Answer the following 6 questions. You may respond in Chinese or English. (100 points total)

1. To the best of your ability, describe with as much detail as possible the principles, and the pros and cons underlying each of the following methods of in vivo human neurophysiological measurement of brain activity: electroencephalography (EEG), event-related potentials (ERP), positron emission tomography (PET), gray/white matter structure magnetic resonance imaging (MRI), diffusion tensor imaging (DTI), functional MRI. In your answer, for each of these methodologies, consider the following: what are the underlying signals being measured, how these signals are measured and using what sort of machines, what aspect of neural activity or function does these measured signals reflect, and what do the measures reflect in terms of the information being processed in the brain? Give examples to better illustrate your answer as appropriate. [20 points]

2. "What is the range of frequency of pure sound tones which is beyond normal human sensation?" Consider this research question and design an experiment to answer this question to the best of your ability. Use any methodology you deem most appropriate to answer the question. This might include behavioral approaches, or any of the methods listed in the question above, or any combination of these. In your answer, state your hypothesis and your reasoning leading up to your hypothesis, describe your experimental logic, participants, materials, procedures, and analyses in detail and justify them, describe your predicted results, discuss possible alternative interpretations of your predicted results and key difficulties in your proposed design. [20 points]

3. "How does the range of frequency of pure sound tone sensation normally change over the human lifespan?" Describe how you might modify the experiment you designed above to follow up on this present research question. [10 points]

4. (a) Long-term memory is usually divided up into explicit memory and implicit memory. Explain their differences and give one example for each of them. [12 points]
　(b) Long-term memory is defined in contrast to short-term memory and working memory. Explain what short-term memory and working memory are, and give one example for each of them. [12 points]
　(c) Which brain region is most important for long-term memory? [2 points]

5. The two-streams hypothesis, a prevailing model of the neural processing of the visual system, argues that the human brain has dorsal and ventral visual systems to process visual information. Explain the difference in function for these two visual systems. [12 points]

6. In animal behavior, associative learning is the learning process by which an animal learns the association between two events. Explain classical conditioning and operant conditioning and give one example for each of them. [12 points]

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