

From Nociceptors to the Meaning of Pain

A Travel Through 50 Years

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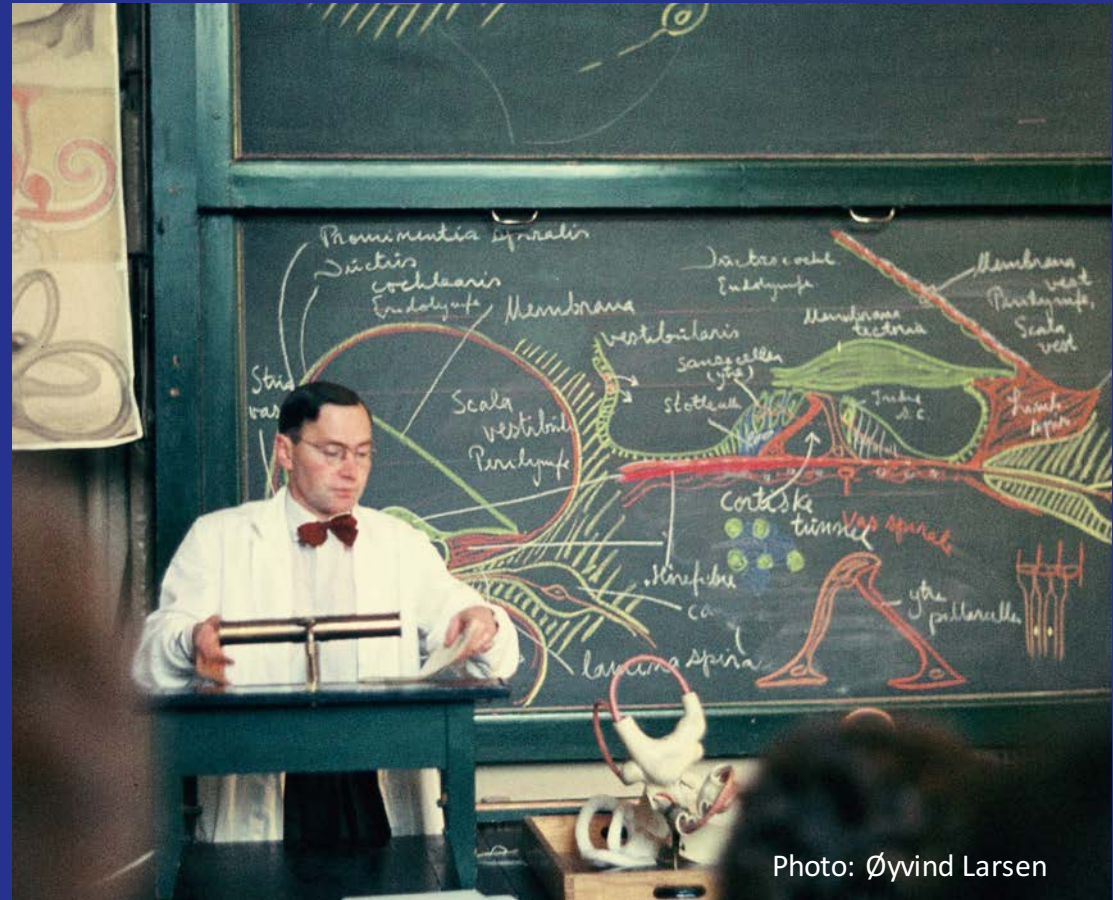
Universitetet i Oslo

NOSF Fagkonferanse 2016

Alf Brodal (1910-1988)



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Why teach?

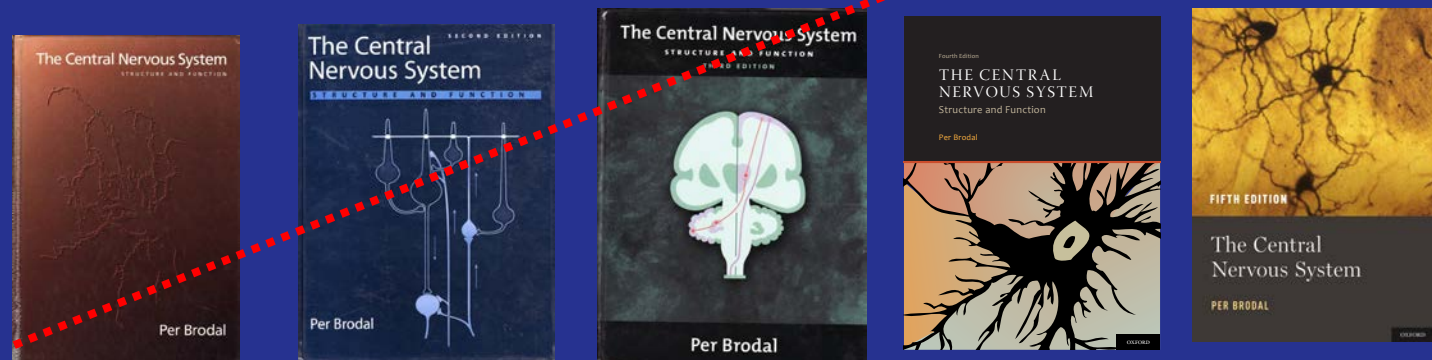
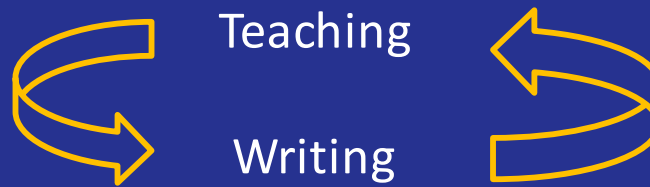
Robert Oppenheimer, 1954

