

- 1) Lowering of synaptic neural path resistance (synaptic resistance)
simple & direct.
complex

$$\frac{\text{growth of synapses}}{\text{growth of dendrite spicules}}$$
 morphological Δ 's left in tissue after excitations have passed
- 2) Self-reexciting circuits, dynamic memory, but ruled out by shock, coma, etc.
- 3) Summed & long term memory - one = dynam + other morphological gradually wears in
- 4) Facil. set comes 1st, then little or no connection between S + R

At organizational level that 2 ideas differ in one case direct association leads

Impulses deflected by: ①

in such a way ②
 that ends up evoking ③
 CR ④ facil. set

what are the deflecting factors?



Neural Basis of the Conditioned Reflex

More than ~~years~~ years after Pavlov's discovery of the conditioned reflex, we still lack a satisfactory explanation of the neural mechanism of conditioning.

~~When~~ An electric shock ~~is~~ applied to the ~~foot~~ ~~of~~ ~~a~~ ~~dog~~ ~~elicits~~ ~~a~~ ~~reflex~~ ~~withdrawal~~ ~~of~~ ~~the~~ ~~foot~~. ~~To~~ ~~be~~ ~~reflexively~~ ~~withdrawn~~. If ~~the~~ shock is applied repeatedly along with a warning signal such as a bell, ~~the~~ the sound of the bell alone comes in time to evoke a "conditioned" ~~reflex~~ ~~response~~ ^{response}. Although attempts to explain this ^{apparently simple} phenomenon have been pursued intently ever since Pavlov first described the conditioned reflex more than ~~years~~ years ago, we still lack today a satisfactory picture of the neural mechanism of conditioning.

Even the general nature of the brain changes ~~that~~ ~~are~~ ~~involved~~ ~~in~~ ~~the~~ ~~process~~ ~~of~~ ~~conditioning~~ remains obscure.

The original suggestion of Pavlov that the problem in terms of ~~deflection~~ ~~of~~ ~~impulses~~ ~~is~~ ~~impulses~~

At present the problem is still a matter of the general nature of the brain changes

Not merely the details, but even the general nature of the brain changes remains ~~to be explained~~ obscure.

7) Essentially ^{our} ~~the~~ problem is ~~that of the~~ ^{to explain} ~~kind of changes~~ ^{the} central ^{nervous} ~~system~~ attractions ~~that~~ ^{impulses from the bell, so to speak,} responsible for deflecting the ~~incoming~~ sensory ^{into the new motor} channels ~~that lead to the~~ ^{of the conditioned} ~~conditioned motor~~ responses. According to one of the simplest and earliest suggestions, it was supposed that ~~new structural~~ ~~the sensory impulses spread~~ ~~new~~ central pathways were formed during conditioning, ^{directly} between the ~~receptor and sensory~~ ^{receptor} and motor centers of the cortex. The ^{repeated} ~~associated~~ excitations of the two cortical centers ^{temporal} ~~in association~~ was supposed to leave a residual effect on the connecting pathways ~~that~~ ^{the sensory} that made it easier for excitations to spread along these ^{particular} channels in the future.

This simple concept has been found inadequate to account for the facts and has long since been replaced

This simple explanation ~~has been~~ ^{was seen} found to be inadequate in its original form and has now given way to various modifications.

The idea that new channels are opened between the receptor and motor centers ~~is still~~ is still accepted in some quarters, but it is ^{now} recognized that these central connections are ~~not~~ ^{highly} complex and devious. ~~must be~~ ^{not} direct between the cortical centers involved but

Instead of ~~residual~~ ^{themselves} effects upon the alternative neural pathways, ~~it has~~ ^{may set up} been proposed that the conditioning process ~~leads~~ ^{in stored circuits} to the establishment of self-reciting activity that persists and acts to deflect subsequent excitation into the motor channels of the conditioned response. This dynamic view of conditioning, however, ~~fails~~ fails to account for the survival of conditioned reflexes following electroconvulsion shock, or deep anesthesia, and states of coma in which such dynamic ~~of~~ activity would be disrupted.

disadvantage dynamic

This has led to a combination exper

Neural Basis of the Conditioned Reflex

Although efforts to analyze the conditioned response (C.R.) have been undertaken intensively ever since Pavlov's initial descriptions more than - years ago, we still lack today a satisfactory picture of the neural mechanism of conditioning. Even the general nature ^{Phys kind} of the brain changes by which ~~a given~~ ^{cause to effect} conditioning stimulus becomes linked to the conditioned response remain ~~uncertain~~ ^{obscure}.

