

Thoughts on

HOW TO FIND  
SOMETHING Important

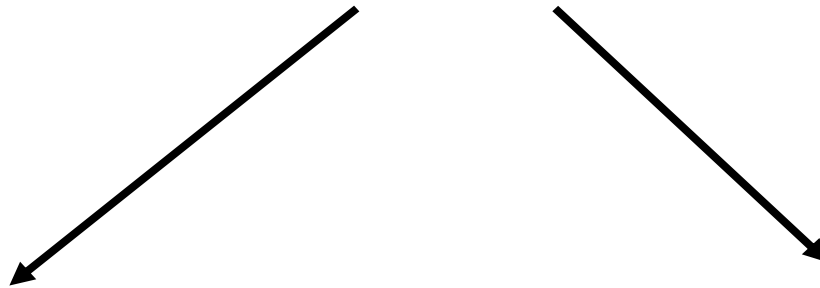
“The first principle  
is that you must not fool yourself --  
and you are the easiest person to fool.”

Richard Feynman,  
Caltech commencement address, 1974



Don't Ever Give Up!

# Interesting Observation/ Idea



**Known**   

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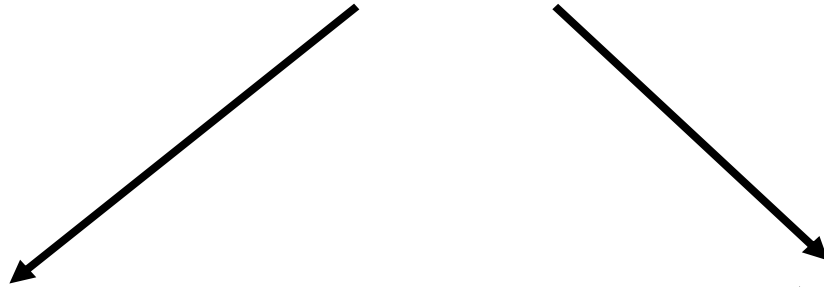
**Unknown** 



**Is it *really* unknown,  
and if so, why?**



# Interesting Observation/ Idea



**Known**



**Unknown**



Is it *really* unknown,  
and if so, why?

Shadowed by  
phobias?

**phobia** *n* [*Greek phobos -- fear, flight*]:  
an exaggerated, *usually inexplicable*  
*and illogical* fear of a particular object  
or class of objects

# Selected Chemo-phobias

Seleno-phobia

Peroxo-phobia

Hydro-phobia

Osmo-phobia

Azido-phobia

Hydrazino-phobia

Aziridino-phobia

Acetyleno-phobia

## *DISCOVERY TECHNIQUES?*

- Look in *scary places*

Plesiosaurs,  
among the most  
recognizable animals  
from the dinosaur era,  
AND  
putative  
inspiration for  
*Loch Ness Monster-myth.*

Artist Tor Sponga's  
interpretation of  
"The Monster"  
catching  
a smaller  
plesiosaur.

## DISCOVERY TECHNIQUES?

- Look in *scary places*
- Embrace ***uncertainty***

# *Embrace* **Uncertainty**

- - *it may be the only 'gift',  
without which,  
the big insights are impossible...*

the best *discoverers*  
all seem drawn to  
regions of high uncertainty?

## DISCOVERY TECHNIQUES?

- Look in *scary places*
- Embrace ***uncertainty***
- generate and modify **hypotheses daily**,  
not by proving, but by **disproving\*\***

\*\* *Karl Popper, along with John Platt's "Strong Inference" Science, 1964, 146: 347-353.*

“We speak piously of taking measurements and making small studies that will add another brick to the temple of science. Most such bricks\*\* just lie around the brickyard.”

*Platt, John.R. (1964) “Strong Inference”  
Science. 146: 347-353.*

\*\*KBS suspects this ‘most’ category  
could be  
>95% -- the majority being merely  
unusable  
or irrelevant, but some actually  
hiding

## DISCOVERY TECHNIQUES?

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- avoid ***'sacred cows'***

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## DISCOVERY TECHNIQUES?

