

8

Psychophysiological Methods

Paul Sowden and Paul Barrett

- 8.1 What is psychophysiology?
- 8.2 The principal areas of physiological data acquisition
 - 8.2.1 *Muscle activity*
 - 8.2.2 *Sweat gland activity*
 - 8.2.3 *Eye movements – pupillary response*
 - 8.2.4 *Cardiac response, blood pressure and blood volume*
 - 8.2.5 *Respiration*
 - 8.2.6 *Electrical potentials of the brain*
- 8.3 Quantifying biosignal data
 - 8.3.1 *Level of measurement*
 - 8.3.2 *Hardware, signal processing and data volume*
 - 8.3.3 *Designing the experiment and choosing parameters to measure*
- 8.4 Conclusion
- 8.5 Further reading

AIMS

This chapter aims to provide the reader with an understanding of the breadth of possibilities in psychophysiological work. The tone of this chapter is less discursive and more didactic than many of the other chapters in this book. It is intended to whet the appetite of those readers who may wish to pursue this kind of research.

Key terms

electrocardiography	photoplethysmograph
electrodermal activity	PQRST complex
electroencephalography	pupillary response
electromyography	skin potentials
electro-oculography	skin resistance
evoked potential electroen-	sphygmomanometer
cephalography	systole
diastole	transducers
galvanic skin response	

8.1 WHAT IS PSYCHOPHYSIOLOGY?

Specifically, the field of psychophysiology is concerned with the manipulation of psychological variables and their corresponding observed effects on physiological processes. Thus, psychophysiology is concerned with observing the interactions between physiological and psychological phenomena. More generally, psychophysiology can be said to encompass both the study of behavioural consequences of physiological properties of the body at a biochemical and anatomical level, and the effects of behaviour on these same physiological properties.

Much of psychophysiological investigation is concerned with examining the concepts of emotion, behavioural states, stress, cognitive task performance, personality and intelligence. In each case, the relationships between psychological factors, stimulus perception and recognition, situational indices and physiological response are used in an attempt to shed light on the initiation, execution, maintenance and termination of behavioural events. Ultimately, the field can be partitioned into six major areas of endeavour as follows.

Social psychophysiology Social psychophysiology is the study of the interactions between physiology and behaviour's when those behaviours are involved in social processes. For example, interpersonal phenomena and group dynamics may be investigated by observing the interplay between various behaviours and each individual's dynamic physiological changes such as pupil size, muscle tone and skin electrical resistance (e.g. Birnbaumer & Ohman, 1993; Blascovich & Kelsey, 1990; Diamond, 2001; Wagner & Manstead, 1989).

Developmental psychophysiology This is the study of the ageing process, looking specifically at how changing properties of physiological systems and anatomical structures affect behaviour (e.g. van der Molen & Molenaar, 1994). In addition, the nature of the interaction between the psychological and physiological factors during development is examined. For example, research may use measures of brain activity (e.g. event-related potentials) to examine ongoing brain function during early development (Ridderinkhof & van der Stelt, 2000; Steinschneider, Kurtzberg & Vaughan, 1992).

Cognitive psychophysiology This concerns the relationship between information processing and physiology (see Jennings & Coles, 1991). That is, it examines the relationships between cognitive task performance and physiological events. For example, it looks at how perception, movement, attention, language and memory may be associated with particular features of brain electrical and magnetic activity (see Kutas & Dale, 1997; Zani & Proverbio, 2002).

Clinical psychophysiology This is the study of psychological disorders and their relationship with physiological functioning and malfunctioning (e.g. Halliday, Butler & Paul, 1987; Magina, 1997). In addition, this area is concerned with the examination of the effectiveness of treatment regimes and drug effects on the

psychological behaviour and affect of the individual. For example, in looking at chronic depression, it is sometimes useful to look at the benefits of any treatment applied in terms of both the behavioural outcomes and the changed nature of physiological parameters such as brain activity, sympathetic nervous system responsivity and biochemical substance assays (Carlson *et al.*, 2004).

Applied psychophysiology This area is involved with the application of psychophysiological techniques and findings to occupational, recreational, clinical and other areas of interest. For example, the monitoring of certain physiological activity within an individual, and providing instant and appropriate feedback of this activity, is known as biofeedback. This technique is used as an aid for relaxation therapy, stuttering, respiration control and a variety of other practical problems whose treatment may be amenable to self-control therapeutic techniques (Schwartz & Andrasik, 2003).

Individual differences This area looks specifically at the relation of physiological processes and anatomical structures to measures of personality and intelligence (generally defined by psychometric measures, e.g. Cooper, 2002; Gale & Eysenck, 1993). These measures may be of typically dynamic psychophysiological form, such as the relationship between the overall amplitude of brain-evoked potentials to varying levels of stimulation, and introversion–extroversion (the augmenting–reducing phenomenon), or may quantify aspects of anatomical physiology and relate these to the psychometric or psychological indices. For example, from histological surveys of human cadavers, the number of dendrites and their length correlate positively with the level of education attainment within individuals.

8.2 THE PRINCIPAL AREAS OF PHYSIOLOGICAL DATA ACQUISITION

This section is a brief summary of important facts and information surrounding the quantification of parameters describing the function of particular physiological structures and systems. It is not intended to be a comprehensive overview but rather is a snapshot of the diversity and richness of the measurement process in psychophysiology.

8.2.1 Muscle activity

Assessing muscle activity is carried out by a technique known as **electromyography**, in which the electrical potentials that are associated with contractions of muscle fibres are measured. These potentials are brief impulses lasting between 1 and 5 milliseconds (ms), detected using devices known as **transducers**. These vary from invasive needle electrodes inserted into muscle tissue and recording individual fibre potentials, to non-invasive surface electrodes that are fixed to the skin above the particular muscle of interest, recording the mass action of muscle fibre groups.

electromyography

transducers

The amplitude of recorded signals can vary between about 1 and 1000 microvolts (μV), although recordings of less than $20\mu\text{V}$ are difficult to obtain. The frequency of the electrical impulses can be anywhere between 20 and 1000 hertz (Hz). The quantitative measures available will vary depending upon the focus of investigation. For example, when one is looking at the behaviour of a single nerve fibre or a homogeneous group of fibres, the single or compound (many fibres) action potential may be measured in response to a precise, targeted stimulus such as a small electric shock. Measures extracted from this potential include those of impulse amplitude and nerve conduction velocity. Alternatively, when looking at the long-term activity of muscle fibres, the integrated amplitude, frequency of nerve firing (impulses) and gradients of frequency responses may be examined.

One interesting example of electromyograph recordings was reported by Surakka and Hietanen (1998) who assessed muscular activity on the face in response to other peoples' facial expressions of emotion. Their research has revealed that people show different muscular reactions to real (Duchenne) as opposed to deliberate (false) smiles. Also, Winkielman and Cacioppo (2001) showed that electromyographic activity is associated with real smiles when conducting easier mental tasks.

8.2.2 Sweat gland activity

Assessing the activity of the sweat glands relies upon measuring electrical activity on the surface of the skin, a procedure known variously as **electrodermal activity** or **galvanic skin response**. What is actually measured are the electrical properties of the skin that are associated with eccrine sweat gland activity. This activity is responsive to changes in emotionality and cognitive activity in general, and is often used as a general measure of arousal.

Measuring electrodermal activity requires the placement of two non-invasive, metallic, surface electrodes either on the palm or the fingers of one hand. Two types of measure can be recorded: **skin potentials** and **skin resistance**. Skin potentials are recorded by measuring the voltage potential between an electrode over an 'active' site and a reference electrode on an inert site. Alternatively, skin resistance is measured by imposing a constant voltage between the electrodes, across the surface of the skin. The current between these electrodes can be measured, and this provides information about the conductivity of the skin between the two electrodes. In short, sweaty palms are better conductors of current than dry ones and the equipment is designed to register any changes in sweat production. An alternative strategy sometimes used is to maintain a constant current between the two electrodes by constantly adjusting the voltage: this voltage adjustment measures skin resistivity. Both momentary fluctuations (phasic) and relatively stable measures (tonic) can be recorded.

If measuring skin potentials, the voltage amplitude between the two electrodes is recorded, and this normally ranges between about 1 and 6 millivolts (mV). If

electrodermal activity
galvanic skin response

skin potentials
skin resistance

measuring skin resistance, then variation of electrical resistance around a baseline is recorded. Given a relatively stable level of resistance of, say, 100 kilohms ($k\Omega$), to the passage of electric current through the surface of the skin, variability of resistance around this baseline value can reach up to 50 ($k\Omega$) or more in magnitude.

Skin conductance is generally measured in microsiemens (μS), where 1 siemens equals $1\Omega^{-1}$. Given a baseline level of conductivity of $10\mu S$, conductivity can be seen to vary generally between about $8\mu S$ and $20\mu S$. A typical response duration would be between about 1 and 3 seconds. Of course, these example values will be heavily dependent on the type of experimental conditions used to elicit changes in potential, resistivity and conductivity.

The quantitative measures derived from electrodermal activity are generally measures of response waveform amplitude and latency, rise/fall times, and frequency of responses. In addition, gradients over time of these measures can be analysed, as in the case of habituation of response amplitude to repetitive stimuli.

Measures of electrodermal activity have been widely used to indicate level of arousal from almost any conceivable stimulus. For instance, Blair, Jones, Clerk and Smith (1997) found that psychopathic individuals show a lower electrodermal response to distress cues in others than a group of matched controls (see also Lorber, 2004).

8.2.3 Eye movements – pupillary response

Pupillary response describes the dilation of the pupil of the eye, while **electro-oculography** describes the measurement of eye movement. In addition, eye-blink rate and duration can be measured.

To measure pupillary response, an individual's eyes are illuminated by low-level infrared light and a low-light-level video camera is used to record pupil size, with digital signal processing of the video images to provide a continuous measurement of pupil diameter. Pupil diameter changes can be measured over a 0.5 mm to 10 mm range. Spontaneous, continuous pupil size changes vary around 1 mm or so. Typically, pupillary response measures encompass pupil diameter and rate of change in diameter in response to either a specific stimulus or a longer-term emotional state.

Electro-oculography is concerned with assessing muscular activity around the eye, and evaluating the change in voltage potential between the positively charged cornea and negatively charged retinal segment of the eye. It uses non-invasive pairs of electrodes placed around the eye. Electrodes placed at the side of the eye record horizontal movement, those placed above and below the eye record vertical movement. Electro-oculographic amplitude varies between about 0.4 and 1 mV. Currently, electro-oculographic signals can record movement up to 70° from a central position, with a resolution of 1° . Eye-blink duration is generally seen to fall between 100 and 400 ms, with rates heavily dependent upon specific situational factors. Electro-oculographic measures encompass eye movement speed, direction, type (smooth pursuit as in tracking tasks, or fast saccades as in reading or examining a static stimulus).

**Pupillary response
electro-oculography**

Pupillary dilation is considered to be indicative of heightened interest and arousal, while electro-oculograms are regularly used in sleep research, for instance, as one indicator of entry to the phase of sleep known as REM (rapid eye movement) sleep, which is characterized by the eyes making rapid darting movements (see Carlson, 2004).

8.2.4 Cardiac response, blood pressure and blood volume

Electrocardiography	Electrocardiography refers to the recording of the electrical potentials generated by the heart muscles over the period of one heartbeat. The electrical waveform produced by the sequence of contractile responses in a heartbeat is referred to as the
PQRST complex	PQRST complex. The P wave is the small change in potential caused by the initial excitation of the atrial (upper heart chambers) muscles just prior to their contraction. The QRS complex represents the contraction of the left and right ventricular (lower chambers of the heart) muscles that pump blood from the ventricular chambers to the lungs and rest of the body. The R wave is the point of maximum ventricular excitation. The T wave indicates repolarization of ventricular muscle.
systole	The term systole is used to describe the atrial and ventricular contraction phases
diastole	(P–S) and diastole to describe the relaxation phase (T–P) of the passive filling of the atria and ventricles. Blood pressure measurement is based upon the measurement of the systolic and diastolic phase wavefronts in the blood moving through the arteries. Blood volume measurement (plethysmography) assesses the amounts of blood that are present in various areas of the body during particular activities.
sphygmomanometer	To make an electrocardiograph measurement, surface electrodes can be placed on the wrist, ankle, neck or chest. For the measurement of blood pressure, a sphygmomanometer (pressure cuff) and stethoscope are used to detect the systolic and diastolic pressures. For blood volume measurements, conventionally a
photoplethysmograph	photoplethysmograph is used to detect the amount of blood passing in tissue directly below the sensor (using the principle of light absorption characteristics of blood). This device is normally placed on a fingertip or an earlobe.

The most popular quantitative measures in electrocardiography are of heart rate (counting the number of R waves over a minute) and heart period (the duration between R waves). The average heart rate is around 75 bpm, beats per minute which is equivalent to a cardiac cycle of 800 ms, during which the heart is in ventricular systole for 200–250 ms and in diastole for 550–600 ms. However, with a multi-component waveform as in the PQRST complex, and the physiological processes that underlie the waveform, meaningful measures can be generated from many combinations of latencies or amplitudes between and within the PQRST complex. The measurement of blood pressure yields simple pressure indices; however, the ratio between the systolic and diastolic pressure values is of significance, as is the absolute value of each pressure parameter. Normal systolic blood pressure (measured in millimetres of mercury displacement (mmHg)) ranges from 95 to 140 mmHg, with about 120 mmHg as the average pressure.

Normal diastolic blood pressure ranges from 60 to 90 mmHg, with about 80 mmHg as the average pressure. Blood volume measures are always relative to some baseline within an individual. The signal is generally an amplified analogue voltage that indexes light absorption by the photoelectric sensor.

Measures such as heart rate variability have been widely used to indicate the mental workload (a concept that reflects information processing demands and complexity) imposed by a variety of tasks, such as those involved in flying aircraft (e.g. Backs, 1998; Sammer, 1998).

8.2.5 Respiration

To assess respiration, measures of the breathing and gas-exchange process are made. More specifically, oximetry examines the arterial blood oxygen (O_2) levels and infrared capnometry examines the lung carbon dioxide (CO_2) levels. Abdominal and thoracic respiration rate and depth may also be measured.

Oximetry measures are made using a specially calibrated photoplethysmograph, with output calibrated as percentage of saturated haemoglobin. For capnometry, a nasal catheter is inserted about 6 mm into a nostril and held in place with some tape on the upper lip. CO_2 expiration pressure (PCO_2) and end-tidal CO_2 ($PETCO_2$; the concentration of CO_2 in expired air) can be measured. For abdominal and thoracic breathing measurement, pneumography and strain gauges are most often used.

