

INVASIVE PSYCHOLOGICAL METHODS

Invasive methods meaning the methods which involve the medical instruments into the part of brain.

The invasive techniques are used on laboratory animals and they fall into 3 categories

- lesions
- electrical stimulation
- invasive recording methods

Before that we describe stereotaxic surgery as all of them involves it.

Stereotaxic surgery means by the experimental device is positioned in the depth of the brain

Two things are required.

1) ^{stereotaxic} atlas - used similar to geographical one imp difference the geographical is 2 dimension and the brain has 3. All the distance are given in millimetre from the designated reference point

2) Stereotaxic instrument - has 2 parts
a head holder ~~and~~ which holds each
 subject's brain in the prescribed position
the electrode holder - which holds the
 device to be inserted

A system of precise gears allows the
 electrode holder move in 3 dimensions
 anterior posterior, ventral-dorsal and
~~tetral~~ lateral and medial

1) Lesion Methods.

In this a part of brains is destroyed
 damaged and inactivated, then
 behaviour is carefully assessed in the
 effort to ~~to~~ determine the lesioned
 function.

Four types of lesions

i) Aspirational lesion - lesion made
 in the ~~#~~ area that is accessible to
 the eyes and the instrument of
 the surgeon.

The cortex tissue is suction by
 the fine lipped hand^{held} glass pipe

The tissue is delicately ~~pr~~ peeled off
~~so~~ that the by the specialised
 surgeon so that the white matter
 and blood vessel underlying the
 tissue is undamaged.

ii) Radiofrequency lesions - Small subcortical
 lesions are made through passing radio
 frequencies from the stereotaxically placed
 electrode from which the heat of current
 is passed ~~through~~ the tissue

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The size and shape of the lesion are determined by the duration and frequency of the current.

iii) Knife cut sectioning is used to eliminate conduction in a nerve or tract. A finely well placed cut can be ambiguously accomplish the task without damaging the nearby tissues.

iv) Reversible lesions
alternative to destructive lesion these are methods to temporarily eliminate the activity of the part of the brain while test are being conducted. There is an advantage that same subject can be tested repeatedly.

Reversible lesions can be done by cooling the target structure or injecting anesthesia to that part.

The behavioural effects of unilateral lesions (restriction from one side) are much milder than bilateral lesions (both sides).

Electrical Stimulation -
function of neural structure is obtained through stimulating electricity.

Electrical brain stimulation is usually delivered across the two tips of bipolar electrode - two insulated wires wound tightly together and cut at the end.

- It is an imp tool because it often has behavioural effects, usually opposite to those produced by the lesions at the same site.

- It can elicit a number of behaviours like eating, drinking, attacking, copulating and sleeping.

- The particular behaviour depends on the location of the electrode tip, frequency of the current etc.

This is usually limited to nonhuman

Electrophysiological recording Methods.

2 types.

1/ Intracellular unit recording -
moment by moment record of graded fluctuation on one neuron membrane potential. Done on chemically immobilized animal because it is difficult to keep the tip of microelectrode position inside animal.

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2) Extracellular unit recording
Recording the action potential
of a neuron through a microelectrode
placed in the extracellular fluid
to it - each time neuron fires
the electrical disturbance and
a blip is recorded at the electrode.

It is difficult to record from
a moving animal but is
possible from flexible microelectrode
that can shift slightly with
the brain.

3) Multiple unit recording -
The electrode tip is much larger
than microelectrode tip, it picks
up signals from many neurons
and slight shift in the position
due to movement of the
subject have little effect on
overall signal.

4) Invasive EEG Recording
Recorded through large
implanted electrodes rather
than scalp electrodes
Cortical EEG
— stainless steel skull screws
Subcortical EEG
stereotaxical implanted wire
electrodes