- Look in *scary places*
- Embrace ***uncertainty***
- generate and modify **hypotheses daily**,  
not by proving, but by **disproving\*\***
- avoid ‘**sacred cows**’
- strive to **Keep It Simple Sweetheart**

\*\* *Karl Popper, along with John Platt’s “Strong Inference” **Science, 1964, 146: 347-353.***

*always  
remember the*

*‘**KISS** Principle’:  
famous advice for  
writers*

## KISS principle *[Wikipedia]*

The term KISS is an acronym for "Keep It Simple, Stupid".

*Other versions include:*

"Keep It Simple & Stupid"

"Keep It Sweet & Simple"

"Keep It Short & Simple"

"Keep it Simple, Sweetheart"

"Keep it Simple, Sherlock"

...roughly corresponds to Occam's razor,  
and to Einstein's maxim:

"Everything should be made as simple as possible, but no simpler."

Leonardo da Vinci had his own variant of Occam's Razor:

"Simplicity is the ultimate sophistication."

Keep

It

Simple,

Sweetheart

Our minds seem easily  
seduced by complexity.

The more intricate approach,  
usually wins out over  
the simpler one, at  
least initially.

Who wants to risk the  
judgment, from  
peers or professors,  
“that’s *too simple-minded*”!

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*Everything should be made as simple as possible, but no simpler."  
Einstein*

Our ‘*belief-engines*’, once engaged,  
have the power to cloak  
entire provinces of nature.

These hidden worlds  
emerge piecemeal,  
along a timeline of *seeing-events*  
whose spatiotemporal coordinates,  
are by definition unknowable,  
not to mention *unimaginable*.

*{words by KBS, but clearly inspired  
by Kevin Kelly’s, “Out of Control”, 1964}*

**“It's tough to make predictions,  
especially about the future.”**

*Yogi Berra [american  
baseball player-philosopher]*

1876 Western Union memo:  
this 'telephone' has too many  
shortcomings to be seriously  
considered as a means  
of communication

Albert Einstein, 1932:  
there is not the slightest  
indication that  
[nuclear energy]  
will ever be obtainable

H																	He
Li	Be											<b>B</b>	<b>C</b>	<b>N</b>	<b>O</b>	<b>F</b>	Ne
Na	Mg											Al	<b>Si</b>	<b>P</b>	<b>S</b>	<b>Cl</b>	Ar
K	Ca	Sc	<b>Ti</b>	<b>V</b>	<b>Cr</b>	<b>Mn</b>	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	<b>Br</b>	Kr
Rb	Sr	Y	Zr	Nb	<b>Mo</b>	<b>Tc</b>	<b>Ru</b>	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	<b>I</b>	Xe
Cs	Ba	La	Hf	Ta	<b>W</b>	<b>Re</b>	<b>Os</b>	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

*Roundup some  
fearless chemists  
and go fishing here!*

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

*Another strange endeavor  
for  
most of us  
is thinking and planning  
'back to the future-style'*

*Why Think*  
*Back to the Future?*

Polaroid is gone, and Kodak is going...?

Journals and newspapers....?

**'Locales'** where it is **profitable** to  
manufacture petrochemicals,  
cars, computers, clothing, etc. are  
in a constant state  
of migration.

# OUT OF CONTROL

The New Biology of  
Machines, Social Systems,  
and the Economic World

"Not since H.G. Wells has  
there been another popular  
scientist who has had the  
nerve to plunge into so  
many bold theories."

—*London Spectator*

**KEVIN KELLY**

Executive Editor of **WIRED**



62 Quotes from

**Out of Control**

*selected by Kevin Kelly for his book's webpage*

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“We cannot import evolution and learning  
without *exporting control*.\*

The great irony of  
‘god games’ is that letting go is the only way to win.”

\*Profs. Finn and Sharpless read, and heeded  
‘Saint’ Kevin’s message  
in early 2000.

*“Telling the future is what organisms are for.”*

my personal favorite, from  
Kevin Kelly’s “Out of Control”!

To find new frontiers  
and elbow room, look in *scary places* . . .

turn *phobias* into opportunities,  
*à la* Stephen King

"Science is the belief  
in the ignorance of the experts."

*Richard Feynman, 1966*

\*\*\*\*\*

Jess H. Brewer  
says:

*"I love [Feynman's] phrase.  
It sums up the bare essence of the intellectual arrogance,  
the willingness to believe in one's own reasoning  
regardless of what "experts" say,  
that makes original science (and art) possible."*