**A Method For Automatically Inventing New Theories.**

I) Theories of how *Amoeba* *proteus* cells crawl:

 1) **Pushing** at the **rear** of each cell.  *Proposed by Mast and other*s

OR 2) **Pulling** at the **front** of each cell. *Bob Allen's theory*

II) Theories about rearrangement of dissociated and randomly mixed cells (sponges, embryos)

1) Steinberg's "Differential Adhesion Hypothesis"

 Cells **maximize** their **areas of cell-cell contact** between cells.

2) Alternative proposed by Wayne Brodland and others:

 Cells **minimize** (=contract) the **areas where they *don't* contact** other cells.

III) Interpretations for chemotaxis, haptotaxis, durotaxis (any directed movements of cells)

(And also for explaining *negative* chemotaxis, etc.)

Protrusion is stimulated on the side of cells where some property is a maximum.

Retraction is inhibited on the side of cells where some property is a maximum.

Protrusion is inhibited on the side of cells where some property is a minimum.

\_\_\_\_\_\_\_\_? is \_\_\_\_\_\_\_? on the side of cells where some property is a \_\_\_\_\_\_\_\_\_?

IV) If you start with a biological theory that is expressed by a sentence that contains any five of the verbs from the following pairs, then what is the maximum number of alternative theories (that explain the same phenomenon) that you can generate by switching even numbers of pairs of these words.

Push  *<->*  Pull

Maximize  *<->*  Minimize

Shrink  *<->*  Expand

Retract  *<->*  Protrude

Inhibit  *<->*  Stimulate

Compress  *<->*  Stretch

Oxidize  *<->*  Reduce

Precipitate <-> Dissolve

***Invent your own pairs of opposite verbs.***

***Starting with any theory that can accurately predict some particular phenomenon,***

***substitute any pair of two opposite verbs.***

For example, replace the word inhibit for stimulate, and substitute compress for stretch.

Any two such replacements of opposite verbs creates a new theory capable of explaining the same original phenomenon.

*If a hypothesis contains more than three of such reversible verbs,*

*then you can make 4, 6, 8 or any even number of substitutions.*

*(Any even number, so that they will cancel out).*

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*You don't need to learn the following material, below; but you might be interested in it.*

*Euclidian geometry "Point" <-> "Line" creates a new theorem, which will be equally true.*

*This phenomenon wasn't discovered until the early 1800s; Euclid didn't know about it.*

*It's called "****Duality****", and is also true of many other kinds of geometry.*

*In electrical circuits capacitance <-> inductance produces a new circuit that performs the*

*same function as whatever circuit you started with.*

***https://en.wikipedia.org/wiki/Duality\_(projective\_geometry)#Principle\_of\_Duality***

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Popper <-> Kuhn

Proof <-> Paradigm

Waves <-> Particles

Macs <-> PCs

Muggle <-> Metaphysician

*Further Suggestions are welcome.*