Localism and holism Much of the discussion in this chapter has been aimed at showing in a very broad way how the production and comprehension of language is related to certain areas of the brain and their interconnections. This particular model of looking at the structure and function of language by relating specific aspects of language to certain localized areas of the brain is called the localist model. Although it is true that certain areas of the brain are involved in language, it is also necessary to take into account holistic or global brain phenomena in order to understand what is happening. The effect on language of broader psychological factors, such as attention span, motivation, alertness, the rate at which auditory and visual memory traces dissipate, etc., must be considered. A holistic type of model does just this. For example, you start to say something and suddenly you are 260 distracted and break off, or you forget what you wanted to say. It would be foolish to conclude that you suffered a momentary breakdown in speech production due to damage to your Broca's area. Or, when a friend says something but you do not catch the words and respond with 'What?', this is not an indication of damage to your Wernicke's area. Some sort of holistic multi-dimensional explanation is required here. The localist model has been successful in explaining roughly 85 per cent of aphasias, but the other 15 per cent are anomalous and baffling. They represent people who have language disorders but do not have damage in the expected language areas, or, conversely, certain damage has not resulted in the predicted symptoms. This cannot but make us reflect on the more global possibilities of language functioning in the brain. While there is an impressive accumulation of scientific knowledge on the brain to date, it is well to keep in mind the fact that even linguistic concepts as simple as that of the noun or the verb have yet to be localized. Science has yet to provide the detailed knowledge of the correspondence between language and the brain's structure and function. 12.8 Methods of investigating brain and language 12.8.1 Traditional methods: post-mortem, brain-injured people, electrical stimulation The comparatively limited understanding we have of the neurological basis of language in the brain is the result of the application of a relatively small number of methods. The oldest method, that used by Broca himself, is the post-mortem examination of the brains of patients who had displayed language disorders while they were alive. The abnormalities he found in certain areas of their brains in post-mortems correlated with the language symptoms they displayed in life. Another method involves observing the language of patients who have had brain operations. A person might require – because of an accident or a tumour, for example – the removal of a lobe of the brain (lobectomy) or even of an entire hemisphere (hemispherectomy). Then, too, the study of the language of living patients with severe brain damage caused by accidents or wartime injuries was and still is a useful method of investigation. Yet another method, pioneered by Penfield in the 1950s, involves the electrical stimulation of the cerebral cortex in patients who are conscious during brain surgery. On being stimulated, patients would report, for example, that they remember childhood events or old songs. How to verify what the patient says about the past is a problem with this method. The use of this procedure has been very limited, since it is restricted to the open 12 ● Language and the brain