another change to the study could be that they conduct it in the participant’s home instead of in a laboratory.

(f) In terms of the overall results, they would probably find that there was still a strong relationship between REM and dreaming. However, they might uncover more individual differences in terms of the pattern of the different stages of the sleep stages, duration of REM, and ability to recall a dream. However, having a larger (and therefore, likely to be more representative) sample should mean that the results can more validly be applied to the general population.

This should mean that the participant should sleep more naturally as they would be in their own bed and normal sleeping environment (normal smells, bed linen, background noise and so on). Overall, this might change the pattern of sleep and depth of sleep – people might sleep more deeply if they are more relaxed at home), but it probably would not affect the overall finding that there is a relationship between REM and dreaming.

Section C questions
(a) One assumption of the biological approach in psychology is that much of human behaviour is governed and can be explained by biology, e.g. hormones, genes, neurotransmitters, brain structure and so on. This means we probably have less control and free will than we would like to think.

(b) The physiological approach could explain dreaming by focusing on the different stages of sleep and the brain wave patterns of each. REM sleep seems to be linked with dreaming, and REM sleep is governed by physiological processes associated with electrical activity in the brain.

(c) One similarity is with Maguire et al., where both studies monitor the brain. Maguire et al. use an MRI scan, while Dement and Kleitman use an EEG. Both studies use these techniques because both are interested in the relationship of the brain with psychological phenomena – Dement and Kleitman are interested in linking the biological event or REM with the psychological event of dreaming; Maguire et al. are interested in linking the biological structure of the brain (size of hippocampus) with the psychological activity of navigation. One difference between the two studies is that Dement and Kleitman’s study is monitoring ongoing, ‘live’ changes in brain activity. The EEG shows differing levels of activity in the brain as it is really happening, second by second, (akin to ‘live TV’). By contrast, the MRI scans used in Maguire et al. just show a one-off image of the brain, fixed at a particular point in time (akin to a photograph).

(d) One strength of the biological approach is that it is scientific. It probably represents the most scientific end of psychology. This means that it is objective, usually empirically based and widely respected. For example, in Maguire et al., the procedures use advanced technological processes and equipment and the procedures were highly controlled – the same VBM and pixel-counting techniques, single-blind technique so observers did not know whose scans they were analysing and so on. Because all these aspects of the procedure increase the validity and objectivity of the research, it is widely accepted and respected.

Another strength of the biological approach is that it generally produces useful contributions to psychology – both in terms of applications and in terms of usefulness for helping further research in the area. For example, Kleitman’s work on the physiological/biological aspects of sleep and dreaming means that he is often described as ‘the father of modern sleep research’ – linking REM and dreaming has meant that the research provided a tool (both for other research and for diagnosing people with sleep disorders) for investigating sleep. This really has changed the way that we think about sleep, work with sleep disorders, and how sleep is researched.

One weakness of the biological approach is that it can be reductionist – only looking at simple explanations. For example, Dement and Kleitman are not interested in the psychological motivations for particular dreams, why people dream particular things and what they might mean. So, whereas Freud was interested in interpreting the content of the dream in terms of fears and wishes, the biological approach completely ignores this. Therefore, it could be said that it is reductionist as it only looks at the simple explanations and ignores more complex psychological explanations. Dreaming is probably a fusion of physiological activity and ‘subconscious’ activity.

Another weakness of the physiological approach is that it overlooks nurture and over-emphasises nature. For example, the implication of Dement and Kleitman’s study is that dreaming is hard-wired into humans as a result of the genetically determined physiological activity of REM and sleep stages. On the other hand, Maguire et al. avoid this by using the physiological approach to investigate how experience (nurture) can actually cause physical changes in the brain, thus showing that weaknesses of the approach as a whole is not necessarily true of all research within that approach if new and interesting directions are taken by researchers.
Section A questions

1 Sperry studied the abilities of split-brain patients.
   (a) Describe one difference between the ability of split-brain patients and
       ‘normal’ people to identify objects by touch alone. [2]
   (b) Give one explanation for this difference. [2]

2 (a) From the study by Sperry, explain why the split-brain operation was
     carried out on the patients in the study. [2]
   (b) Outline the major function of the corpus callosum. [2]

3 The results of Sperry’s study of split-brain patients suggest that we
   effectively have two minds. Outline two pieces of evidence from the study
   that show this. [4]

4 (a) Describe the technique that Sperry used to present information to
     only one side of the brain? [2]
   (b) Explain why ‘normal’ people do not have any difficulty with the
       technique used to test the split-brain patients. [2]

5 From the paper by Sperry on split-brain patients, outline evidence which
   indicates that language is processed in the left hemisphere of the brain. [4]

6 (a) In Sperry’s study, describe one problem with generalising from the
     sample. [2]
   (b) Explain what is meant by the term ‘left visual field’ as used in the
       paper by Sperry. [2]

7 In Sperry’s study of split-brain patients,
   (a) Explain what is meant by ‘hemispheric deconnection’. [2]
   (b) Outline two psychological effects of hemispheric deconnection. [2]