The different methods of respiration assessment produce analogue voltages, digital values or direct pressure manometer readings that index the gases or strains being measured. There are up to 50 measures that can be extracted from an examination of the output from oximetry, capnography and pneumography. These vary from measures of volume displacement, frequency and pressure, to proportionate fractionation of gases in expired air and oxygenation of the blood. The analysis of respiration has inexplicably been neglected in psychophysiology. However, the book by Fried and Grimaldi (1993) is a remarkable testament to the richness of relationships between respiration and psychological factors, and to the theoretical importance of respiration to conventional models of arousal and physiological functioning.

An interesting finding from the analysis of respiration has been that individuals suffering from panic disorder have greater irregularity and complexity in their breathing patterns, which may make them more vulnerable to panic attacks (e.g. Caldirola, Bellodi, Caumo, Migliarese & Perna, 2004).

8.2.6 Electrical potentials of the brain

The electrical activity generated by the mass action of neurons within the cortex and midbrain structures is measured using a technique known as **electroencephalography**. In addition, since electrical currents generate magnetic fields, these can be measured by magnetoencephalography. Electroencephalograph (EEG) recordings can be made using either invasive needle electrodes, placed directly into the exposed cortex or deeper structures, or non-invasive electrodes placed upon the surface of the scalp

Electroencephalography

(up to more than 300 with high-density EEG recording). These electrodes are used to record voltage differences between one or more cortical sites and a relatively electrically inactive area (such as an earlobe). For magnetoencephalograph recording, superconducting quantum interfering devices (SQUIDs) are used to detect the minute dynamically fluctuating magnetic fields within the brain. Unlike EEG electrodes, SQUIDs do not have to be in contact with the scalp or cortical tissue as there is no reliance on electrical conductivity of electrons through body tissues.

The electrical signals emanating from the brain are very small (of the order of microvolts). Spontaneous electroencephalography is the term used to describe the continuous stream of activity that is always present within the brain. This activity can be characterized as patterns of oscillatory waveforms that have conventionally been subdivided in terms of their frequency into four main bands: delta (low frequency, 0.5–4 Hz; amplitude 20–200 μV), theta (low frequency, 4–7 Hz; amplitude 20–100 μV), alpha (dominant frequency, 8–13 Hz; amplitude 20–60 μV) and beta (high frequency, 13–40 Hz; amplitude 2–20 μV). Electroencephalography has frequently been used to study levels of arousal from deep sleep, where delta activity predominates, through to alert attentiveness, where beta activity predominates.

evoked potential electroencephalography

If, instead of recording the spontaneous activity of the brain, a brain response is evoked by a quantifiable stimulus, then it is possible to examine the change in electrical activity in direct response to a known stimulus. This technique is known as **evoked potential electroencephalography**. Some of these evoked potentials can last less than 10 ms (such as the brain-stem auditory evoked potential generated by subcortical brain tissues) or up to a second or longer as in the case of the *Bereitschaftspotential* or readiness potential (a slow shift in voltage that is observed as preceding voluntary or spontaneous movement within an individual). Generally, because of the low level of brain response over and above the normal background electroencephalographic activity, many evoked responses are collected and then summed to produce an average evoked response (AER), also known as an average evoked potential (AEP). The basis for this summation is that activity in the waveform that is not generated in response to the stimulus will be almost random and hence sum to near zero over occasions, while activity that is related to the stimulus will be enhanced by adding these stimulus-generated signals together.

For spontaneous EEG data, the most popular method of analysis is based around a mathematical technique known as Fourier analysis. This decomposes the complex EEG waveform into simple separate oscillating components each having a particular frequency of oscillation and magnitude. Following this, the amount of electrical energy accounted for by each particular frequency that could possibly make up the complex waveform provides direct, quantitative measures that index signal power at certain frequencies. More recent methods of analysis have re-expressed multi-electrode output as a spatial contour map – the topographical EEG map. This is a method of interpolating activity between electrodes in order to produce a set of smoothed gradients that can be ‘mapped’ over the surface of the

scalp, encompassing all electrode positions and the intervening spaces between electrodes. In addition, chaos theory (non-linear dynamic analysis or fractal dimensionality analysis) has very recently been applied to the background EEG as a method for determining the 'complexity' of the EEG. For AEP research, measures invariably focus on peaks and troughs in the waveform, characterizing these components by their amplitude and latency from the point of stimulation. Some work has also focused on the spectral composition of the AEP. Particularly promising has been analysis that uses the wavelet transform, which allows a multi-resolution analysis of time-varying signals and which is especially suited to locating the time interval within which a high-frequency signal, such as the brainstem auditory evoked potential, occurs (see Samar, Swartz & Raghuvier, 1995).

Contemporary EEG work frequently uses high-density recording (see Oostenveld & Praamstra, 2001) where many electrodes are placed on the scalp, yielding a relatively high-resolution topographical map. Using this type of recording, Huber, Ghilardi, Massimini and Tononi (2004) have been able to show that slow wave sleep may be crucial to learning new tasks. Specifically, they found that learning a new task may trigger an increase in slow wave sleep activity in the relevant brain area, which in turn may enhance task performance.

However, despite advances in the topographic mapping of EEG data its spatial resolution is still relatively poor. Fortunately, complementary techniques for measuring brain activity, such as functional magnetic resonance imaging (see Box 8.1), have relatively good spatial resolution. When used together, these techniques make an especially particularly powerful combination to measuring the brain activity associated with psychological processes.

Box 8.1 Functional magnetic resonance imaging

Functional magnetic resonance imaging (fMRI) is currently the fastest-growing method for relating brain activity to psychological processes and behaviour. Whilst the hardware and facilities required are extremely expensive, they are becoming increasingly available to researchers working in psychology departments, with a number of departments having their own fMRI facilities.

Functional magnetic resonance imaging works by detecting the radiofrequency energy emitted by the nuclei of atoms as they align with a strong magnetic field. Participants in fMRI studies are placed inside a scanner, which fundamentally comprises a large, high-strength magnet, various coils that make local adjustments to the static magnetic field generated by the large magnet, and radiofrequency transmitting and receiving coils. The participants are stimulated in some way, for instance, by presentation of visual stimuli, whilst their brain activity is measured as described next.

Essentially, a radiofrequency pulse is used to flip the nuclei out of alignment with the magnetic field and then, as they move back into alignment, they emit radiofrequency energy – the magnetic resonance signal – that is measured by a receiver

(Continued)

Box 8.1 (Continued)

coil. Because increased neural processing requires increased oxygen consumption, and because the magnetic resonance signal from deoxygenated blood is reduced relative to oxygenated blood, changes in the blood oxygen level dependent (BOLD) response are related to changes in underlying neural activity in a given brain area. Statistical analysis of fMRI BOLD data attempts to relate changes in stimulation applied by the experimenter to changes in the BOLD response in different brain areas. From this type of analysis various types of deduction can be made including those about the functional role of different brain areas, about the interactions between brain areas, about the mechanisms of learning in the brain and about the modulation of brain activity by factors such as task.

In recent years there has been an explosion of fMRI-based research. To take one example, by using fMRI, researchers have been able to identify brain areas that seem to be associated with psychological cravings (Myrick *et al.*, 2004).

8.3 QUANTIFYING BIOSIGNAL DATA

8.3.1 Level of measurement

As can be seen from the information presented in Section 8.2, the measurements made from psychophysiological data are almost always at true ratio level – that is, they behave like interval level measurements and possess a true zero (see Chapter 3). However, despite the high level of precision of psychophysiological measurements, the psychologist using these measures faces a significant problem. She must determine the psychological meaningfulness of any change in the biosignal. For instance, returning to the earlier example of using heart rate variability as a measure of mental workload, a statistically significant change in heart rate variability may not necessarily signify a psychologically meaningful change in mental workload. Thus, the interpretation of psychophysiological data is often more qualitative than the precision of the measures might seem to imply.

8.3.2 Hardware, signal processing and data volume

Having established that the scale of measurement is superior to that of nearly all psychological data, it is apparent that many issues in the quantification of parameters that bedevil psychology fade into insignificance in this area. However, the price of this philosophical simplicity is computational and methodological complexity. The measures made are invariably electrically based, exact to a predetermined level of accuracy defined by the properties of the sensors and any amplification used, and prone to levels of noise that can utterly distort any parameter or signal. So, in order to attempt to measure any physiological parameter from any part of the human body, fairly detailed knowledge is required of the underlying physiology to be assessed, the physical properties of the sensors or transducers to be

applied, the properties of the signals thus generated (electrical engineering and digital signal processing techniques) and the plethora of possible methods of analysis (both bivariate and multivariate methods of waveform analysis, periodicity analysis, event detection, pattern recognition and clustering techniques).

A simple measure such as heart rate (counted in beats per minute) seems a trivial parameter to acquire, until you ask yourself how you are going to measure the heart rate. Having found out that two electrodes placed, say, on each wrist will enable the acquisition of the information, your next problem is to work out how you are going to extract the heart rate parameter itself: that is, how you record the electrical signals. Assume next that you are provided with a computer-based recording system set up to output a number every 10 seconds or so which indicates beats per minute. Looking at the number, you see the heart rate is alternating between 50 and 70 beats per minute. Is this acceptable? The individual being assessed is sitting quietly. Your local expert happens by and notices that the 50 Hz hardware notch filter is off. In addition, checking the earth electrode shows that very poor electrical contact is being made between this and the individual. By improving this contact and switching the notch filter in-line, the heart rate stabilizes around 70 beats per minute. To understand what has happened requires knowledge of the expected heart rate, the properties of metallic electrodes, earthing problems, the operation of a notch filter, and the appreciation of how a heart rate monitor works. This is all *before* you begin to manipulate a single psychological variable. Note also that here you were dealing with a relatively large biological signal. Imagine attempting to measure high-frequency EEG of maybe $5\mu\text{V}$ in amplitude with amplifiers that have background, self-generated electronic noise of about $1\mu\text{V}$, and where mains noise can be as large as $10\text{--}20\mu\text{V}$. The knowledge required to ensure that the signal you are seeing is actually biologically generated and not some property of the hardware in use, or of bad measurement technique, is quite considerable.

Unlike much purely psychological research, it is possible to generate quantitative physiological data that are literally pure error. This is a problem in some topographic EEG systems that provide maps of brain electrical activity computed from many electrodes placed upon the scalp. Most systems have automated filtering such that only frequencies between 0 and 40 Hz are displayed. However, if an electrode becomes detached from the scalp or its connecting wire breaks (inside the insulating plastic), this electrode will pick up large amounts of background mains noise (and any other stray frequencies present in the environment). Depending upon the efficiency of the filters, this electrode position will be seen as producing either very low-amplitude signals across the signal spectrum or high-frequency beta of moderate amplitude (where beta activity was defined as being from 20 Hz upwards). In this latter case, the filter does not remove *all* 50 Hz activity and, owing to spectral smearing (given a low sampling speed and short segment of EEG), this gets mapped as high-frequency activity in your EEG records. Experienced EEG technicians and researchers can invariably

detect this. For a novice researcher, it poses a serious problem. Once again, only knowledge of the measurement process and the characteristics of the hardware can guard against this incorrect interpretative process.

8.3.3 Designing the experiment and choosing parameters to measure

If you set up an experiment protocol, and have acquired some psychophysiological data, your next problem is deciding what parameters to extract from these data. This stage of the measurement process *must* be decided on the basis of a priori measurement and psychological hypotheses. Data dredging (extracting every conceivable parameter and attempting to relate them to the psychological parameters) in the hope of finding something is virtually impossible to implement in this area. So many parameters can be computed that attempting to sift through your data in this manner is a recipe for disaster. You will run out of time, computing facilities and energy! Modern laboratories routinely keep all physiological data on some form of archive medium (e.g. magnetic, CD-ROM or DVD). However, only certain hypothesis-specific parameters are extracted from this archive for use in the examination of psychological relationships. Should other hypotheses evolve over time, the archive data can then be reanalysed (where relevant) in order to permit the extraction of the new parameters.

One major problem you may face is that the system you are using to acquire psychophysiological data may permit only certain forms of analysis or, more rarely, provide no parameters at all. That is, you may have access to a computer-based skin conductance recording system, which will acquire and store the continuous conductance levels. However, if you do not have a program that analyses this output in terms of response latency and amplitude, then the data are practically useless. Your only options are to write all the incoming data to a chart recorder and carry out all such measures by hand, or (more usually) obtain or write a computer program yourself that implements the procedures necessary to extract these parameters. This highlights another global feature of psychophysiological data acquisition: the collection of data can take a few minutes, but the volume of data generated can tax the computer system whilst the analysis of one participant's data by hand can take days! This is particularly true for methods that measure brain activity such as electroencephalography, magnetoencephalography and fMRI where several gigabytes of data may be simultaneously recorded from a large number of locations in just a few hours. Even the latest analysis packages running on high-specification computers can take hours to complete each stage of the necessary analysis.

Of course, returning to the heart rate example above, it may be that only five such measures are made throughout an experiment, where (say) the only focus of interest is the effect of difficulty of task problem on heart rate. The drawback to such simple experiments is that the explanatory power of any results is limited by the paucity of variables analysed! As Fried and Grimaldi (1993) also point out in

their discussion of pulmonary (respiration) research, using observable movements of the chest or abdomen (pneumography) alone as indicators of respiration activity is not to be recommended, as $PETCO_2$ activity demonstrates that such movement can be quite unrelated to actual airflow into and out of the lungs. Thus, to use respiration rate or depth as an indicator of increasing or decreasing airflow is liable to be prone to error. In the same way, the use of heart rate alone is not of much practical use except as a simple descriptor of one particular feature of cardiac activity.

8.4 CONCLUSION

Psychophysiological methods offer insights into a wide range of human behaviours and experiences. In this chapter we have attempted to convey the breadth of techniques available to the psychophysiological researcher. In a chapter like this it is not possible to go into much depth, but it is hoped that we have whetted the appetite of students and researchers to look further into this area of investigation. The following short section on further reading should provide the requisite detail for helping a researcher embark on effective psychophysiological research.

8.5 FURTHER READING

Andreassi (2000) is an excellent introductory text. It is probably the best general textbook for students who are completely new to the area. Cacioppo *et al.* (2000) should be read straight after Andreassi's text. This is a comprehensive book that is intended both as a reference source for the specialist and yet to be accessible to undergraduates.

Dempster (2001) is a good introductory text on the recording and analysis of psychophysiological data using modern computer-based data acquisition systems. Since electroencephalography is one of the largest research areas in psychophysiology, it is useful to take a look at Fisch (1999). This is written at an introductory level suitable for students who have no prior knowledge of psychophysiology but is also of value to experienced EEG users. For students who wish to undertake projects involving electroencephalography, it is an essential handbook that provides much practical as well as some theoretical information. For those who wish to learn about functional magnetic resonance imaging, Jezzard, Matthews and Smith (2001) provides an excellent starting point. Aimed at postgraduate level, it covers the underlying principles of fMRI and the design and analysis of fMRI experiments. Finally, Fried and Grimaldi (1993) is an absolutely brilliant book. It contains an excellent introductory section on psychophysiological measurement and provides a masterful description of respiratory functions and processes. In addition, the provocative and challenging hypotheses in the book make this probably one of the best 'specialist' books in this area.

