

Notebook #12

COMPOSITIONS

NAME ~~Histology~~
Neuro-physiology

MADE IN U.S.A.

- Physiology of hearing -

R. S. Washley - 1942 - Harvard

Hilgard + Marquis - Conditioning Nat'l Soc. of Study of Educ.
Psych. of Learning - Country theory 4/1st ybk
" " Human " - The Geoch

Associat'n - what elements are associated

Contiguity - behavior

Similarity - general

Innate organiz.

Kuo + Watson in Amer. ^{no inherited pattern}
~~pushed it~~

Kuo backtracking a bit now admits may be.

Its nature - man as well as animals

^{motor + apte}
Innate patterns unequivocal in lower forms
species of spiders & their webs - all insects -
birds nests

Mammals - mating, nursing, etc.

rat mating like Steinach, Stone, & Beach

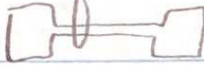
(birds retrieve round object, any color, have to
be right texture as well as round)

isolation & lack of exper doesn't affect ♂ rat's R

elimination of sense organs can go on
indef. as long as one or so is left.

baby guinea pig w. half elicited R.

♂
Extra shots of hormone reduces particularity of S which is adequate.

Retrieving —  up to 18 days
cotton wads — no
stuffed skins — yes
5^d n. + olf. & others sense modalities can be eliminated but not all.
strengthen drive & decrease the specificity
pit. extract or replace very young babies for old dishes.

Motivation — endocrine effects

secretions do activate these performances.
mode of action??

cause growth of special A_m connections.

(speed rules out growth processes)

modifications of position endings or whisker

1) Moll's evacuation theory. — distention of mammary glands nas or other glands — no causal R. occurs when most of glands removed.

2) Kempf — internal secretions affects sense organs of autonomic system & expect a general increase in activity

3) Hormones act directly on C.N.S. to bring out sex lib. 1938 45:45 Psych Rev.

Rats reared 100 days in dark - are able to judge distance for jumping - innate organization.

same for pattern vision - " " " ?

organization thus w/out moving & building up avoid exper.

elements arranged in geometric patterns are more readily recognized & remembered.

geometrical figures - but not cause of mysterious intrinsic mathematical properties. but ease of R. to these objects.

innate organization of patterns? -

Fill in homogeneous fields & simple figures in hemianopia & scotomas

Fortification figures in scintillating scotomas (spontaneous discharge of cortex = organized so)

living in Einstein world seeing it as Euclidean?
Is logic logical? or experiential?

Neurology of this innate organization

Remarkable precision in growth of connections needed on connection basis.

Kappers' biotaxis growth at rt LS - guided by electrical potentials
no expt'l evidence to support it.

arranged mixed sorted gene cell to cell correspondence in retinal & tactile systems of the rat.

arranged by mechanics of growth in cord.

Some of innate organiz in cortex.

Anomalous variations of C.N.S. connections
double cones in retina

familial diffcs - enlarged tracts, etc.

evidence rather appears definite precise connections

other view = interaction of masses of cells
algebraic summation

laws of irradiation of excitations thru homogeneous cortical tissue.

? Growth process, itself, establishes organized patterns in NS.
? Anatomical variations, however, preclude any precise cell-to-cell connection.

? Variability of adequate S shows simple cell-connections wait work.

Neurological pathways involved in association
Peripheral n.s. precise & isolated.

Vision - cell-to-cell projection

Double hemisection of cord in rat - leaves squeal to pinch, turning of head to correct side, later after shock disappears, get same motor patterns - tho all long tracts are severed above forelimb level. Rats are pretty clumsy, tho. Indicated some descent of ead'd patterns thru cord(?)

Ingebritsen got some condit'g w. just a thread of long tracts left, but not when all cut.

Decorticate conditioning ^{Scott, Anderson, Zelensky}

Pretty clear get condit'g in decorticate dogs
Sinden, Cullen & Mettler!