8 In Sperry’s study, split-brain patients were found to have difficulties on
   some tasks.
   (a) Describe one conclusion that can be drawn from the observations
       of their behaviour. [2]
   (b) Explain why patients do not experience these difficulties in everyday
       life. [2]

9 With reference to Sperry’s study, explain why split-brain patients:
   (a) Could not describe in speech material presented to their left visual
       field. [2]
   (b) Could describe an object that they held in their right hand. [2]

10 With reference to Sperry’s study, outline tasks that are controlled by the
    right hemisphere. [4]

Section B questions

Answer the following question with reference to the Sperry study:

(a) Briefly outline the previous research or event which was the stimulus for this study. [2]

(b) Describe the sample used in this study and suggest one strength of using this sample. [6]

(c) Give two strengths of the self-report method as used in this study. [6]

(d) Give two weaknesses of the self-report method as used in this study. [6]

(e) Outline the results of this study. [6]

(f) Describe and evaluate changes that could be made to the way this study was conducted. [10]

Section C questions

(a) Outline one assumption of the physiological approach. [2]

(b) Describe how the physiological approach could explain the way the brain controls
    behaviour. [4]

(c) Describe one similarity and one difference between the Sperry study and any core
    studies that take the physiological approach. [6]

(d) Discuss strengths and weaknesses of the physiological approach using examples from
    any core studies that take this approach. [12]

Section A questions

1 (a) If a split-brain patient touched an object with their left hand they couldn’t say what it was, though a normal
    person could do this.

   (b) This is because information from the left hand goes to the right hemisphere which, in the split-brain patient,
       has no connection to the left hemisphere where speech originates.

2 (a) The operation was carried out as a treatment for
       epilepsy. The patients had all experienced serious and debilitating
       epilepsy and it was hoped that this operation would significantly reduce
       seizures and bring about an improvement in their ability to lead normal
       lives.

   (b) The corpus callosum serves as a communication bridge between the left and right hemispheres so that
       information can be communicated from one side to the other.

3 One piece of evidence is from the $/$ study. In this study the person could draw the dollar sign with their left hand but could
   not say what they had drawn – the dollar was flashed to the left visual field which is perceived by the right hemisphere. The
   right hemisphere is the silent hemisphere and controls the left hand. Another example is that Sperry placed two objects, one
   in each hand, and then asked participants to find the objects from in a pile of objects; each hand could find its own object,
   but ignored the other hand’s objects. Sperry said, ‘It is like two separate individuals working over a collection of test items
   with no cooperation between them’, i.e. like two minds acting separately in one body.

4 (a) One technique was using touch tests. Sperry would put an object into one hand only of a split-brain patient
    (behind a screen so that the patient could not see it). If an object is put in the right hand, the feel of this object is
    processed by the right hemisphere only; and if an object is put in the left hand it is processed by the right
    hemisphere only.

   (b) They do not have a problem because the hemispheres can communicate. If something is put into a normal
    person’s left hand, the information is relayed to the right hemisphere which can work out from feeling the object
    what it might be. The right hemisphere can communicate with the left hemisphere via the corpus callosum, so that
    then the person can say the name of the object out loud.

5 One piece of evidence supporting the idea that language is produced in the left hemisphere comes from the visual tests. When
   participants are shown an image in the left visual field it is processed by the right hemisphere. Here, when
   asked what they could see, split-brain patients generally said ‘nothing’. This is because the ‘talking hemisphere’, the left
   hemisphere, had indeed seen nothing. But when an image is presented to the right visual field (left hemisphere) the
   split-brain patient can readily say what it has seen which shows that language abilities are in the left hemisphere. Another
   piece of evidence comes from the stereognostic
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MODEL ANSWERS TO THE EXAM-SYLe QUESTIONS IN THE BOOK

Section B questions

(a) The aim of the study was to see whether split-brain patients (people who had had their corpus callosum cut) showed any problems or deficit as a result of this operation. Previous research suggested there were no important behaviour effects in everyday life in humans but effects had been observed in animals. Sperry wanted to investigate the patients under more experimental conditions and work out how the right and left hemispheres might work. In a way, this was a perfect opportunity to find out about lateralisation of brain function.

(b) The sample were all split-brain patients. They had all had a commissurotomy in order to treat severe epilepsy. For most of the patients, the operation had reduced the symptoms of epilepsy. There were only a small number of participants – approximately six participants. One problem is that the sample may not show how hemispheres work. This is because epilepsy can be caused by some form of brain damage, and in itself can cause further neurological problems; it might be that, even before the commissurotomy, these patients did not have ‘normal’ brains. Therefore, this study may not tell us about how a normal person’s brain works or what would happen if a non-epileptic person had the same operation.

(c) One strength of self-report as used in this study was that it provided a direct way of accessing the participants’ experiences without the experimenter having to make assumptions or inferences about what was happening. For example, in the mini-experiment using ‘keycase’ across both visual fields, asking the participants what they had seen was the simplest, most direct way of finding out what information had travelled to the relevant hemisphere.