References

- Abraham, C. & Hampson, S. E. (1996). A social cognition approach to health psychology: Philosophical and methodological issues. *Psychology and Health, 11*, 223–241.
- Adams, E. W. (1966). On the nature and purpose of measurement. *Synthese, 16*, 125–129.
- Ainsworth, M. D. S., Blehar, R. M. C., Waters, E. & Wall, S. (1978). *Patterns of attachment: A psychological study of the Strange Situation*. Hillsdale, NJ: Erlbaum.
- Albrecht, T. L., Johnson, G. M. & Walther, J. B. (1993). Understanding communication processes in focus groups. In D. L. Morgan (Ed.), *Successful focus groups: Advancing the state of the art*. London: Sage.
- Alcalá-Quintana, R. & García-Pérez, M. A. (2004). The role of parametric assumptions in adaptive Bayesian estimation. *Psychological Methods, 9*, 250–271.
- Allen, M. J. & Yen, W. M. (1979). *Introduction to measurement theory*. Belmont CA: Wadsworth.
- American Psychological Association (1992). *APA Ethics Code*. Washington, DC: American Psychological Association.
- Anderson, J. A. (1972). Separate sample logistic discrimination. *Biometrika, 59*, 19–36.
- Andreassi, J. L. (2000). *Psychophysiology: Human behavior and physiological response* (4th ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Andrich, D. (1988). *Rasch models for measurement*. Beverly Hills, CA: Sage.
- Arbuckle, J. L. (2003). *Amos 5.0 update to the Amos user's guide*. Chicago: Smallwaters Corporation.
- Archer, J. (2004). The trouble with 'doing boy'. *The Psychologist, 17*, 132–136.
- Argyle, M (1972). *The psychology of interpersonal behaviour*. Harmondsworth: Penguin.
- Ashford, P. (1994). *Proenvironmentalism: Identity and the media*. PhD thesis, University of Surrey.
- Ashworth, P. (2003a). The origins of qualitative psychology. In J. A. Smith (Ed.), *Qualitative psychology. A practical guide to research methods* (pp. 4–24). London: Sage.
- Ashworth, P. (2003b). An approach to phenomenological psychology: The contingencies of the lifeworld. *Journal of Phenomenological Psychology, 34*, 145–156.

- Atkinson, J. & Heritage, J. (Eds) (1984). *Structures of social action: Studies in conversation analysis*. Cambridge: Cambridge University Press.
- Atkinson, J. W. (1958). *Motives in fantasy, action and society*. New York: Van Nostrand.
- Atkinson, P., Coffey, A., Delamont, S., Lofland, J. & Lofland, L. (2001). *Handbook of ethnography*. London: Sage.
- Auerbach, C. & Silverstein, L. (2003). *Qualitative data: An introduction to coding and analysis*. New York: New York University Press.
- Axelrod, R. (Ed.) (1976). *Structure of decision*. Princeton, NJ: Princeton University Press.
- Back, L. (1993a). Gendered participation: Masculinity and fieldwork in a south London adolescent community. In D. Bell, P. Caplan & W. J. Karim (Eds), *Gendered fields: Women, men and ethnography* (pp. 215–232). London: Routledge.
- Backs, R. W. (1998). A comparison of factor analytic methods of obtaining cardiovascular autonomic components for the assessment of mental workload. *Ergonomics*, 41, 733–745.
- Baker, F. (2001). *The basics of item response theory*. ERIC Clearinghouse on Assessment and Evaluation, University of Maryland, College Park, MD. <http://edres.org/irt/>
- Bales, R. F. (1950). *Interaction process analysis: A method for the study of small groups*. Cambridge, MA: Addison-Wesley.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A., Ross, D. & Ross, S. A. (1961). Transmission of aggression through imitation of aggressive models. *Journal of Abnormal and Social Psychology*, 63, 575–582.
- Bandura, A., Ross, D. & Ross, S. A. (1963). Imitation of film-mediated aggressive models. *Journal of Abnormal and Social Psychology*, 66, 3–11.
- Bandura, A. & Walters, R. H. (1963). *Social learning and personality development*. New York: Holt.
- Banks, M., Bates, I., Breakwell, G., Bynner, J., Emler, N., Jamieson, L. & Roberts, K. (1992). *Careers and identities*. Milton Keynes: Open University Press.
- Banks, S. P. (2004). Identity narratives by American and Canadian retirees in Mexico. *Journal of Cross-Cultural Gerontology*, 19, 361–381.
- Barbour, R. S. & Kitzinger, J. (Eds) (1998). *Developing focus group research: Politics, theory and practice*. London: Sage.
- Barker, C., Pistrang, N. & Elliott, R. (2002). *Research methods in clinical psychology* (2nd ed.). New York: Wiley.
- Barker, G. N. & Rich, S. (1992). Influences on adolescent sexuality in Nigeria and Kenya: Studies from recent focus group discussions. *Studies in Family Planning*, 23, 199–210.
- Barnes, R., Auburn, T. & Lea, S. (2004). Citizenship as practice. *British Journal of Social Psychology*, 43, 187–206.
- Bateson, G. (1972). *Steps to an ecology of mind*. New York: Ballantine.
- Basch, C. E. (1987). Focus group interview: An underutilized research technique for improving theory and practice in health education. *Health Education Quarterly*, 14, 411–448.
- Baumann, U., Laireiter, A. R. & Krebs, A. (1996). Computer-assisted interaction diary on social networks, social support, and interpersonal strain. In J. Fahrenberg & M. Myrtek (Eds) *Ambulatory assessment: Computer assisted psychological and psychophysiological methods in monitoring and field studies*. Göttingen: Hogrefe and Huber.

- Beattie, A. (1991). The evaluation of community development initiatives in health promotion: A review of current strategies. In *'Roots and Branches': Papers from the OU/HEA 1990 Winter School on Community Development and Health* (pp. 212–235). Milton Keynes: HEU/Open University.
- Beattie, G. (2003). *The new psychology of body language*. London: Routledge.
- Bechtel, W. & Richardson, R. C. (1993). *Discovering complexity: Decomposition and localization as strategies in scientific research*. Princeton, NJ: Princeton University Press.
- Begg, C. B. (1994). Publication bias. In H. Cooper & L. V. Hedges (Eds), *Handbook of research synthesis* (pp. 521–529). New York: Russell Sage Foundation.
- Beike, D. R., Lampinen, J. M. & Behrend, D. A. (Eds) (2004). *The self and memory*. New York: Psychology Press.
- Bell, M. M. & Gardiner, M. (Eds) (1998). *Bakhtin and the human sciences: No last words*. London: Sage.
- Bellisle, F., Dalix, A. M. & De Castro, J. M. (1999). Eating patterns in French subjects studied by the 'weekly food diary' method. *Appetite*, 32(1), 46–52.
- Bentler, P. M. (1995). EQS: *Structural equations program manual*. Encino, CA: Multivariate Software Inc.
- Berg, B. (1995). *Qualitative research methods for the social sciences* (2nd ed.). Boston: Allyn & Bacon.
- Berman, N. G. & Parker, R. A. (2002). Meta-analysis: Neither quick nor easy. *BMC Medical Methodology*, 2:10 (<http://www.biomedcentral.com/1471-2288/2/10>).
- Billig, M. (1988). Methodology and scholarship in understanding ideological explanation. In C. Antaki (Ed.), *Analysing everyday explanation: A casebook of methods*. London: Sage.
- Birnbaum, A. (1968). Some latent trait models and their use in inferring an examinee's ability. In L. F. Lord & M. Novick (Eds), *Statistical theories of mental test scores*. Reading, MA: Addison-Wesley.
- Birnbaumer, N. & Ohman, A. (Eds) (1993). *The structure of emotion*. Berlin: Hogrefe and Huber.
- Blair, R. J. R., Jones, L., Clark, F. & Smith, M. (1997). The psychopathic individual: A lack of responsiveness to distress cues? *Psychophysiology*, 34(2), 192–198.
- Blake, R. & Hiris, E. (1993). Another means for measuring the motion aftereffect. *Vision Research*, 33, 1589–1592.
- Blake, R. & Sekuler, R. (2005). *Perception* (5th ed.). New York: McGraw-Hill.
- Blalock, H.M. Jr. (1988) *Social statistics* (rev. 2nd ed.). Singapore: McGraw-Hill.
- Blascovich, J. & Kelsey, M. (1990). Using electrodermal and cardiovascular measures of arousal in social psychological research. In C. Hendrick & M. S. Clark (Eds), *Research methods in personality and social psychology*. Newbury Park, CA: Sage.
- Blashfield, R. K. & Aldenderfer, M. S. (1988). The methods and problems of cluster analysis. In J. R. Nesselroade & R. B. Cattell (Eds), *Handbook of multivariate experimental psychology*. London: Plenum.
- Blinkhorn, S. F. & Johnson, C. (1990). The insignificance of personality testing. *Nature*, 348, 671–672.
- Bloor, M., Frankland, J., Thomas, M., & Robson, K. (2001). *Focus groups in social research*. London: Sage.

- Blum, G. S. (1949). A study of psychoanalytic theory of psychosexual development. *Genetic Psychology Monographs*, 39, 3–99.
- Blumer, H. (1969). *Symbolic interactionism*. Englewood Cliffs, NJ: Prentice Hall.
- Bogardus, E. (1926). The group interview. *Journal of Applied Sociology*, 10, 372–382.
- Bond, T. G. & Fox, C. M. (2001). *Applying the Rasch model: Fundamental measurement in the human sciences*. Mahwah, NJ: Erlbaum.
- Borg, I. & Groenen, P. (1997). *Modern multidimensional scaling*. New York: Springer.
- Bormann, H. (1972). Fantasy and rhetorical vision: The rhetorical criticism of social reality. *Quarterly Journal of Speech*, 58, 396–407.
- Boulton, M. (Ed.) (1994). *Challenge and innovation: Advances in social research on HIV/AIDS*. Brighton: Falmer.
- Bramley, N. & Eatough, V. (2005). An idiographic case study of the experience of living with Parkinson's disease using interpretative phenomenological analysis. *Psychology & Health*, 20, 223–235.
- Brazelton, T. B. & Cramer, B. G. (1991). *The Earliest Relationship: Parents, infants and the drama of early attachment*. London: Karnac Books.
- Breakwell, G. M. (1994). The echo of power: An integrative framework for social psychological theorizing. *The Psychologist*, 7(2): 65–72.
- Breakwell, G. M. (Ed.) (2004). *Doing social psychology research*. Oxford: Blackwell/BPS.
- Breakwell, G. M. & Canter, D. V. (1993). *Empirical approaches to social representations*. Oxford: Oxford University Press.
- Bringer, J., Johnston, L. & Brackenridge, C. (2004). Maximising transparency in a doctoral thesis: The complexities of writing about the use of QSR*NVIVO within a grounded theory study. *Qualitative Research*, 4, 247–265.
- British Psychological Society (2004). *The BPS Code of Conduct, Ethical Principles and Guidelines*. Leicester: BPS. http://www.bps.org.uk/the-society/ethics-rules-charter-code-of-conduct/ethics-rules-charter-code-of-conduct_home.cfm.
- Brocki, J. & Wearden, A. (in press). A critical evaluation of interpretative phenomenological analysis in health psychology. *Psychology & Health*.
- Brockmeier, J. & Carbaugh, D. (Eds) (2001). *Narrative and identity: Studies in autobiography, self and culture*. Amsterdam: John Benjamins.
- Bruner, J. (1990). *Acts of meaning*. Cambridge, MA: Harvard University Press.
- Bryant, P. & Bradley, L. (1985). *Children's reading problems*. Oxford: Blackwell.
- Bryant, P.E. (1990). Empirical evidence for causes in development. In G. Butterworth & P. E. Bryant (Eds), *Causes of development*. New York: Harvester Wheatsheaf.
- Bull, P. (2004). The analysis of equivocation in political interviews. In G. M. Breakwell (Ed.), *Doing social psychology research*. Oxford: Blackwell.
- Burawoy, M., Burton, A., Ferguson, A. A. & Fox, K. J., with Gamson, J., Hurst, L., Julius, N. G., Kurzman, C., Salzinger, L., Schiffman, J. & Ui, S. (1991). *Ethnography unbound: Power and resistance in the modern metropolis*. Berkeley: University of California Press.
- Burman, E. (1992). Feminism and discourse in developmental psychology: Power, subjectivity and interpretation. *Feminism & Psychology*, 2, 45–59.
- Burman, E. (1995). 'What is it?' Masculinity and femininity in cultural representations of childhood. In S. Wilkinson & C. Kitzinger (Eds), *Feminism and discourse: Psychological perspectives*. London: Sage.