- The specialization of science is an inevitable accompaniment of progress; yet it is full of dangers,..
- Thus it is proper to the role of the scientist that he not merely find the truth and communicate it to his fellows, but that he teach, that he try to bring the most honest and most intelligible account of new knowledge to all who will try to learn.

A bird's eye view..

- Why are we equipped with the ability to feel pain in the first place?
 - Nothing in biology makes sense except in the light of evolution
(Dobzhansky (1973))
- What are the most salient properties necessary for the "pain system" to fulfill its tasks?
 - it has to be strongly context-dependent
 - it must learn fast
- Why does the system so often go "awry"?
 - Sensitivity versus specificity

Space
devoted
to pain



1992

1997

2004

2010

2016

"Pain Curriculum" in Medical School 1963

- Heavy bias toward peripheral mechanisms
- General knowledge of pathways – dominant view: labeled lines
- Largely ignoring the many unanswered questions and paradoxes of pain in clinical settings

"Less reflective scientists teach undergraduates only those parts of their science that are "established facts", deferring until graduate school anything disputed or under active investigations" (*W.C. Wimsatt, 2007*).

Yet – some people saw the problems..

K.D. Keele: Anatomies of Pain, 1957

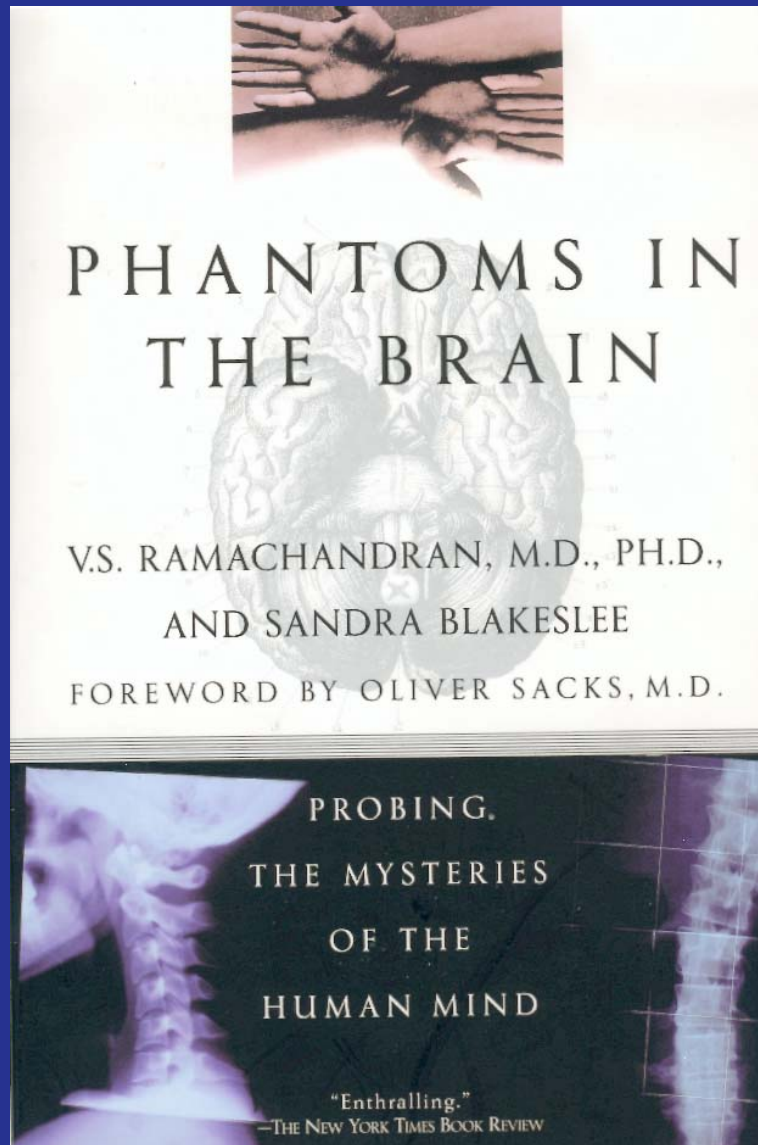
- Perpetuated pain is .. always complex pain, containing many components built into a pain edifice
- ..the exploration of which presents the clinician with a very different problem from the physiologist's analysis of experimental pain.