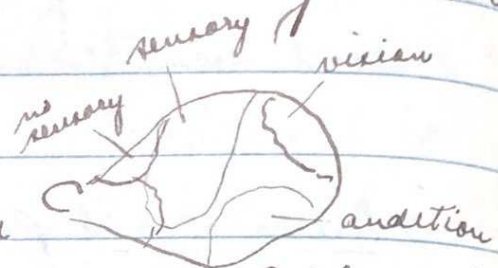
Bird lacks cortex - except hippocampal lobes & basal ganglia - w. these out can be condit'g

Chickens can learn after forebrain removal
to choose diff't color grains.

No evidence of any partic. "learning center" in
the cortex.

Localized functions

Vision - except when



lesions made in infancy. Brightness habits
are abolished but can be relearned
at a normal rate. Additional lesions
to sup. collic. wipes out subcortical
habits. (really sub-thalamic)

Capacity for visual brightness habits =
equivalent in sup. collic. & striate area.

Large lesions elsewhere don't affect
the visual discrimination.

Striate lesions in monkeys makes im
look blind until they are taken into a
dark room w. one or two bright lights.

Man may be totally blind as claimed but
? = still controversial.

Get nystagmus maint.s in animals w. striate area removed.

Hearing

Clips head & localized by rat w. lesions in auditory area.

Somesthetic - little known

Olfaction - appears to be sub-cortical or equivalent

Motor areas - no C.R. after motor areas removed.

Rashley got retention in monkeys, however.

Get recovery of paralysis if only area 4 is destroyed but not if area 6 + 4 destroyed.

Maze Habits - General effect of lesions accordg to maps of cortex destroyed.

Katch box, reasoning (Maier), & brightness (win visual area)

Possible explanations

1. Shock - ruled out by time factor
2. Invasion of a critical area - the binocular

field in the visual area. This doesn't hold in
maze learning however

3. Multi-sense privation — expt. tend rule
this out as ^{main} sole factor. Destruction of visual
area effects a habit learned by blind animal.
Visual cortex has some other function besides
visual discrim. in maze learning.

4. Larger lesions interfere w. transcortical
associations more. Knife cuts vs. mass lesion
(knife cuts hit projection tracts)

Perfect retention after cuts that separate
any projection area from any other.

5. Non-sensory function of sensory areas.
Notion of mass-action based on above
reasoning.

Function correlated w. mass of tissue
what it means = ?

Diff't parts of cortex exert mutual facilitation
on nearby parts. — but large lesions outside
visual area does not affect visual habits
also non-effect of cutting transcortical
tracts = no. of facilitative effect.

"Vicarious functioning" - a ^{function} habit destroyed by lesion - another part can take over. Seems now that that sort of thing does not actually occur. If whole ball mechanisms concerned are destroyed, no other part can take over. (striate + sup. coll.) (area 6 + area 4) but if remove only ^{one} part get recovery. So have no-called vicarious function only w/in specific systems. (muc. rubber + motor area) in cat. What takes over is another part that always was concerned w. this type of function.

"Equipotentiality" - 1st that whole cortex, but now obvious not so. perhaps w/in functional centers, but ? here. Stature now says yes w/in a given area of cortex. The non-sensory function of sensory areas = equipot. in diff^t areas.

34,000 cells from lat genic. to cortex in rat. can still discriminate ^{patterns} when only 600 cells of binocular field. Temporal construction ^{space} of pattern

Any small part of the visual cortex can work ok for pattern vision. = equivalent. [in same sense that diff't parts of retina = so.]

Memory Disturbances - clinical

Diff'ce between loss of memory & of understanding pretty well broken down now - get both.

Never a loss of a specific group of memories due to lesions (As. hysterical losses). & no (primary motor & sensory center lesion) lesions cause loss of mode of organization.

Aphasias - don't get loss of associated group of words (no localized mem. traces) but of general types of abilities - associate names w. object, getting words out. Loss in ability to think certain types of relationships. Not destruction of traces but of organizing mechanisms.