- Burman, E. & Parker, I. (1993a). Introduction – discourse analysis: the turn to the text. In E. Burman & I. Parker (Eds), *Discourse analytic research: Repertoires and readings of texts in action*. London: Routledge.
- Burman, E. & Parker, I. (Eds) (1993b). *Discourse analytic research: Repertoires and readings of texts in action*. London: Routledge.
- Burr, V. (2003). *Social constructionism* (2nd Ed.). London: Routledge.
- Cabinet Office (1999). *Modernising government*. Cm 4310. London: Stationery Office (<http://www.cabinet-office.gov.uk/moderngov/whtpaper/index.htm>).
- Cacioppo, J. T., Tassinari, L. G. & Berntson, G. G. (2000). *Handbook of psychophysiology*. Cambridge: Cambridge University Press.
- Caldirola, D., Bellodi, L., Caumo, A., Migliarese, G. & Perna, G. (2004). Approximate entropy of respiratory patterns in panic disorder. *American Journal of Psychiatry*, 161, 79–87.
- Campbell, A. (2004). Words, words, words. *British Journal of Developmental Psychology*, 22, 509–513.
- Campbell, D. T. & Stanley, J. (1966). *Experimental and quasi-experimental designs for research*. Chicago: Rand McNally.
- Campbell, J. M. (1992). Treating depression in well older adults: use of diaries in cognitive therapy. *Issues in Mental Health Nursing*, 13(1), 19–29.
- Campos, J.J., Anderson, D.I., Barbu-Roth, M.A., Hubbard, E.M., Hertenstein, M.J., & Witherington, D. (2000). Travel broadens the mind. *Infancy*, 1, 149–219.
- Campos, J.J., Hiatt, S., Ramsay, D., Henderson, C. & Svejda (1978). The emergence of fear of the visual cliff, In M. Lewis & L. Rosenblum (Eds) *The development of fear*. (pp. 149–182), New York: Plenum.
- Campos, J.J., Svejda, M.J., Bertenthal, B., Benson, N. & Schmid, D. (1981). Self-produced locomotion and wariness of heights: new evidence from training studies, paper presented at the meeting of the society for Research in Child Development, Boston, Mass.
- Campos, J.J., Svejda, M.J., Campos, R.G. & Bertenthal, B. (1982). The emergence of self-produced locomotion: its importance for psychological development in infancy, In D. Bricker (Ed.) *Intervention with at-risk and handicapped infants*, (pp 195–216), Baltimore, Md: University Park Press.
- Cappello, M. (2005). Photo interviews: Eliciting data through conversations with children. *Field Methods*, 17, 170–182.
- Carlson, J. G., Seifert, A.R. & Birnbaumer, N. (1994). *Clinical applied psychology*. New York: Plenum.
- Carlson, N. R. (2004). *Physiology of behaviour* (8th edn). Boston: Pearson.
- Carr, W. & Kemmis, S. (1986). *Becoming critical: Education, knowledge and action research*. London: Falmer.
- Cattell, R. B. (1978). *The scientific use of factor analysis*. London: Plenum.
- Cattell, R. B. (1981). *Personality and learning theory*, Vols I and II. Berlin: Springer.
- Catterall, M. & Maclaran, P. (1997). Focus group data and qualitative analysis. *Sociological Research Online*, 2(1): <http://www.socresonline.org.uk/2/1/6.html>
- Chalmers, H. & Colvin, J. (2005). Addressing environmental inequalities in UK policy: An action research perspective. *Local Environment*, 10(4), 1–28.
- Chamberlain, P., Camic, P. & Yardley, L. (2004). Qualitative analysis of experience: Grounded theory and case studies. In D. Marks & L. Yardley (Eds), *Research Methods for Clinical and Health Psychology*. London: Sage.

- Chambers, R. (1998) Beyond 'Whose reality counts?' New methods we now need. In O. Fals Borda (Ed.), *People's participation: Challenges ahead*. Bogotá: Tercier Mundo.
- Chapman, E. (2002). The social and ethical implications of changing medical technologies: The views of people living with genetic conditions. *Journal of Health Psychology*, 7, 195–206.
- Charmaz, C. (1990). Discovering chronic illness: Using grounded theory. *Social Science and Medicine*, 30, 1161–1172.
- Charmaz, K. (2000). Grounded theory: Objectivist and subjectivist methods. In N. Denzin & Y. Lincoln (Eds), *Handbook of qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.
- Child, D. (1990). *The essentials of factor analysis*. London: Cassell.
- Christensen, L. B. (1988). *Experimental methodology* (4th edn). Boston: Allyn & Bacon.
- Clark-Carter, D. (2003). Effect size: The missing piece in the jigsaw. *The Psychologist*, 16, 636–638.
- Clogg, C. C. & Stockley, J. W. (1988). Multivariate analysis of discrete data. In J. R. Nesselrode & R. B. Cattell (Eds), *Handbook of multivariate experimental psychology*. London: Plenum.
- Cochran, W. G. (1937). Problems arising in the analysis of a series of similar experiments. *Journal of the Royal Statistics Society*, 4, 102–118.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37–46.
- Cohen, J. (1988). *Statistical power analyses for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Conner, M., Fitter, M. & Fletcher, W. (1999). Stress and snacking: A diary of daily hassles and between-meal snacking. *Psychology and Health*, 14(1), 51–63.
- Conrad, P. (1987). The experience of illness: Recent and new directions. *Research in the Sociology of Health Care*, 6, 1–31. **CHAPTER 16**
- Converse, P. E. (1964). The nature of belief systems in mass publics. In D.E. Apter (Ed.), *Ideology and discontent*. New York; Free Press. **CHAPTER 11**
- Cook, T. D. & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Chicago: Rand McNally.
- Cooke, B. & Wolfram Cox, J. (2005). *Fundamentals of action research*, Vols I–IV. London: Sage.
- Cooper, C. (2002). *Individual differences*. London: Hodder Arnold.
- Corkrey, R. & Parkinson, L. (2002). A comparison of 4 computer-based telephone interviewing methods: Getting answers to sensitive questions. *Behavioural Research Methods, Instruments and Computers*, 34, 354–363.
- Cornsweet, T. N. (1962). The staircase-method in psychophysics. *American Journal of Psychology*, 75, 485–491.
- Cornsweet, T. N. & Teller, D. Y. (1965). Relation of increment thresholds to brightness and luminance. *Journal of the Optical Society of America*, 55, 1303–1308.
- Cox T. F. & Cox M. A. (2001). *Multidimensional scaling* (2nd ed.). Boca Raton, FL: Chapman & Hall.
- Coxon, A. P. M. (1994). Diaries and sexual behaviour: The use of sexual diaries as method and substance in researching gay men's response to HIV/AIDS. In M. Boulton (Ed.), *Challenge and innovation: Methodological advances in social research on HIV/AIDS. Social aspects of AIDS*. London: Taylor & Francis.

- Coxon, A. P. M. (1999). Parallel accounts? Discrepancies between self-report (diary) and recall (questionnaire) measures of the same sexual behaviour. *AIDS Care*, *11*, 221–234.
- Crittenden, P. (1998). Truth, error, omission, distortion, and deception: An application of attachment theory to the assessment and treatment of psychological disorder. In S. M. Clany Dollinger & L. F. DiLalla (Eds), *Assessment and intervention issues across the life span*. London: Lawrence Erlbaum.
- Croft, C. A. & Sorrentino, M. C. (1991). Physician interaction with families on issues of AIDS: What parents and youth indicate they desire. *Journal of Health Behavior, Education and Promotion*, *15*(6), 13–22.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297–334.
- Cronbach, L. J. (1971). Test validation. In R. L. Thorndike (Ed.), *Educational measurement*. Washington, DC: ACE.
- Cronbach, L. J., Gleser, G. C., Nanda, H. & Rajaratnam, N. (1972). *The dependability of behavioral measurements: Theory of generalizability for scores and profiles*. New York: Wiley.
- Crowne, D. P. & Marlowe, D. (1964). *The approval motive: Studies in evaluative dependence*. New York: Wiley.
- Dale, A., Gilbert, G. N. & Arber, S. (1985). Integrating women into class theory. *Sociology*, *19*, 384–409.
- Dallos, R. & Draper, R. (2005). *An introduction to family therapy* (2nd ed.). Maidenhead: Open University Press.
- Dallos, R. & Vetere, A. (2005). *Researching psychotherapy and counselling*. Maidenhead: Open University Press.
- Davies, B. & Harré, R. (1990). Positioning: the discursive production of selves. *Journal for the Theory of Social Behaviour*, *20*, 43–63.
- Davies, B. & Harré, R. (1999). Positioning and personhood. In R. Harré & L. van Langenhove (Eds), *Positioning theory*. Oxford: Blackwell.
- Davies, J. B. (2004). Time for a paradigm shift: Bring on the physics revolution. *The Psychologist*, *17*, 692–693.
- Davison, M. L. & Sharma, A. R. (1990). Parametric statistics and levels of measurement: factorial designs and multiple regression. *Psychological Bulletin*, *107*, 394–400.
- de Gruijter, D. N. M. & van der Kamp, L. J. T. (2005). Statistical test theory for education and psychology. <http://icloniis.iclon.leidenuniv.nl/gruijter/>
- De Leuw, E., & Hox, J. (2001). Trends in household survey nonresponse: A longitudinal and international comparison. In R. Groves, D. Dillman, J. Eltinge & R. Little (Eds), *Survey nonresponse*. New York: Wiley.
- Delli-Carpini, M. & Williams, B. A. (1994). Methods, metaphors and media research: The uses of TV in political conversation. *Communication Research*, *21*(6), 782–812.
- Dempster, J. (2001). *The laboratory computer: A practical guide for physiologists and neuroscientists*. San Diego, CA: Academic Press.
- Denzin, N. & Lincoln, Y. (2005). *The Sage handbook of qualitative research* (3rd ed.). Thousand Oaks, CA: Sage.
- Derrida, J. (1976). *Of grammatology* (trans. G. Chakravorty Spivak). Baltimore, MD: Johns Hopkins University Press.

- Diamond, L. M. (2001). Contributions of psychophysiology to research on adult attachment: Review and recommendations. *Personality and Social Psychology Review*, 5, 276–295.
- Dickinson, J. J., & Poole, D. A. (2000). Efficient coding of eyewitness narratives: A comparison of syntactic unit and word count procedures. *Behavior Research Methods, Instruments and Computers*, 32, 537–545.
- Dobson, V. G. & Rose, D. (1985). Models and metaphysics: The nature of explanation revisited. In D. Rose & V.G. Dobson (Eds), *Models of the visual cortex*. Chichester: Wiley.
- Drew, P. (2003). Conversation analysis. In J. A. Smith (Ed.), *Qualitative psychology. A practical guide to research methods*. London: Sage.
- Dunn, N. J., Seilhamer, R. A., Jacob, T. & Whalen, M. (1993). Comparison of retrospective and current reports of alcoholics and their spouses on drinking behavior. *Addictive Behaviors*, 17, 543–555.
- Dworkin, S. F. & Wilson, L. (1993). Measurement of illness behavior: Review of concepts and common measures. In P. M. Conn (Ed.), *Paradigms for the Study of Behavior*. New York: Academic Press.
- Eatough, V. & Smith, J. A. (in press). I feel like a scrambled egg in my head: An idiographic case study of meaning making and anger using interpretative phenomenological analysis. *Psychology & Psychotherapy*.
- Edley, N. & Wetherell, M. (1999). Imagined futures: Young men's talk about fatherhood and domestic life. *British Journal of Social Psychology*, 38, 181–194.
- Edmunds, H. (1999). *The focus group research handbook*. Lincolnwood, IL: NTC Business Books.
- Edwards, D. & Potter, J. (1992). *Discursive psychology*. London: Sage.
- Elliott, R. (1986). Interpersonal process recall (IPR) as a process research method. In L. Greenberg & W. Pinsof (Eds), *The psychotherapeutic process*. New York: Guilford Press.
- Elliott, R., Fischer, C. T. & Rennie, D. L. (1999). Evolving guidelines for publication of qualitative research studies in psychology and related fields. *British Journal of Clinical Psychology*, 38, 215–229.
- Ellis, C. (1998). Exploring loss through autoethnographic inquiry: Autoethnographic stories, co-constructed narratives, and interactive interviews. In J. Harvey (Ed.), *Perspectives on loss: A sourcebook* (pp. 49–61). Philadelphia: Brunner/Mazel.
- Ellis, D.G (1993). *Small group decision making*. New York: McGraw-Hill.
- Ellis, J. & Kiely, J. (2005) Action inquiry strategies: Taking stock and moving forward. In B. Cooke & J. Wolfram Cox, *Fundamentals of action research*. London: Sage.
- Ely, R., Melzi, G., Hadge, L., McCabe, A. (1998). Being brave, being nice: Themes of agency and communion in children's narratives. *Journal of Personality*, 66, 257–284.
- Embretson, S. E. & Reise, S. (2000). *Item response theory for psychologists*. Mahwah, NJ: Erlbaum.
- Erdberg, P. & Exner, J. E. (1984). Rorschach assessment. In G. Goldstein & M. Hersen (Eds). *Psychological assessment*. New York: Pergamon.
- Evans, M. (1993). Reading lives: How the personal might be social. *Sociology*, 27, 5–13.
- CHAPTER 16**
- Evans, R. I., Rozelle, R. M., Mittelmark, M. B., Hansen, W. B., Bane, A. L. & Havis, J. (1978). Deterring the onset of smoking in children: knowledge of immediate physiological effects and coping with peer pressure, media pressure and parent modeling. *Journal of Applied Social Psychology*, 8(2), 126–135.

- Everitt, B. S. (1977). *The analysis of contingency tables*. London: Chapman & Hall.
- Everitt B. S., Landau, S. & Leese, M. (2001). *Cluster analysis*. London: Arnold.
- Ewing, K. P. (2000). Dream as symptom, dream as myth: A cross-cultural perspective on dream narratives. *Sleep and Hypnosis*, 2(4), 152–159.
- Exner, J. (1986). *The Rorschach: A comprehensive system* (2nd edn). Chichester: Wiley.
- Eysenck, H. J. (1952). The effects of psychotherapy: An evaluation. *Journal of Consulting Psychology*, 16, 319–324.
- Eysenck, H. J. (1994). Meta-analysis and its problems. *British Medical Journal*, 309, 789–792.
- Eysenck, H. J. & Eysenck, S. B. G. (1975). *Manual for the Eysenck Personality Questionnaire*. London: Hodder & Stoughton.
- Eysenck, H. J. & Eysenck, S. B. G. (1976). *Psychoticism as a dimension of personality*. London: Hodder & Stoughton.
- Ezzy, D. (1998). Theorizing narrative identity: Symbolic interactionism and hermeneutics. *Sociological Quarterly*, 39, 239–252.
- Fals Borda, O. (2001). Participatory action research in social theory: Origins and challenges. In P. Reason & H. Bradbury (Eds), *Handbook of action research: Participative inquiry and practice* (pp. 27–37). London: Sage.
- Farell, B. & Pelli, D. G. (1998). Psychophysical methods. In R. H. S. Carpenter & J. G. Robson (Eds), *Vision research: A practical guide to laboratory methods* (pp. 129–136). Oxford: Oxford University Press.
- Farsides, T. (2004). Cognitive mapping: Generating theories of psychological phenomena from verbal accounts and presenting them diagrammatically. In G. M. Breakwell (Ed.), *Doing social psychology research*. Oxford: Blackwell.
- Feldman, C. F. (2001). Narratives of national identity as group narratives: Patterns of interpretive cognition. In J. Brockmeier & D. Carbaugh (Eds), *Narrative and identity: Studies in autobiography, self and culture* (pp. 129–144). Amsterdam: John Benjamins.
- Field, A. P. (2003). Can meta-analysis be trusted? *The Psychologist*, 16, 642–645.
- Field, A. & Hole, G. (2003). *How to design and report experiments*. London: Sage.
- Fielding, N. (Ed.) (2003). *Interviewing*. London: Sage.
- Fisch, B. J. (1999). *Fisch and Spehlmann's EEG primer: Basic principles of digital and analog EEG* (3rd ed.). Amsterdam: Elsevier.
- Fischer, G. & Molenaar, I. (1995). *Rasch models: Foundations, recent developments and applications*. London: Springer.
- Fisher, R. A. (1935). *The design of experiments*. Edinburgh: Oliver & Boyd.
- Fleiss, J. L. (1971). Measuring nominal scale agreement among many raters. *Psychological Bulletin*, 76, 378–382.
- Flick, U. (1998). *An introduction to qualitative research*. London: Sage.
- Fontana, A. & Fry, J. H. (2000). The interview: From structured questions to negotiated text. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.
- Forbat, L. (2005). *Talking about care: Two sides to the story*. Bristol: Policy Press.
- Freeman, P. R. (1973). *Table of d' and β* . Cambridge: Cambridge University Press.
- Fried, R. & Grimaldi, J. (1993). *The psychology and physiology of breathing*. London: Plenum.