Another strength is that the experimenters were able to generate both qualitative and quantitative data by using self-report. For example, they could ask them what they were experiencing in a free-format way, such as when they elicited the information that one participant felt that they were not getting messages from one hand. This is qualitative data. Their answers to the tasks themselves enabled a count of correct responses generating quantitative data.

(d) A weakness of self-report is that participants do not necessarily tell the truth, so if they had come to an understanding of what the experimenters expected (because they understood the nature of their operation and its possible implications) they may not have given truthful answers such as when they could not identify an object by touch. Another weakness is that the self-report technique made it very obvious to the participant when he/she had failed in a task such as not being able to say what they had seen. This may have affected their self-esteem and caused them worry in a way that a different data collection technique may not have done.

(e) The results of this study show that, if a projected picture is shown and responded to in one visual field, it is only recognised again if it appears in that visual field (VF).

If visual material appears in the right visual field (RVF, processed by left hemisphere), the participant could describe it in speech and writing as normal.

If the same visual material is projected to the left visual field (LVF, processed by the right hemisphere) then the participant says he did not see anything or says there was just a flash of light on his left side. (Language centres are in the left hemisphere.)

If you then ask the same participant to use his left hand (right hemisphere control) to point to a matching picture or object in a collection of pictures/objects, he points to the item he just insisted he couldn’t see. These results confirm that the right hemisphere cannot speak or write (called aphasias and agraphias respectively).

(f) One change to this study could be to observe split-brain patients in their everyday lives to see how their condition might affect them. They could be watched doing ordinary tasks in ordinary conditions, e.g. preparing and eating food, cleaning, interacting with family members, etc. This would make the study more ecologically valid. It might also reveal some everyday behaviours which were affected by having a split brain, which, on a superficial inspection, seemed quite normal. Another change to this study would be to use many more patients. This would probably show overall similar findings and would also help explore the individual differences between the participants and discover whether there was any pattern or reasons for why some participants could show ipsilateral control (right hemisphere communicating with right hand).

Section C questions

(a) One assumption of the biological approach in psychology is that much of human behaviour is governed and can be explained by biology, e.g. hormones, genes, neurotransmitters, brain structure and so on. This means we probably have less control and free will than we would like to think.

(b) The physiological approach could explain how the brain controls behaviour by demonstrating how the ability to produce such behaviours as naming objects and identifying them by touch are governed by the structure of the brain. This is shown by Sperry’s study where a physical alteration in the brain causes clear differences between participants.

(c) One similarity between Sperry and Dement and Kleitman is that both studies included a self-report technique for collecting data. Sperry’s participants were asked directly about what they had seen or touched, as well as their subjective experiences about what was happening to them. Dement and Kleitman’s participants were asked to report into the tape recorder the content and length of their dreams. This means that the researchers in both cases were accessing directly the participants’ experiences in their own words.

One difference between Sperry and Maguire et al. is that while Maguire et al. collected only quantitative data in the
form of numerical analyses of brain scans, Sperry collected both quantitative and qualitative data by looking at test scores as well as participants’ comments.

(d) One strength of the physiological approach is that it is scientific. It probably represents the most scientific end of psychology. This means that it is objective, usually empirically based and widely respected. For example, in Maguire et al., the procedures use advanced technological processes and equipment and the procedures were highly controlled – same VBM and pixel-counting techniques, single-blind technique so observers did not know whose scans they were analysing and so on. Because all these aspects of the procedure increase the validity and objectivity of the research, it is widely accepted and respected.

Another strength of the physiological approach is that it generally produces useful contributions to psychology – both in terms of applications and in terms of usefulness for helping further research in the area. For example, Sperry’s study was valuable from a theoretical point of view in order to understand the brain, its structure and operations, such as the functions of the hemispheres. This knowledge could be used about different parts of the brain to better understand people who have suffered brain damage in, for example, a car accident. Also, sometimes people need to have brain tumours removed and surgeons need to know the effects of removing parts of the brain.

One weakness of the physiological approach is that it often lacks ecological validity due to the nature of the tasks and the environment where they take place. This means that it could be argued that they are of limited value in telling us about people’s mind and behaviour in real, everyday life. For example, Sperry’s study into split-brain patients revealed a wealth of detail about how they performed under particular circumstances that were very unusual. In real life, however, no such impairments were noted by the patients because their coping strategies (eye movements) led to their being able to function perfectly normally.

Another weakness of the physiological approach is that it overlooks nurture and over-emphasises nature. For example, the implication of Dement and Kleitman’s study is that dreaming is hard-wired into humans as a result of the genetically determined physiological activity of REM and sleep stages. On the other hand, Maguire et al. avoids this by using the physiological approach to investigate how experience (nurture) can actually cause physical changes in the brain, thus showing that weaknesses of the approach as a whole is not necessarily true of all research within that approach if new and interesting directions are taken by researchers.