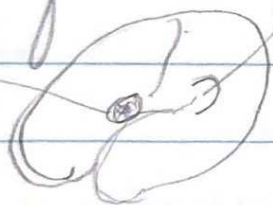
- 1) No loss specific memory
- 2) Disturbance of categories of thought/org
- 3) Retardation in new learning
- 4) Accompanying (?) once a habit is formed it is less stable - forgotten more easily

(if traces, bands, expect them to last as long in remaining tissue)

(5) Dynamic low-thresholds - doesn't function until reinforced thru some intermediate memory devices. & under excitement, tissues total aphasic talk fluently under fever, otherwise dumb. Can swear, sing hymns. Patterns there, threshold raised.

(6) Definite localization, however, of ffg functions tho not too precise. Exceptions on

Broca's



angular gyrus

Broca's area - motor speech

Angular gyrus -

(Klüver's basal region in temporal lobe.)

Possibility of restitution of function

Vicarious function held early in last war but much less hopeful now.

Hospitalization discourages & depresses, & reeducation ^{out} of this "cared for" state.

Diagnosis =

excitability of this center ~~damaged~~

lesion



Lesions in primary motor & sensory areas
= pretty permanent, chance of vicarious
function = about nil.

In Franzi's expts on monkey - a considerable
amount of motor cortex was left intact (monkey
w. arms tied up, ^{recovered} used other arm quickly.)

Recovery in internal capsule & motor
disturbance showed very gradual & very slight
recovery from paralysis.

Outlook = much better for children
than adults for restitution. Pretty complete
recovery in infant monkeys.

Complementary growth & regeneration =
improbable.

Can usually retrain any specific
performance & but get no recovery of
generalized performance & abilities.

Memory Traces: (Matthie in German)

1. Growth of cells - ^{Verworn} connections strengthening etc.
neurofibrillar substance (conductile substance)
Cells not S's during growth tend to deteriorate
(removal of eye = example lat. genic. & cortex not loss of cells, but Δ in appearance)

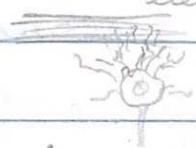
2. Growth of connections ^{Kap}

Cell processes

Glia growth (Cajal) expansion & retraction

Kapper's (on neurobitaxis) J.C.N. '17

electric field comes connections to form.



Growth theories demand repetition, but learning w. single experience (tho the single exp'd may last subconsciously)

3. Chemical D's in cell Osterhout '05

Robertson - reversible chemical process. = learning curve.


Matthew - Org. Chem. text. Chile

4. Change in R. of synapse.

Sherrington no ref. in his writings to learning - just inferred & attributed to him. He talks of R. of synapse, detouring R's etc. but,

McDougall's nervous pressure & drainage as of water in pipe system.

Max Meyer - interconnecting pathways not functional are opened up by suction, etc. drainage.

Johnson's drainage theory. 

J.C. Peck: '37

by electrical potential $\Delta \phi$

Fail to account for one-way assoc. which is character. of much learning

5. Specific sensitization

\approx in learning & allergies

Meterikoff. Cells simultaneously excited, tend to develop chemicals which form interfitting chemicals

Weiss specificities doesn't fit data on electrical condu.

Jagannath's Physiology of Brain

All theories based ^{on} assumption that Δ 's are at particular synapses or between particular cells. Waitmark acc'd; Raskby.

Thing which learned is generalized - sensory, motor,

- a. Sensory equivalence - one eye to other, figure falls on diff't part of retina,
- b. Motor equivalence - monkey right & left hands on latch box. Knocked out cortex of left so monkey used untrained right.

Don't learn specific muscle coordina. but pattern in relation to axis- posture of steady.

c. C.N. equipotentiality.

d. Retroactive inhibition. Learning habits of a type tend to knock out other habits of same type tho assoc's not identical

Alterations of memory traces in course of time. Patterns distorted toward more familiar objects + toward greater symmetry.