- Frith, H. (2000). Focusing on sex: Using focus groups in sex research. *Sexualities*, 3, 275–297.
- Frith, H. & Kitzinger, C. (1998). Emotion work as a participant resource: A feminist analysis of young women's talk-in-interaction. *Sociology: Journal of the British Sociological Association*, 32(2), 305–321.
- Frosh, S., Phoenix, A. & Pattman, R. (2003). Taking a stand: Using psychoanalysis to explore the positioning of subjects in discourse. *British Journal of Social Psychology*, 42, 39–53.
- Fuller, T. D., Edwards, J. N., Vorakitphokatom, S. & Sermsri, S. (1993). Using focus groups to adapt survey instruments to new populations: Experience from a developing country. In D. L. Morgan (Ed.), *Successful focus groups: Advancing the state of the art*. London: Sage.
- Gage, N.L. (1963) *Handbook of research on teaching*. Chicago: Rand McNally.
- Gale, A. & Eysenck, H. O. (Eds) (1993). *Handbook of individual differences: Biological perspectives*. Chichester: Wiley.
- Gaskell, G., Wright, D. & O'Muircheartaigh, P. (1993). Reliability of surveys. *The Psychologist*, 6, 500–503.
- Gaventa J. & Cornwall, A. (2001). Power and knowledge. In P. Reason & H. Bradbury, *Handbook of action research: Participative inquiry and practice*. London: Sage.
- Gergen, K. J. (1989). Warranting voice and the elaboration of the self. In J. Shotter & K. J. Gergen (Eds), *Texts of identity*. London: Sage.
- Gergen, K. J. (1994). *Realities and relationships: Soundings in social construction*. Cambridge, MA: Harvard University Press.
- Gergen, K. J. (1998). From control to co-construction: New narratives for the social sciences. *Psychological Inquiry*, 9(2), 101–103.
- Gervais, M.-C. (1993). *How communities cope with environmental crises: The case of the Shetland oil spill*. Paper presented at the BPS Social Psychology Section Annual Conference, Jesus College, Oxford, September.
- Gescheider, G. A. (1997). *Psychophysics* (3rd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Gibbs, G. R. (2002). *Qualitative data analysis: Explorations with NVivo*. Buckingham: Open University Press.
- Gileson, E. J., & Walk, R. D. (1960). The 'visual cliff'. *Scientific American*, 202, 64–71.
- Gifi, A. (1990). *Nonlinear multivariate analysis*. Chichester: Wiley.
- Gilgun, J. F., Daly, K. & Handel, G. (1992). *Qualitative methods in family research*. London: Sage.
- Gillett, R. (2001). Meta-analysis and bias in research reviews. *Journal of Reproductive and Infant Psychology*, 19(4), 287–294.
- Giorgi, A. & Giorgi, B. (2003). Phenomenology. In J. A. Smith (Ed.), *Qualitative psychology. A practical guide to research methods* (pp. 25–50). London: Sage.
- Glaser, B. G. & Strauss, A. L. (1967). *The discovery of grounded theory*. Chicago: Aldine.
- Glaser, R. (1963). Instructional technology and the measurement of learning outcomes. *American Psychologist*, 18, 519–522.
- Glass, G., McGraw, B. & Smith, M. L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: Sage.
- Glitz, B. (1998). *Focus groups for libraries and librarians*. New York: Forbers Custom Publishing.
- Greenwald, P. C. (1975). Consequences of prejudice against the null hypothesis. *Psychological Bulletin*, 82, 1–20.

- Goetz, J. P. & LeCompte, M. D. (1984). *Ethnography and qualitative design in educational research*. London: Academic.
- Goffman, E. (1961). *Asylums*. Chicago: Aldine.
- Goldberg, D. (1972). *The detection of psychiatric illness by questionnaire*. London: Oxford University Press.
- Golsworthy, R. & Coyle, A. (1999). Spiritual beliefs and the search for meaning among older adults following partner loss. *Mortality*, 4, 21–40.
- Gomm, R., Hammersley, M. & Foster, P. (2000). *Case study and generalization*. In R. Gomm, M. Hammersley & P. Foster (Eds), *Case study method*. London: Sage.
- Gottman, J. M. (1982). Emotional responsiveness in marital communications. *Journal of Communications*, Summer, 108–120.
- Green, D. M. & Swets, J. A. (1966). *Signal detection theory and psychophysics*. New York: Wiley.
- Greenacre, M. (1984). *Theory and application of correspondence analysis*. New York: Academic.
- Greenacre, M. & Blasius, J. (1994). *Correspondence analysis in the social sciences*. New York: Academic Press.
- Greenbaum, T. L. (1998). *The handbook for focus group research*. London: Sage.
- Greenbaum, T. L. (2000). *Moderating focus groups: A practical guide for group facilitation*. Thousand Oaks, CA: Sage.
- Greenwood, D. J. & Levin, M. (1998). *Introduction to action research*. London: Sage.
- Groves, R., Fowler, F., Couper, M., Lepkowski, J., Singer, E. & Tourangeau, R. (2004). *Survey methodology*. Hoboken, NJ: Wiley.
- Gulliksen, H. (1950). *Theory of mental tests*. New York: Wiley.
- Guttman, L. (1941). The quantification of a class of attributes: A theory and method of scale construction. In P. Horst *et al.* (Eds), *The prediction of personal adjustment*. New York: Social Science Research Council.
- Haberman, S. J. (1978). *The analysis of qualitative data*, Vol. 1. New York: Academic.
- Haberman, S. J. (1979). *The analysis of qualitative data*, Vol. 2. New York: Academic.
- Hair, J. F., Anderson, R. E., Tatham, R. L. & Black, W. C. (1992). *Multivariate data analysis*. New York: Macmillan.
- Hair J. F., Tatham R. L., Anderson R. E. & Black W. (1998). *Multivariate data analysis*. New York: Prentice Hall.
- Hagenaars J. A. & McCutcheon A. L. (2002). *Applied latent class analysis*. Cambridge: Cambridge University Press.
- Hall, J. L. (1981). Hybrid adaptive procedure for estimation of psychometric functions. *Journal of the Acoustical Society of America*, 69, 1763–1769.
- Halliday, A. M., Butler, S. R. & Paul, R. (1987). *A textbook of clinical neurophysiology*. Chichester: Wiley.
- Hambleton, R. K., Swaminathan, H. & Rogers, H. J. (1991). *Fundamentals of item response theory*. London: Sage.
- Hammersley, M. (1992). *What's wrong with ethnography? Methodological explorations*. London: Routledge.
- Hammersley, M. & Atkinson, P. (1995). *Ethnography: Principles in practice* (2nd edn). London: Routledge.

- Hammond, S. (1988). *The meaning and measurement of adolescent estrangement*. PhD thesis, University of Surrey.
- Harlow, L. L., Mulaik, S. & Steiger, J. H. (Eds) (1997). *What if there were no significance tests?* Hillsdale: Lawrence Erlbaum.
- Harman, H. (1976). *Modern factor analysis*. Chicago: University of Chicago Press.
- Harper, D. J. (1994). The professional construction of 'paranoia' and the discursive use of diagnostic criteria. *British Journal of Medical Psychology*, 67, 131–143.
- Harré, R. (1979). *Social being*. Oxford: Basil Blackwell.
- Hart, E. & Bond, M. (1995). *Action research for health and social care: a guide to practice*. Buckingham: Open University Press.
- Harvey, L. O. Jr (1986). Efficient estimation of sensory thresholds. *Behavior Research Methods, Instruments and Computers*, 18, 623–632.
- Hayduk, L. A. (1996). *LISREL: Issues, debates and strategies*. Baltimore, MD: Johns Hopkins University Press.
- Helmholtz, H. von (1962). *Treatise on physiological optics*. New York: Dover. Originally published in 1866.
- Henkel, R. E. (1975). Part-whole correlations and the treatment of ordinal and quasi-interval data as interval data, *Pacific Sociological Review*, 18, 3–26.
- Henwood, K. L. (1993). Women and later life: The discursive construction of identities within family relationships. *Journal of Ageing Studies*, 7, 303–319.
- Henwood, K. L. & Pidgeon, N. (1992). Qualitative research and psychological theorizing. *British Journal of Psychology*, 83, 97–111.
- Henwood, K. L. & Pidgeon, N. F. (2001). Talk about woods and trees: Threat of urbanisation, stability and biodiversity. *Journal of Environmental Psychology*, 21, 125–147.
- Henwood, K. L. & Pidgeon, N. F. (2003). Grounded theory in psychological research. In P. Camic, L. Yardley & J. Rhodes (Eds), *Qualitative research in psychology* (pp. 131–155). Washington, DC: American Psychological Association Press.
- Hepburn, A. & Wiggins, S. (2005). Size matters: constructing accountable bodies in NSPCC helpline interaction. *Discourse & Society*, 16, 625–645.
- Hilder, J. (1997). *Notes on the use of focus groups in organizational settings*. Unpublished manuscript, Social Psychology European Research Institute, University of Surrey.
- Hinkelmann, K. & Kempthorne, O. (2005). *Design and analysis of experiments, advanced experimental design*. Chichester: Wiley.
- Hobbs, D. & May, T. (Eds) (1993). *Interpreting the field: Accounts of ethnography*, Oxford: Clarendon Press.
- Hoepfl, M. (1997). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education*, 9 (<http://wwwborg.lib.vt.edu/JTE/jte-v9n1/hoeofl.html>).
- Hollander, J. A. (2004). The social context of focus groups. *Journal of Contemporary Ethnography*, 33, 602–637.
- Hollway, W. (1989). *Subjectivity and method in psychology: Gender, meaning and science*. London: Sage.
- Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, 6, 65–70.

- Holstein, J. & Gubrium, J. F. (Eds) (2003). *Inside interviewing: New lenses, new concerns*. London: Sage.
- Holsti, O. R. (1969). *Content analysis for the social sciences*. Reading, MA: Addison-Wesley.
- Holter, I. M. & Schwartz-Barcott, D. (1993). Action research: What is it, how has it been used and how can it be used in nursing? *Journal of Advanced Nursing*, 18, 298–304.
- Hosmer, D. W. & Lemeshow, S. (1989). *Applied logistic regression*. Chichester: Wiley.
- Hoyle, R. H. (1995). *Structural equation modelling: Concepts, issues and applications*. London: Sage.
- Huber, R., Ghilardi, M. F., Massimini, M. & Tononi, G. (2004). Local sleep and learning. *Nature*, 430, 78–81.
- Huberty, C. J. (1994). *Applied discriminant analysis*. Chichester: Wiley.
- Hui, C. H. & Triandis, H. C. (1989). Effects of culture and response format on extreme response style. *Journal of Cross-Cultural Psychology*, 20, 296–309.
- Hulin, C. L., Drasgow, F. & Parsons, C. K. (1983). *Item response theory*. Homewood, IL: Dow Jones-Irwin.
- Hull, D. L. (1988). *Science as a process*. Chicago: University of Chicago Press.
- Hunt, M. (1997). *How science takes stock: The story of meta-analysis*. New York: Russell Sage Foundation.
- Hutchinson, K. & Wegge, D. (1991). The effects of interviewer gender upon response in telephone survey research. *Journal of Social Behavior and Personality*, 6, 575–584.
- Hyden, L. C. & Bulow, P. H. (2003). Who's talking: Drawing conclusions from focus groups: Some methodological considerations. *International Journal of Social Research methodology*, 6(4), 305–321.
- Israel, J. (1972). Stipulations and construction the social sciences. In J. Israel & H. Tajfel (Eds), *The context of social psychology*. London: Academic.
- Jacobson, N. S., Fokette, W. C. & Ravenstorf, D. (1984). Toward a standard definition of clinically significant change. *Behaviour Therapy*, 17, 308–311.
- Jarrett, R. L. (1993). Focus group interviewing with low-income minority populations. In D. L. Morgan (Ed.), *Successful focus groups: Advancing the state of the art*. Newbury Park, CA: Sage.
- Jennings, J. & Coles, M. G. (Eds) (1991). *Handbook of cognitive psychophysiology: Central and autonomic nervous system approaches*. Chichester: Wiley.
- Jezzard, P., Matthews, P. M. & Smith, S. (2001). *Functional MRI: An introduction to methods*. Oxford University Press: Oxford.
- Jordan, S. & Roberts, C. (2000). *Learning and residence abroad: Introduction to ethnography for language learners*. Oxford Brookes University, Thames Valley University and King's College London.
- Jöreskog, K. G. (1970). A general method for analysis of covariance structures, *Biometrika*, 57, 239–51.
- Jöreskog, K. G. & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Hillsdale, NJ: Scientific Software International/Erlbaum.
- Jovchelovitch, S. (2000). Corruption flows in our blood: Mixture and impurity in representations of public life in Brazil. In M. Chaib & B. Orfali, B. (Eds), *Social representations and communicative processes*. Jönköping: Jönköping University Press.