The initial suggestion of Pavlov that conditioning involves the ^{formation} ~~topping~~ of new cortical associations ^{directly linking} ~~between~~ the receptor and motor ^{by all but a few investigators} centers of the cortex has been ~~generally~~ discarded as being too simple and at variance with more recent evidence ().

~~This does not preclude, however,~~ ^{many} students of conditioned reflex physiology, however, ^{contribute to adapt response} support a modification of this idea ^{holding} maintaining that new ^{brain} neural pathways, ~~of some kind, even though they be~~ ~~very complex and devious, must be~~ ~~formed~~ ^{cortical} between the ^{for conditioning} receptor and motor centers must be necessary ^{perhaps} even tho they be much more devious and complex than originally conceived.

Konorski (1) suggests neurobiology or
something as

Others ^{have been evidence points} ~~are~~ coming to a ~~more~~ more
dynamic interpretation of conditioning
in which the ~~central~~ ^{central} linking between
the ^{conditioned stimulus} CS and CR is conceived to be an
active ^{or} facilitatory set rather than new
structural pathways in the brain.

This hypothesis seems to have greater
promise in flexibility and explanatory
value than

According to this view the new linkage
between stimulus and response is
achieved, not ~~by~~ ^{through} the formation of new
neural connections ~~between~~ but ^{through}
the organization of an appropriate facilitatory
set.

~~Physiology of the Conditioned Reflex~~
~~Central Mechanism of the Conditioned Reflex~~
~~Central Nervous~~

Neural Basis of the Conditioned Reflex

Efforts to analyze the conditioned response, although pursued intensively ever since Pavlov's initial reports more than 40 years ago, more than 40 years after P's initial studies and

Although efforts to analyze the CR have been pursued intensively ever since P's initial studies more than 40 years ago, we still lack ^{today} a satisfactory picture of the neural mechanism of conditioning. The initial suggestion of Pavlov that conditioning involves the opening of new neural pathways linking directly the receptor and motor centers of the cerebral cortex has been generally discarded as being too simple. ~~at least in its original form~~ A modification of this traditional

Central Nervous ~~System~~

Physiology of Conditioned Reflex Learning

— years after Pavlov's first ^{report} of the conditioned reflex, we still lack a

~~report~~ satisfactory picture of the neural mechanism of conditioning.

Despite ^{continued and persistent} intensive efforts to analyze the conditioned reflex ^{performed continuously ever} since its first discovery by Pavlov more than years ago, ←

Although efforts to analyze the conditioned reflex have been pushed intensively ever since P's ^{original} ~~preliminary~~ ^{critical} studies more than 1 year ago.

classical expln in terms new cerebral conn.s between receiving & motor centers
usually, evid & data pointing to an expln in more dynamic terms in facilitatory rel plays auto important role
illus. vs. specific neural conn.s

The problem ^{is that of} ~~boils down essentially~~ ^{essentially}
~~to that of the nature of the changes~~
 brought about in the brain by training
 that cause a given neural stimulus

We are still uncertain
 of ~~the~~ ^{general} nature of the ^{brain} changes that ~~take~~
 place in the brain during training ~~and~~
~~which are responsible for deflecting~~
~~the~~ ~~response~~
~~and are responsible for deflecting~~ ~~the~~ ~~response~~ ^{guiding}
 the ^{cause a given} ~~to deflect~~ ~~the~~ sensory ^{discharge} ^(from cell) ^{to elicit a}
~~response~~ ^(conditioned) ^(salivary) ^{response.}