Trace = everywhere, nowhere, mystical Attempts to be more definite.

1) Neural reverberation

These = exactly my own old theory

This limits ok on memory 10-12 yr back
Continuous activity in unconscious which affected by every exp. Total part exp. of individual in every act.
Ebbelke also

2) Analogy w. chemical gradients Kolb's Brain Mech. 1968 L. Davis see Pavlov works

Koller's theory in Dynamic Psych. isomorphism reproduced in C.N. syst. spatial characters of stimulation

3) Irradiation Idea - wave analogy

- trace must be reproduced thru out large areas of cortex. must be reduplicated in the system.

Cortex is essentially a network. any display into it results in spreading potential waves.

get standing waves from a pattern w. interference
points of inhibition + reinforcement.

Impossible

C.N.S. doesn't transmit waves like a liquid
so patterns of reverberatory circuits instead of waves
scintillations of migraine scotoma - fortification
figures

Have to consider equivalence on motor
side also. (mov't in relations to ^{posture} axes of body)

Conditioning not a prototype of all learning.
Difficulties in extending C.R. to include all "

Gestalt = an alternative theory of learning
vs. associationism. Harterian, Levine
& Wheeler identify learning w. structuring
& Memories are plastic, dynamic, undergo Δ ,
same laws apply to organz of pp'n also
apply to organization of memories.
Deny importance of repetition in fixing memory.

Definite time limits in Δ in staircase illusion & in seeing complicated patterns.

Gestaltists' denial of association of individual items. " really just presenting a problem and not the solution of it. Kohler is about only one who sees need for physiological interpretation.

Innate organization coherence, closure, etc & perhaps logical relation to ideas.

No innate organiz for language. any child could learn any language as easily as any other. But once learn one language, get grammar organization, which serves as background / what learned is not so much single words, as the flow of the language. (The posture) @

Laws of learning is there one law for fixation of learning

Contiguity

Repetition, practice [w. a purpose]

Law of effect

Structuring - logicity, etc

Primacy, Recency, Intensity.

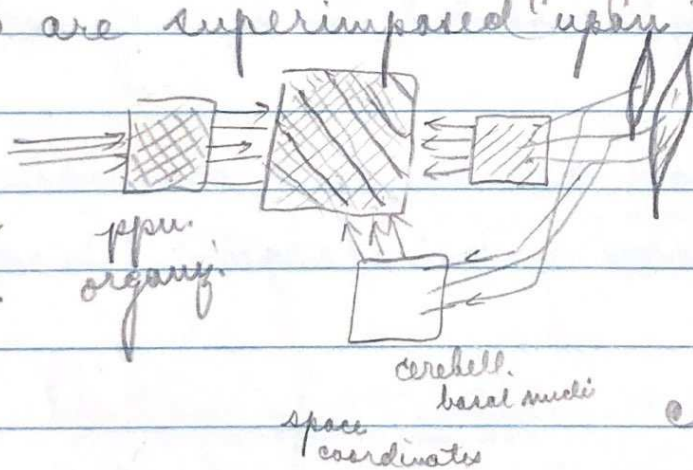
Contiguity recognized by all. Similarity
Spont repetition may work other than strengthening best

Factors contributing to fixation of habits & memory

Cells of C.N.S. are firing all the time - comes out
in behavior only when excess impulses delivered.

Pattern of relations to each other in firing, the
continuous, keeps changing. Effects of various
S are superimposed upon the basic activity

Background
an which
pattern R's
are super-
imposed.



All b'ib' determined
in terms of space
coordinates - posture
w. respect to environment

A "set" enforces further direction of activity and throws
a whole field of associated R's into readiness for
functioning.

When a set taken, the activities which come out are contaminated by what's to come. (spoonerisms)

Whole sentences formulated at subthreshold level before starting.

Freudians start at wrong end by assuming that it is only in dreams these mix-up occur.

"Warming up" in extemp. lectures or a conversation - words & associations & organization gradually begin to come forth.