- Junker, B. H. (1972). *Fieldwork: An introduction to the social sciences*. Chicago: University of Chicago Press.
- Kalfs, N. & Willem, S. (1998). Large differences in time use for three data collection systems. *Social Indicators Research*, 44, 267–290.
- Kelly, G. A. (1955). *The psychology of personal constructs*, Vols 1 and 2. New York: Norton.
- Kemmis, S & McTaggart, R (1988). *The action research planner*. Geelong: Deakin University Press.
- Kenny, A. J. (2005). Interaction in cyberspace: An on-line focus group. *Journal of Advanced Nursing*, 49, 414–422.
- Keppel, G. & Saufley, J. R. (1980). *Introduction to design and analysis: A Student's handbook*. San Francisco: Freeman.
- Kerlinger, F. N. & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Belmont, CA: Wadsworth/Thomson Learning.
- Kerlinger, F. N. & Pedhazur, E. J. (1973). *Multiple regression in behavioral research*. New York: Holt, Rinehart and Winston.
- Kidder, L. H. & Fine, M. (1987). Qualitative and quantitative methods: When stories converge. In M. M. Mark & L. Shotland (Eds), *New directions in program evaluation*. San Francisco: Jossey-Bass.
- Kiernan, B. D., Cox, D. J., Kovatchev, B. P., Kiernan, B. S. & Giuliano, A. J. (1999). Improving driving performance of senior drivers through self-monitoring with a driving diary. *Physical and Occupational Therapy in Geriatrics*, 16(1–2), 55–64.
- King, G., Keohane, R. O. & Verba, S. (1994). *Designing social enquiry: scientific inference in qualitative research*. Princeton, NJ: Princeton University Press.
- King, R. M. & Wilson, G. V. (1992). Use of a diary technique to investigate psychosomatic relations in atopic dermatitis. *Journal of Psychosomatic Research*, 35, 697–706.
- King-Smith, P. E., Grigsby, S. S., Vingrys, A. J., Benes, S. C. & Supowit, A. (1994). Efficient and unbiased modifications of the QUEST method: Theory, simulations, experimental evaluation and practical implementation. *Vision Research*, 34, 885–912.
- King-Smith, P. E. & Rose, D. (1997). Principles of an adaptive method for measuring the slope of the psychometric function. *Vision Research*, 37, 1595–1604.
- Kirk, R. E. (1996). Practical significance: A concept whose time has come. *Educational and Psychological Measurement*, 56, 746–759.
- Kitcher, P. (1993). *The advancement of science*. New York: Oxford University Press.
- Kitzinger, J. (1994). The method of focus group interviews: The importance of interaction between research participants. *Sociology of Health and Illness*, 16(1), 103–121.
- Klecka, W. R. (1980). *Discriminant analysis*. London: Sage.
- Klee, R. (1997). *Introduction to the philosophy of science*. New York: Oxford University Press.
- Klein, S. A. (2001). Measuring, estimating, and understanding the psychometric function: A commentary. *Perception & Psychophysics*, 63, 1421–1455.
- Klein, S. A. & Macmillan, N. A. (Eds) (2001). Psychometric functions and adaptive methods. *Perception & Psychophysics*, 63, 1277–1455.
- Kline, P. (1993). *Handbook of psychological testing*. London: Routledge.
- Klopfer, W. G. & Taulbee, E. S. (1976). Projective tests. *Annual Review of Psychology*, 27, 543–568.

- Knipschild, P. (1994). Systematic reviews: Some examples. *British Medical Journal*, *309*, 719–721.
- Knodel, J. (1993). The design and analysis of focus group studies: a practical approach. In D. L. Morgan (Ed.), *Successful focus groups: Advancing the state of the art*. London: Sage.
- Kontsevich, L. L. & Tyler, C. W. (1999). Bayesian adaptive estimation of psychometric slope and threshold. *Vision Research*, *39*, 2729–2737.
- Kraemer, H. C. & Thiemann, S. (1987). *How many subjects? Statistical power analysis in research*. Newbury Park, CA: Sage.
- Krippendorff, K. (1980). *Content analysis: An introduction to its methodology*. Beverly Hills, CA: Sage.
- Krosnick, J. A., Holbrook, A. L., Berent, M. K., Carson, R. T., Haneman, W. M. *et al.* (2002). The impact of 'no opinion' response options on data quality. *Public Opinion Quarterly*, *66*, 371–403.
- Krosnick, J. A. & Schuman, H. (1988). Attitude intensity, importance and certainty and susceptibility to response effects. *Journal of Personality and Social Psychology*, *54*, 940–952.
- Krueger, R. A. (1993). Quality control in focus group research. In D. L. Morgan (Ed.), *Successful focus groups: Advancing the state of the art*. London: Sage.
- Krueger, R. A. (1994). *Focus groups: A practical guide for applied research* (2nd edn). London: Sage.
- Krueger, R. A. & Casey, M. (2000). *Focus groups: A practical guide for applied research* (3rd ed.). Newbury Park, CA: Sage.
- Kruskal, J. B. (1964). Nonmetric multidimensional scaling: A numerical method. *Psychometrika*, *29*, 1–27.
- Kruskal, J. B. & Wish, M. (1978). *Multidimensional scaling*. Beverly Hills, CA: Sage.
- Kuder, G. & Richardson, M. (1937). The theory of the estimation of test reliability. *Psychometrika*, *2*, 151–160.
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Kutas, M. & Dale, A. (1997). Electrical and magnetic readings of mental functions. In M. D. Rugg (Ed.), *Cognitive neuroscience*. Hove: Psychology Press.
- Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. London: Sage.
- Labovitz, S. (1975). Comment on Henkel's paper: The interplay between measurement and statistics. *Pacific Sociological Review*, *18*, 27–35.
- Lakoff, G. (1990). *Women, fire and dangerous things*. Chicago: University of Chicago Press.
- Lakatos, I. (1970). Falsification and the methodology of scientific research programmes. In I. Lakatos & A. Musgrave (Eds), *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press.
- Lamiell, J. T. (1995). Rethinking the role of quantitative methods in psychology. In J. A. Smith, R. Harré & L. Van Langenhove (Eds), *Rethinking methods in psychology*. London: Sage.
- Lancaster, H.O. (1969). *The chi-squared distribution*. New York: Wiley.

- Lasen, A. (no date). *A comparative study of mobile phone use in public places in London, Madrid and Paris*. Digital World Research Centre, University of Surrey.
- Lee, R. M. & Fielding, G. (2004). Tools for qualitative data analysis. In M. Hardy & A. Bryman (Eds), *Handbook of data analysis* (pp. 529–546). London, Sage.
- Legg, C., Puri, A. & Thomas, N. (2000). Dietary restraint and self-reported meal sizes: Diary studies with differentially informed consent. *Appetite*, *34*, 235–243.
- Levine, M. W. (2000). *Fundamentals of sensation and perception* (3rd ed.). Oxford: Oxford University Press.
- Lewin, K. (1943). Forces behind food habits and methods of change, *Bulletin of the National Research Council*, *108*, 35–65.
- Lewin, K. (1948). Action research and minority problems. In G. W. Lewin (Ed.), *Resolving social conflicts: Selected papers on group dynamics by Kurt Lewin*. New York: Harper.
- Lewis, A. & Porter, J. (2004). Interviewing children and young people with learning difficulties. *British Journal of Learning Disability*, *32*, 191–197.
- Libman, E., Fichten, C. S., Bailes, S., & Amsel, R. (2000). Sleep questionnaire versus sleep diary: Which measure is better? *International Journal of Rehabilitation and Health*, *5*, 205–209.
- Light, R. J. (1971). Measures of response agreement for qualitative data: Some generalisations and alternatives. *Psychological Bulletin*, *76*, 175–181.
- Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*, Beverly Hills, CA: Sage.
- Linell, P. (2001). A dialogical conception of focus groups and social representations. In U. Sötterlund Larson (Ed.), *Sociocultural theory and methods: An anthology*. Department of Nursing, University of Trollhättan/Uddevalla.
- Linn, R. L. & Slinde, J. A. (1977). The determination of the significance of change between pre and post testing periods. *Review of Educational Research*, *47*, 121–190.
- Lipsey, M. W. & Wilson, D. B. (1993). The efficacy of psychological, educational, and behavioural treatment: Confirmation from meta-analysis. *American Psychologist*, *48*, 1181–1209.
- Lipsey, M. W. & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.
- Lipton, P. (1991). *Inference to the best explanation*. London: Routledge.
- Llewellyn, G. (1991). Adults with an intellectual disability: Australian practitioners' perspectives. *Occupational Therapy Journal of Research*, *11*, 323–335.
- Long, J. S. (1983). *Confirmatory factor analysis*. Newbury Park, CA: Sage.
- Lorber, M. F. (2004). Psychophysiology of aggression, psychopathy, and conduct problems: A meta-analysis. *Psychological Bulletin*, *130*, 531–552.
- Lord, F. M. (1980). *Applications of item response theory to practical testing problems*. Reading, MA: Addison-Wesley.
- Lord, F. M. & Novick, M. (1968). *Statistical theories of mental test scores*. Reading, MA: Addison-Wesley.
- Lowenthal, D. (1985). *The past is a foreign country*. Cambridge: Cambridge University Press.
- Luce, R. D. & Tukey, J. W. (1964). Simultaneous conjoint measurement: A new type of fundamental measurement. *Journal of Mathematical Psychology*, *1*, 1–27.
- Luce, R. D., Krantz, D. H., Suppes, P. & Tversky, A. (1990). *Foundations of measurement, volume 3: Representation, axiomatisation and invariance*. New York: Academic Press.

- Lundh, L. G. & Sperling, M. (2002). Social anxiety and the post-event processing of socially distressing events. *Cognitive Behaviour Therapy*, 31, 129–134.
- Lunt, P. (1996). Discourse of savings. *Journal of Economic Psychology*, 17, 677–690.
- Lunt, P., & Livingstone, S. (1996). Focus groups in common and media research. *Journal of Communication*, 42, 78–87.
- Lynn, P., Beerten, R., Laiho, J. & Martin, J. (2001). *Recommended standard final outcome categories and standard definitions of response rate for social surveys*. Working Papers of the Institute for Social and Economic Research 2001–23. University of Essex, Colchester.
- Macmillan, N. A. & Creelman, C. D. (2005). *Detection theory: A user's guide* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum.
- Madill, A. & Doherty, K. (1994). 'So you did what you wanted then': Discourse analysis, personal agency, and psychotherapy. *Journal of Community & Applied Social Psychology*, 4, 261–273.
- Magina, C. A. (1997). Some recent applications of clinical psychophysiology. *International Journal of Psychophysiology*, 25(1), 1–6.
- Manis, J. G. & Metzger, B. N. (1967). *Symbolic interactionism: A reader in social psychology*. Boston: Allyn & Bacon.
- Marascuilo, L. A. & Levin, J. R. (1983). *Multivariate statistics in the social sciences*. Monterey, CA: Brooks/Cole.
- Markham, A. N. (2004). Internet communication as a tool for research. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice* (pp. 95–124). London: Sage.
- Marsh, P., Rosser, E. & Harré, R. (1978). *The rules of disorder*. London: Routledge & Kegan Paul.
- Marshall, C. & Rossman, G. B. (1999). *Designing qualitative research* (3rd ed.). London: Sage.
- Maruyama, G. M. (1997). *Basics of structural equation modeling*. London: Sage.
- Mather, G., Verstraten, F. & Anstis, S. (Eds) (1998). *The Motion Aftereffect. A modern perspective*. Cambridge, MA: MIT Press.
- May, V. (2004). Narrative identity and the re-conceptualization of lone motherhood. *Narrative Inquiry*, 14(1), 169–189.
- McAdams, D. P. (1999). Personal narratives and the life story. In O. P. John & L. A. Pervin (Eds), *Handbook of personality: Theory and research* (2nd ed.). New York: Guilford Press.
- McAdams, D. P. (2004). The redemptive self: Narrative identity in America today. In D. R. Beike, J. M. Lampinen & D. A. Behrend (Eds) *The self and memory* (pp. 95–115). New York: Psychology Press.
- McCutcheon, A. L. (1987). *Latent class analysis*. Newbury Park, CA: Sage.
- McDonald, R. P. (1985). *Factor analysis and related methods*. Hillsdale, NJ: Erlbaum.
- McLachlan G. J. (2004). *Discriminant analysis and statistical pattern recognition*. Chichester: Wiley.
- McTaggart R. (2005). Is validity really an issue for participatory action research. In B. Cooke & J. Wolfram Cox, *Fundamentals of action research*. London: Sage.
- McLlenberg, G. J. (1991). A note on simple gain score precision. *Applied Psychological Measurement*, 23, 87–89.

- Merton, R. K. & Kendall, P. L. (1946). The focused interview. *American Journal of Sociology*, 51, 541–557.
- Michell, J. (1997). Quantitative science and the definition of measurement in psychology. *British Journal of Psychology*, 88, 355–383.
- Michell, J. (1999). *Measurement in psychology: A critical history of a methodological concept*. Cambridge: Cambridge University Press.
- Michell, J. (2000). Normal science, pathological science and psychometrics. *Theory and Psychology*, 10, 639–667.
- Michell, L. (1998). Combining focus groups and interviews: telling how it is: telling how it feels. In R. Barbour & J. Kitzinger (Eds), *Developing focus group research* (pp. 36–46). London: Sage.
- Michell, L. & West, P. (1996). Peer pressure to smoke: The meaning depends on the method. *Health Education Research*, 11(1), 39–49.
- Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis*. London: Sage.
- Miles, S. & Rowe, G. (2004). The laddering technique. In G. M. Breakwell (Ed.), *Doing social psychology research*. Oxford: Blackwell.
- Milgram, S. (1974). *Obedience to authority*. New York: Harper & Row.
- Milgram, S. (1983). *Obedience to authority: An experimental view*. New York: Harper/Collins.
- Mill, J. S. (1950). *A system of logic*. New York: Harper. Originally published in 1874.
- Minami, M. (2000). The relationship between narrative identity and culture. *Narrative Inquiry*, 10(1), 75–80.
- Minium, E. W., King, B. M. & Bear, G. (1993). *Statistical reasoning in psychology and education*. New York: Wiley.
- Mislevy, R. J. (1993). Foundations of a new test theory. In N. Frederiksen, R. J. Mislevy & I. Bejar (Eds), *Test theory for a new generation of tests*. London: Erlbaum.
- Moncrieff, J. (1998). Research synthesis: Systematic reviews and meta-analysis. *International Review of Psychiatry*, 10, 304–311.
- Moore, J., Canter, D., Stockley, D. & Drake, M. (1995). *The faces of homelessness in London*. Aldershot: Dartmouth.
- Moran, D. (2000). *Introduction to phenomenology*. London: Routledge.
- Morgan, D. L. (1988) *Focus groups as qualitative research*. Newbury Park, CA: Sage.
- Morgan, D. L. (1997). *Focus groups as qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.
- Morgan, D. L. & Krueger, R. A. (1997). *Focus group kit*. London: Sage.
- Morris, D. (2002). *Peopewatching*. London: Vintage.
- Moscovici, S. (1976). *Social influence and social change*. London: Academic.
- Moser, C. A. & Kalton, G. (1971). *Survey methods in social investigation*. London: Heinemann.
- Myers, G. (2000) Becoming a group: Face and sociability in moderated discussions. In S. Sarangi and M. Coulthard (Eds), *Discourse and Social Life*. Haslow: Pearson. pp. 121–137.
- Myrick, H., Anton, R. F., Li, X., Henderson, S., Drobos, D., Voronin, K. & George, M. S. (2004). Differential brain activity in alcoholics and social drinkers to alcohol cues: Relationship to craving. *Neuropsychopharmacology*, 29, 393–402.

- Nesselroade, J. R. & Cattell, R. B. (Eds) (1988). *Handbook of multivariate experimental psychology* (2nd edn). London: Plenum.
- Neugebauer, H. (1929). Das Gefühls- und Willensleben meines Sohnes in seiner frühen Kindheit. *Zeitschrift für Angewandte Psychologie*, *34*, 275–310.
- Nezlek, J. B. (1991). Self-report diaries in the study of social interaction. *Contemporary Social Psychology*, *14*(4), 205–210.
- Nigro, G. & Wolpaw, S. (2004). Interviewing young children with props. *Applied Cognitive Psychology*, *18*, 549–565.
- Nishisato, S. (1980). *Analysis of categorical data: Dual scaling and its applications*. Toronto: University of Toronto Press.
- Nitko, A. J. (1988). Designing tests that are integrated with instruction. In R. L. Linn (Ed.), *Educational measurement*. New York: Macmillan.
- Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.
- Nunnally, J. C. & Bernstein, I. (1994). *Psychometric theory*. New York: McGraw-Hill.
- O'Brien, K. (1993). Improving survey questionnaires through focus groups. In D. L. Morgan (Ed.), *Successful focus groups: Advancing the state of the art*. London: Sage.
- Oldroyd, D. (1986). *The arch of knowledge: An introductory study of the history of the philosophy and methodology of science*. New York: Methuen.
- Oostenveld, R. & Praamstra, P. (2001). The five percent electrode system for high-resolution EEG and ERP measurements. *Clinical Neurophysiology*, *112*, 713–719.
- Oppenheim, A. N. (1992). *Questionnaire design, interviewing and attitude measurement*. London: Pinter.
- O'Reilly, K. (2004). *Ethnographic methods*. London: Routledge.
- Palmer, R. (1969). *Hermeneutics*. Evanston, IL: Northwestern University Press.
- Park, R. E. (1967). *On social control and collective behaviour: Selected papers*. Chicago: University of Chicago Press.
- Parker, I. (1992). *Discourse dynamics: Critical analysis for social and individual psychology*. London: Routledge.
- Parker, I. (1997). Discourse analysis and psychoanalysis. *British Journal of Social Psychology*, *36*, 479–495.
- Parker, I. & Burman, E. (1993). Against discursive imperialism, empiricism and constructionism: Thirty-two problems with discourse analysis. In E. Burman & I. Parker (Eds), *Discourse analytic research: Repertoires and readings of texts in action*. London: Routledge.
- Parker, I., Georgaca, E., Harper, D., McLaughlin, T. & Stowell-Smith, M. (1995). *Deconstructing psychopathology*. London: Sage.
- Parkes, C. M. (1971). Psycho-social transitions: A field for study. *Social Science and Medicine*, *5*, 101–115.
- Pashler, H. & Wixted, J. (Eds) (2002). *Methodology in experimental psychology*. Chichester: Wiley.
- Pearson, K. (1904). Report on certain enteric fever inoculation statistics. *British Medical Journal*, *3*, 1243–1246.
- Pelli, D. G. & Farell, B. (1995). Psychophysical methods. In M. Bass (Ed.), *Handbook of optics*, Vol. I (2nd edn). New York: McGraw-Hill.
- Pentland, A. (1980). Maximum likelihood estimation: The best PEST. *Perception & Psychophysics*, *28*, 377–379.

- Performance and Innovation Unit (2001). *Better policy delivery and design: A discussion paper*. <http://www.strategy.gov.uk>
- Peters, M. L., Sorbi, M. J., Kruise, D. A., Kerssens, J. J., Verhaak, P. F. M., & Bensing, J. M. (2000). Electronic diary assessment of pain, disability and psychological adaptation in patients differing in duration of pain. *Pain, 84*, 181–192.
- Piaget, J. (1952a). *The origins of intelligence in the child*. New York: Basic Books.
- Piaget, J. (1952b). *The child's conception of number*. London: Routledge & Kegan Paul.
- Pidgeon, N. & Henwood, K. (2004). Grounded theory. In M. Hardy & A. Bryman (Eds), *Handbook of data analysis*. London: Sage.
- Plummer, K. (Ed.) (1981). *The making of the modern homosexual*. London: Hutchinson.
- Pomerantz, A. M. (1986). Extreme case formulations: A new way of legitimating claims. *Human Studies, 9*, 219–229.
- Popper, K. R. (1959). *The logic of scientific discovery*. London: Hutchinson.
- Potter, J. (1996). *Representing reality: Discourse, rhetoric and social construction*. London: Sage.
- Potter, J. (2003). Discourse analysis. In M. Hardy & A. Bryman (Eds), *Handbook of Data Analysis*. London: Sage.
- Potter, J. & Collie, F. (1989). 'Community care' as persuasive rhetoric: A study of discourse. *Disability, Handicap & Society, 4*, 57–64.
- Potter, J. & Wetherell, M. (1987). *Discourse and social psychology: Beyond attitudes and behaviour*. London: Sage.
- Powell, G. E. & Adams, M. (1993). *Introduction to research on placement*. Paper presented at the Clinical Psychology Forum, 12–16 March, British Psychological Society.
- Pullman, P. (1998). *The subtle knife*. London: Scholastic Point.
- Radley, A. & Chamberlain, K. (2001). Health psychology and the study of the case: From method to analytic concern. *Social Science and Medicine, 3*, 321–332.
- Rapoport, R. N. (1972). Three dilemmas in action research. In P. A. Clark (Ed.), *Action research in organisational change*. London: Harper & Row.
- Rasch, G. (1960). *Probabilistic models for some intelligence and attainment tests*. Copenhagen: Danish Institute for Educational Research.
- Ray, P. & Page, A. C. (2002). A single session of hypnosis and eye movement desensitisation and reprocessing (EMDR) in the treatment of chronic pain. *Australian Journal of Clinical and Experimental Hypnosis, 30*, 170–178.
- Reason, P. (1988). *Human inquiry in action: Developments in new paradigm research*. London: Sage.
- Reason, P. & Bradbury, H. (2001a). *Handbook of action research: Participative inquiry and practice*. London: Sage.
- Reason, P. & Bradbury, H. (2001b). Introduction: Inquiry and participation in search of a world worthy of human aspiration. In P. Reason & H. Bradbury (Eds), *Handbook of action research: Participative inquiry and practice* (pp. 1–14). London: Sage.
- Reason, P. & Torbert, W. (2001). The action turn: Toward a transformational social science. *Concepts and Transformations, 6*(1), 1–37.
- Reicher, S. (2000). Against methodolatry: Some comments on Elliott, Fischer, and Rennie. *British Journal of Clinical Psychology, 39*, 1–6.
- Reid, K., Flowers, P. & Larkin, M. (2005). Exploring lived experience: An introduction to interpretative phenomenological analysis. *The Psychologist, 18*, 20–23.

- Reuband, K. & Blasius, J. (1996). Face-to-face, telephone and mail questionnaires: Response rates and pattern in a large city study. *Köln Zeitschrift für Soziologie und Sozialpsychologie*, *48*(2), 296–318.
- Reuben, D. B., Wong, R. C., Walsh, K. E. & Hays, R. D. (1995). Feasibility and accuracy of a postcard diary system for tracking healthcare utilization of community-dwelling older persons. *Journal of the American Geriatrics Society*, *43*, 550–552.
- Rich, M. & Patashnick, J. (2002). Narrative research with audio-visual data: VIA and NVivo. *International Journal of Social Research Method, Theory and Practice*, *5*, 245–261.
- Richards, L. (2000). *Using NVivo in qualitative research* (2nd edn.). Melbourne: QSR International.
- Ricoeur, P. (1970). *Freud and philosophy*. New Haven, CT: Yale University Press.
- Ridderinkhof, K. R. & van der Stelt, O. (2000). Attention and selection in the growing child: views derived from developmental psychophysiology. *Biological Psychology*, *54*, 55–106.
- Robson, C. (2002). *Real world research*. Oxford: Blackwell.
- Roethlisberger, F. J. & Dickson, W. J. (1939). *Management and the worker*. Cambridge, MA: Harvard University Press.
- Rorschach, H. (1921). *Psychodiagnostics*. Berne: Huber.
- Rose, D. (1988). ZSCORE: A program for the accurate calculation of d' and β . *Behavior Research Methods, Instruments and Computers*, *20*, 63–64.
- Rose, D. & Dobson, V. G. (1985). Methodological solutions for neuroscience. In D. Rose & V. G. Dobson (Eds), *Models of the visual cortex*. Chichester: Wiley.
- Rose, R. M., Teller, D. Y. & Rendleman, P. (1970). Statistical properties of staircase estimates. *Perception & Psychophysics*, *8*, 199–204.
- Rosenhan, D. L. (1973). On being sane in insane places. *Science*, *179*, 250–268.
- Rosenthal, R. (1979). The 'file drawer' problem and tolerance for null results. *Psychological Bulletin*, *86*, 638–641.
- Rosenthal, R. (1991). *Meta-analytic procedures for social research*. Beverly Hills, CA: Sage.
- Rothschild, Lord (1971). *The organisation and management of government research and development* (Cmnd. 4814). London: HMSO.
- Rust, J. & Golombok, S. (1999). *Modern psychometrics: Science of psychological assessment*. London: Routledge.
- Rustin, M. (2002). Research, evidence and psychotherapy. In C. Mace, S. Morley & B. Roberts (Eds), *Evidence in the psychological therapies*. Hove: Brunner/Routledge.
- Salmon, P. (2003). How do we recognise good research? *The Psychologist*, *16*(1), 24–27.
- Samar, V. J., Swartz, K. P. & Raghuvver, M. R. (1995). Multiresolution analysis of event-related potentials by wavelet decomposition. *Brain and Cognition*, *27*, 398–438.
- Sammer, G. (1998). Heart period variability and respiratory changes associated with physical and mental load: Non-linear analysis. *Ergonomics*, *41*, 746–755.
- Sapsford, R. & Jupp, V. (Eds) (1996). *Data collection and analysis*. London: Sage.
- Schaie, K. W. (1965). A general model for the study of developmental problems. *Psychological Bulletin*, *64*, 92–107.
- Schiffman, S. S., Reynolds, M. L. & Young, F. W. (1981). *Introduction to multidimensional scaling*. New York: Academic.

- Schuetz, A. (1998). Autobiographical narratives of good and bad deeds: Defensive and favorable self-description moderated by trait self-esteem. *Journal of Social and Clinical Psychology, 17*, 466–475.
- Schuman, H. & Presser, S. (1996). *Questions and answers in attitude surveys: Experiments on question form, writing and context*. London: Sage.
- Schwartz, M. S. & Andrasik, F. (2003). *Biofeedback: A practitioner's guide*. New York: Guilford Press.
- Schwartz, A., Campos, J. & Baisel, E. (1973). The visual cliff: cardiac and behavioral correlates on the deep and shallow sides at five and six months of age. *Journal of Experimental Child Psychology, 15*, 86–99.
- Scott, J. (2006). *Documentary research*. London: Sage.
- Scott, J. & Xie, Y. (2006). *Quantitative social science*. London: Sage.
- Sedgwick, E. (1990). *The epistemology of the closet*. London: Penguin.
- Seidel, J. V., Kjolseth, A. & Seymour, J. A. (1988). *The Ethnograph: A user's guide*. Littleton, CO: Qualitative Research Associates.
- Shadish, W. R., Cook, T. D. & Campbell, D. T. (2001). *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton Mifflin.
- Shaughnessy, J. J., Zechmeister, E. B. & Zechmeister, J. S. (2006). *Research methods in psychology* (7th ed.). Boston: McGraw-Hill.
- Shavelson, R. J. & Webb, N. M. (1991). *Generalizability theory*. London: Sage.
- Sherliker, L. & Steptoe, A. (2000). Coping with new treatment of cancer: A feasibility study of daily diary measures. *Patient Education and Counseling, 40*(1), 11–19.
- Shoham-Salomon, V., Avner, R. & Neeman, R. (1989). You're changed if you do and changed if you don't: Mechanisms underlying paradoxical interventions. *Journal of Consulting and Clinical Psychology, 57*, 590–598.
- Shye, S. (1988). *Multiple scaling*. Amsterdam: North-Holland.
- Šidák, Z. (1967). Rectangular confidence regions for the means of multivariate normal distributions. *Journal of the American Statistical Association, 62*, 625–633.
- Silverman, D. (Ed.) (2004). *Qualitative research: Theory, method and practice*. London: Sage.
- Simpson, M. (Ed.) (1996). *Anti-gay*. London: Freedom Editions.
- Singer, J. A. (1997). How recovered memory debates reduce the richness of human identity. *Psychological Inquiry, 8*, 325–329.
- Singer, J. A. (2004). Narrative identity and meaning making across the adult lifespan: An introduction. *Journal of Personality, 72*, 437–460.
- Skidelsky, R. (1992). *John Maynard Keynes: A biography. Vol. 2: The economist as saviour, 1920–1937*. London: Macmillan.
- Skinner, B. F. (1953). *Science and human behaviour*. New York: Macmillan.
- Skinner, C., Holt, D. & Smith, T. (1989). *Analysis of complex surveys*. New York: Wiley.
- Slater, L. (2004). *Opening Skinner's box: Great psychological experiments of the twentieth century*. New York: W.W. Norton.
- Smith, J. A. (1993). The case study. In R. Bayne & P. Nicolson (Eds), *Counselling and psychology for health professionals* (pp. 249–265). London: Chapman & Hall.
- Smith, J. A. (1996). Beyond the divide between cognition and discourse: Using interpretative phenomenological analysis in health psychology. *Psychology and Health, 11*, 261–271.