At same time wipes out extraneous associations. A given item may call up entirely diff't associations depending on set.

Reflex chain associations - or a schema, by which whole system of organization is activated at once.

Set consists of a sub-threshold excitation of a whole series of activities.

Implicit temporal organization of a sequence before it comes out.

Organization of language, - of music

Basic rhythm ties things together
when a note started seems to spread thru
system and take care of phasic reactions going
on. A basic pattern, modifying what is
superimposed upon it.

verb - motif, direction in space, coordinates

words get tied up early w. " " "

noun - setting gives it relation to space + time
generalization into a category which relates
it into a motif system

schemata of reinforcement which act as a
mold. determine order. (vs. set)

Problem of Attention + highest level regen.



Certain active centers represent
activity around 'em + limit
type of activity in that region.

Role of Consciousness in Learning

Learning once considered entirely of consciousness

Instances of learning w/out awareness

salivary secret, pupillary dil., CR's to
subconscious cues that cannot be reported.

"Tics", typing errors, ...

Philosophers emphasize consciousness as spanning
time in a way which physical events do not.

Contiguity not only simultaneous - but together
in attention. = something more than mere
contiguity. More coherence the better, more
structure the better. Repetition apparently
doesn't help, in itself. does not strengthen bonds.

Law of Effect Mower - strongest present proponent.

Carroll in w. animal studies

Thorndike supports it.

Distinction between the association and
the fixing of the association. Many associations
are made & few fixed.

Rats recall where food located for 48 hrs after finding it once - if familiar w. the room.
= delayed reaction. The approach, transition, and many other things learned in habit formation besides the "habit" concentrated on.

Propietic R's of Euglena & Amoeba -
Reverse from positive to negative under various conditions - same in higher forms, & in R. according to physiological state predominant.

Motivation

for evacuation of distended viscus

" filling up of empty stomach

→ general activity till release of tension - been over-generalized.

Trang cut off contractile part of stomach & got hunger just the same, but fullness caused inhibition as before.

Morgan denervated stomach and got effects on hunger by changing sugar level. Believes central effect. Like respir. & hunger centres have to be started by sompic

Thirst - central dehydration as in ¹⁹⁰² ~~hunger~~ ^{hunger}
Sex drive - endocrine effects on all reproductive
activities. Excitement reinforces itself,
builds up, cataleptic.

Danger of use of conception of energy to motivate
nervous, mental, energies etc. / systems of psycho-physic

Common idea of drives from thalamus. Holley: mutual
facilitation of various systems reinforcing or cancelling
Know nothing about what "drive" is.

Law of Effect - no relaxation or intent to learn in
incidental learning. animal case.

contiguity in field of attention

motivation & relaxation not the fixing agents
themselves, but increase ^{attention & fixing} association bands of
contiguity in field of attention.

Doesn't see how D of Thurston can act as a
fixing agent.

Gestalt System & Learning Rev of Koffke

Assume every Sm leaves a trace of some sort - chemical -

No suggestion of problem of serial order. ^{sentence organizing}

They don't translate static spatial order into motor sequences.

Traces all organized in Gestalten - deny the linkage of elements.

Trace persists by virtue of its organization

Traces interact w. each other & w. ^{relevant} simultaneous ^{excitations} processes.

Trace & process diff'ly located.

A description of the behavior of memory traces - but not a theory of what the traces are.

Kohler's dynamics of brain fields. more concrete
In anoxia & other conditions get visual
ppin OK, but it is not remembered any time.

Dr. Mower - Law of effect

The S. that remains aversive situation, the S that produced it, has important influence.

a purely verbal system

highly simultaneous occurrence of excitations in field of attention?

[Never learn any new basic reactions. They can all be performed first - & have to be performed first before they are learned. Learning consists of adjusting the background set & organizing it so ~~new~~ S appear to get new effect] So traces could not be specific

Visual after images may reappear spontaneously up to 48 hrs after experience.