- Smith, J. A. (1999). Towards a relational self: Social engagement during pregnancy and psychological preparation for motherhood. *British Journal of Social Psychology*, *38*, 409–426.
- Smith, J. A. (2003). *Qualitative psychology: A practical guide to methods*. London: Sage.
- Smith, J. A. (2004). Reflecting on the development of interpretative phenomenological analysis and its contribution to qualitative research in psychology. *Qualitative Research in Psychology*, *1*, 39–54.
- Smith, J. A., Harré, R. & Van Langenhove, L. (1995a). *Rethinking methods in psychology*. London: Sage.
- Smith, J. A., Harré, R. & Van Langenhove, L. (1995b). Idiography and the case study. In J. A. Smith, R. Harré & L. Van Langenhove (Eds), *Rethinking psychology* (pp. 59–69). London: Sage.
- Smith, J. A. & Osborn, M. (2003). Interpretative phenomenological analysis. In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to research methods* (pp. 51–80). London: Sage.
- Smith, M. J. (2005). *Philosophy and methodology in the social sciences*. London: Sage.
- Smith, M. L. & Glass, G. V. (1977). Meta-analysis of psychotherapy outcome studies. *American Psychologist*, *32*, 752–60.
- Solesbury, W. (2001). *Evidence based policy: Whence it came and where it's going*. Working Paper 1, ESRC UK Centre for Evidence Based Policy and Practice.
- Spearman, C. (1907). Demonstration of formulae for true measures of correlation. *American Journal of Psychology*, *18*, 161–169.
- Spencer, L., Faulkner, A. & Keegan, J. (1988). *Talking about sex*. London: Social and Community Planning Research.
- Spencer, L., Ritchie, J., Lewis, J. & Dillon, L. (2003). *Quality in qualitative evaluation: A framework for assessing research evidence*. London: Cabinet Office.
- Spradley, J. P. (1979). *The ethnographic interview*. New York: Holt, Rinehart and Winston.
- Spradley, J. P. & Mann, B. J. (1975). *The cocktail waitress: Women's work in a man's world*. New York: Wiley.
- Stanton, B., Black, M., Laljee, L. & Ricardo, I. (1993). Perceptions of sexual behaviour among urban early adolescents: translating theory through focus groups. *Journal of Early Adolescence*, *13*(1), 44–66.
- Steinschneider, M., Kurtzberg, D. & Vaughan, H. G. (1992). Event-related potentials in developmental neuropsychology. In I. Rapin & S. J. Segalowitz (Eds), *Handbook of Neuropsychology*, Vol. 6. Amsterdam: Elsevier Science.
- Stephoe, A., & Wardle, J. (1999). Mood and drinking: A naturalistic diary study of alcohol, coffee and tea. *Psychopharmacology*, *141*, 315–321.
- Stevens, S. S. (1946). On the theory of scales of measurement, *Science*, *103*, 677–680.
- Stewart, D. W. & Shamdasani, P. N. (1990). *Focus groups: Theory and practice*. Newbury Park, CA: Sage.
- Steyaert, C. & Bouwen, R. (2004). Group methods of organizational analysis. In C. Cassell & G. Simon (Eds), *Essential Guide to Qualitative Methods in Organizational Research*. London: Sage. pp. 140–153.
- Stine, W. W. (1989). Meaningful inference: The role of measurement in statistics. *Psychological Bulletin*, *105*, 147–155.

- Stockley, D. (1998). *Report of rough sleepers' views and experiences for the Salvation Army in evidence to the Social Exclusion Unit*. London: Salvation Army.
- Strauss, A. & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.
- Strauss, A. & Corbin, J. (Eds) (1997). *Grounded theory in practice*. London: Sage.
- Strauss, A. & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Newbury Park, CA: Sage.
- Stringer, E. T. (1996). *Action research: A handbook for practitioners*. London: Sage.
- Stringer, E. T. (1999). *Action research* (2nd ed.). London: Sage.
- Strong, J. & Large, R. G. (1995). Coping with chronic low back pain: an idiographic exploration through focus groups. *International Journal of Psychiatry in Medicine*, 25, 371–387.
- Sudman, S. & Bradburn, N. M. (1982). *Asking questions: A practical guide to questionnaire design*. San Francisco: Jossey-Bass.
- Suen, H. K. (1990). *Principles of test theories*. Hillsdale, NJ: Erlbaum.
- Surakka, V. & Hietanen, J. K. (1998). Facial and emotional reactions to Duchenne and non-Duchenne smiles. *International Journal of Psychophysiology*, 29(1), 23–33.
- Svejda, M. & Schmid, D. (1979). The role of self-produced locomotion in the onset of fear of heights on the visual cliff, paper presented at the meeting of the Society of Research in Child Development, San Francisco.
- Swantz, M.-L., Ndedya, E. & Masaiganah, M. S. (2001). Participatory action research in Southern Tanzania, with special reference to women. In P. Reason & H. Bradbury (Eds), *Handbook of action research: Participative inquiry and practice* (pp. 386–395). London: Sage.
- Tabachnick, B. G. & Fidell, L. S. (2001). *Using multivariate statistics*. Boston: Allyn & Bacon.
- Tacq, J. (1997). *Multivariate analysis techniques in social science research: From problem to analysis*. London: Sage.
- Taylor, C. (1985). Self-interpreting animals. In *Philosophical papers: Vol. 1. Human agency and language* (pp. 45–76). Cambridge: Cambridge University Press.
- Taylor, M. M. & Creelman, C. D. (1967). PEST: efficient estimates on probability functions. *Journal of the Acoustical Society of America*, 41, 782–787.
- Taylor, S. M., Elliot, S., Eyles, J., Frank, J. et al. (1991). Psychosocial impacts in populations exposed to solid waste facilities. *Social Science and Medicine*, 33, 441–447.
- Teichert, D. (2004). Narrative, identity and the self. *Journal of Consciousness Studies*, 11(10–11), 175–191.
- Thomas, J. (1993). *Doing critical ethnography*. London: Sage.
- Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, DC: American Psychological Association.
- Tinsley, H. E. A. & Brown, S. D. (2000). *Handbook of applied multivariate statistics and mathematical modeling*. New York: Academic Press.
- Tippett, L. H. (1931). *The method of statistics*. London: Williams & Norgate.
- Tizard, B., Blatchford, P., Burke, J., Farquar, C. & Plewis, I. (1988). Young children at school in *the inner city*. Hove: Erlbaum.
- Todman, J. B. & Dugard, P. (2001). *Single-case and small-n experimental designs: A practical guide to randomization tests*. Mahwah, NJ: Lawrence Erlbaum Associates.

- Torgerson, C. J., Porthouse, J. & Brooks, G. (2003). A systematic review and meta-analysis of randomised controlled trials evaluating interventions in adult literacy and numeracy. *Journal of Research in Reading*, *26*, 234–255.
- Townsend, J. T. & Ashby, F. G. (1984). Measurement scales and statistics: The misconception misconceived. *Psychological Bulletin*, *96*, 394–401.
- Treisman, M. & Watts, T. R. (1966). Relation between signal detectability theory and the traditional procedures for measuring sensory thresholds: Estimating d' from results given by the method of constant stimuli. *Psychological Bulletin*, *66*, 438–454.
- Treutwein, B. (1995). Adaptive psychophysical procedures, *Vision Research*, *35*, 2503–2522.
- Treutwein, B. & Strasburger, H. (1999). Fitting the psychometric function. *Perception and Psychophysics*, *61*, 87–106.
- Turner, B. A. & Pidgeon, N. F. (1997). *Man made disasters* (2nd ed.), Oxford: Butterworth-Heinemann.
- Turpin, G., Barley, V., Beail, N., Scaife, J., Slade, P., Smith, J. A. & Walsh, S. (1997). Standards for research projects and theses involving qualitative methods: Suggested guidelines for trainees and courses. *Clinical Psychology Forum*, *108*, 3–7.
- Tyrrell, R. A. & Owens, D. A. (1988). A rapid technique to assess the resting states of the eyes and other threshold phenomena: The modified binary search (MOBS). *Behavior Research Methods, Instruments and Computers*, *20*, 137–141.
- Ullman, J. B. (2001). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (Eds), *Using multivariate statistics* (4th ed.). Boston: Allyn & Bacon.
- Ulrich, R. & Miller, J. (2004). Threshold estimation in two-alternative forced-choice (2AFC) tasks: The Spearman-Kärber method. *Perception & Psychophysics*, *66*, 517–533.
- Ussher, J. M. & Mooney-Somers, J. (2000). Negotiating desire and sexual subjectivity: Narratives of young Lesbian avengers. *Sexualities*, *3*, 183–200.
- Uzzell, D. L. (1979). Four roles for the community researcher. *Journal of Voluntary Action Research*, *8*(1–2), 66–76.
- Van der Linden W. & Hambleton R. (1997). *The handbook of modern item response theory*. London: Springer.
- Van der Molen, B. (2000). Relating information needs to the cancer experience. 2. Themes from six cancer narratives. *European Journal of Cancer Care*, *9*(1), 48–54.
- Van der Molen, M. W. & Molenaar, P. C. M. (1994). Cognitive psychophysiology: A window to cognitive development and brain maturation. In G. Dawson & K. W. Fischer (Eds), *Human behavior and the developing brain*. New York: Guilford.
- Vetere, A. & Gale, T. (1987). *Ecological studies of family life*. Chichester: Wiley.
- von Eye, A. (1990). *Introduction to configural frequency analysis*. Cambridge: Cambridge University Press.
- von Eye, A. (2002). *Configural frequency analysis: Methods, models, and applications*. Earlbaum: New York.
- Wagner, H. & Manstead, A. (Eds) (1989). *Handbook of social psychophysiology*. Chichester: Wiley.
- Waite, B. M., Claffey, R. & Hillbrand, M. (1998). Differences between volunteers and non-volunteers in a high demand self-recording study. *Psychological Reports*, *83*(1), 199–210.
- Walker, P., Lewis, J., Lingayah, S. & Sommer, F. (2000). *Prove it: Measuring the effect of neighbourhood renewal on local people*. London: New Economics Foundation (http://www.neweconomics.org/gen/z_sys_PublicationDetail.aspx?PID=2).

- Wallwork, J. & Dixon, J. A. (2004). Foxes, green fields and Britishness: On the rhetorical construction of place and national identity, *British Journal of Social Psychology*, 43, 21–39.
- Warnock, M. (1987). *Memory*. London: Faber and Faber.
- Watson, A. B. & Pelli, D. G. (1983). QUEST: A Bayesian adaptive psychometric method. *Perception & Psychophysics*, 33, 113–120.
- Watzlawick, P. (1964). *An anthology of human communication*. Palo Alto, CA: Science and Behavior Books.
- Watzlawick, P., Beavin, J. & Jackson, D. (1967). *Pragmatics of human communication*. New York: Norton.
- Weille, K. L. (2002). The psychodynamics of consensual sadomasochistic and dominant-submissive sexual games. *Studies on Gender and Sexuality*, 3, 131–160.
- Welkowitz, J., Ewen, R. B., & Cohen, J. (1982). *Introductory statistics for the behavioral sciences*. San Diego, CA: Harcourt Brace Jovanovich.
- Weller, S. C. & Romney, A. K. (1990). *Metric scaling: Correspondence analysis*. London: Sage.
- Wellings, K., Branigan, P. & Mitchell, K. (2000). Discomfort, discord and discontinuity as data: Using focus groups to research sensitive topics. *Culture, Health and Sexuality*, 2, 255–267.
- Wengraf, T. (2001). *Qualitative research interviewing: biographic narrative and semi-structured methods*. Thousand Oaks, CA: Sage.
- Werner, O. & Schoepfle, G. M. (1987). *Systematic fieldwork. Volume 1: Foundations of ethnography and interviewing*. London: Sage.
- Wetherell, M. (1998). Positioning and interpretative repertoires: Conversation analysis and post-structuralism in dialogue. *Discourse & Society*, 9, 387–412.
- Wetherell, M. (2001). Debates in discourse research. In M. Wetherell, S. Taylor & S. J. Yates (Eds), *Discourse theory and practice: A reader*. London: Sage.
- Wetherell, M. & Potter, J. (1992). *Mapping the language of racism: Discourse and the legitimization of exploitation*. Hemel Hempstead: Harvester Wheatsheaf.
- Wetherell, M., Taylor, S. & Yates, S. J. (Eds) (2001a). *Discourse theory and practice: A reader*. London: Sage.
- Wetherell, M., Taylor, S. & Yates, S. J. (Eds) (2001b). *Discourse as data: A guide for analysis*. London: Sage.
- Wetherill, G. B. & Levitt, H. (1965). Sequential estimation of points on a psychometric function. *British Journal of Mathematical and Statistical Psychology*, 18, 1–10.
- Whyte, W. F. (1991). *Participatory action research*. London: Sage.
- Whyte, W. F. (1943). *Street corner society: The social structure of an Italian slum*. Chicago: University of Chicago Press.
- Widdicombe, S. (1993). Autobiography and change: rhetoric and authenticity of 'Gothic' style. In E. Burman & I. Parker (Eds), *Discourse analytic research: Repertoires and readings of texts in action*. London: Routledge.
- Wiggins, S. (2004). Good for 'you': Generic and individual healthy eating advice in family mealtimes. *Journal of Health Psychology*, 9, 535–548.
- Wilkinson, S. (1998). Focus group methodology: A review. *International Journal of Social Research Methodology*, 1, 181–203.
- Wilkinson, S. (2003). Focus groups. In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to research methods*. (pp. 184–204). London: Sage.

- Wilkinson, S. (2004a). Focus groups. In G. M. Breakwell (Ed.), *Doing social psychology research*. Oxford: Blackwell.
- Wilkinson, S. (2004b). Focus group research. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice* (pp. 177–199). London: Sage.
- Willig, C. (Ed.) (1999). *Applied discourse analysis: Social and psychological interventions*. Buckingham: Open University Press.
- Willig, C. (2001). *Introducing qualitative research in psychology: Adventures in theory and method*. Buckingham: Open University Press.
- Wilson, C. & Powell, M. (2003). A guide to interviewing children. *Applied Cognitive Psychology*, 17(2), 249.
- Wilson, G. D. & Patterson, J. R. (1968). A new measure of conservatism. *British Journal of Social and Clinical Psychology*, 7, 264–290.
- Winborne, D. G. & Dardaine, R. P. (1993). Affective education for 'at risk' students – the new urban principles. *Urban Review*, 15(2), 139–150.
- Winer, B. J. (1978). *Statistical principles in experimental design*. New York: McGraw-Hill.
- Winkielman, P. & Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: Psychophysiological evidence that processing facilitation elicits positive affect. *Journal of Personality and Social Psychology*, 81, 989–1000.
- Wirth, L. (1928). *The ghetto*. Chicago: University of Chicago Press.
- Wolf, F. M. (1986). *Meta-analysis: Quantitative methods for research synthesis*. Beverly Hills, CA: Sage.
- Wolke, D., Meyer, R. & Gray, P. (1994). Validity of the Crying Pattern Questionnaire in a sample of excessively crying babies. *Journal of Reproductive and Infant Psychology*, 12(2), 105–114.
- Woodworth, R. S. & Schlosberg, H. (1954). *Experimental psychology* (rev. ed.). London: Methuen.
- Wooffitt, R. (2001). Analysing factual accounts. In N. Gilbert (Ed.), *Researching social life* (2nd ed.). London: Sage.
- Yardley, L. (2000). Dilemmas in qualitative research, *Psychology and Health*, 15, 215–228.
- Yin, R. K. (2003). *Case study research. Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Young, K. & Kramer, J. (1978). Local exclusionary policies in Britain: The case of suburban defence in a metropolitan system. In K. Cox (Ed.), *Urbanization and conflict in market societies*. London: Methuen.
- Zani, A. & Proverbio, A. M. (2002). *The cognitive electrophysiology of mind and brain*. San Diego, CA: Academic Press.
- Ziller, R. C. (1973). *The social self*. Oxford: Pergamon Press.
- Ziller, R. C. (2000). Self-counselling through re-authored photo self narratives. *Counselling Psychology Quarterly*, 13, 265–278.
- Zorbaugh, H. W. (1929). *The Gold Coast and the slum: A sociological study of Chicago's Near North Side*. Chicago: University of Chicago Press.