Pat Wall: attacking the ignored questions

R. Melzack 1999:

- The gate control theory's most important contribution to understanding pain was its emphasis on central neural mechanisms.
- The theory forced the medical and biological sciences to accept the brain as an active system that filters, selects and modulates inputs.

"The diagram of mechanism we published had all the disadvantages of excessive clarity..." (*P. D. Wall, 1978*)



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“Pain is an *opinion* on the organism’s state of health rather than a mere reflexive response to an injury”

Rheumatology 2005;42:97-101

doi:10.1093/rheumatology/keg041, available online at www.rheumatology.oupjournals.org

A controlled pilot study of the utility of mirror visual feedback in the treatment of complex regional pain syndrome (type 1)

C. S. McCabe, R. C. Haigh, E. F. J. Ring, P. W. Halligan¹,
P. D. Wall² and D. R. Blake

Background. We assessed mirror visual feedback (MVF) to test the hypothesis that incongruence between motor output and sensory input produces complex regional pain syndrome (CRPS) (type 1) pain.

Methods. Eight subjects (disease duration ≥ 3 weeks to ≤ 3 yr) were studied over 6 weeks with assessments including two controls (no device and viewing a non-

REVIEW

Postherpetic Neuralgia: Irritable Nociceptors and Deafferentation

Howard L. Fields,^{*,†} Michael Rowbotham,^{*,‡} and Ralf Baron^{*,§}

^{}Department of Neurology, [†]Department of Physiology, and [‡]Department of Anesthesiology, University of California at San Francisco, San Francisco, California 94143; and [§]Klinik für Neurologie, Christian-Albrechts-Universität Kiel, Kiel, Germany*

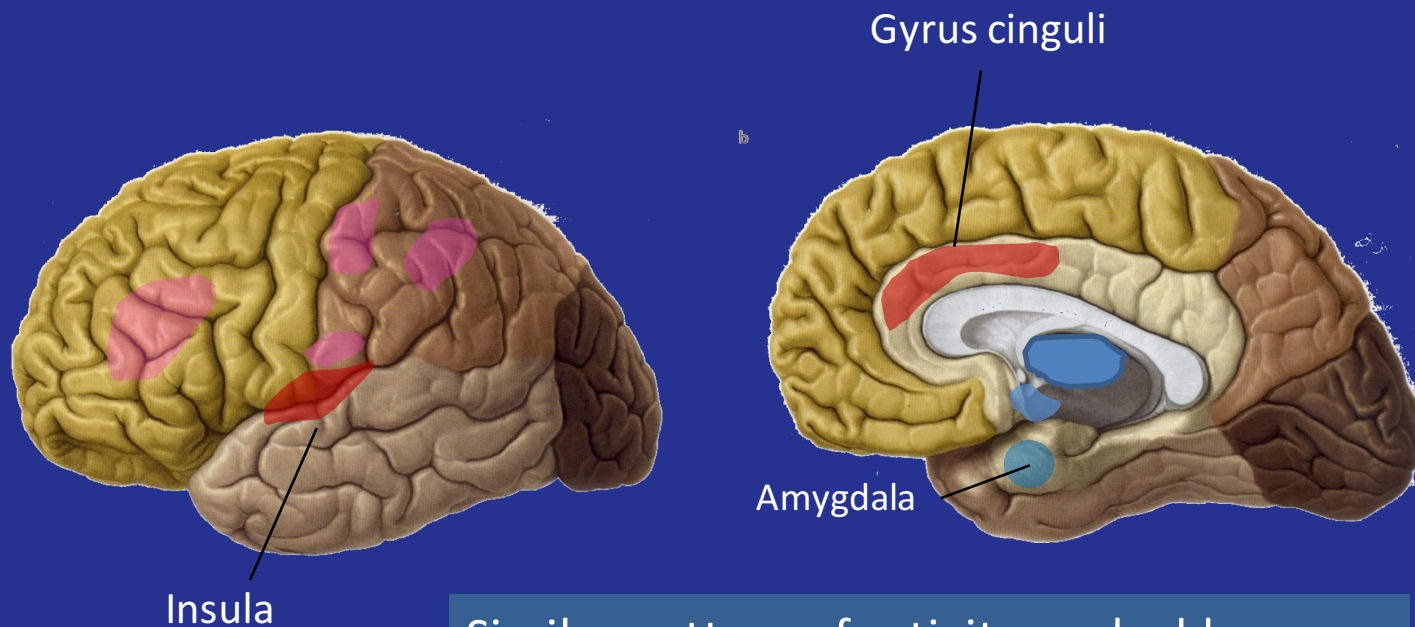
Received August 31, 1998; accepted for publication September 1, 1998

Postherpetic neuralgia (PHN) is a common and often the most extensively investigated of the neuropathic pain syndromes. Quantitative testing of primary afferent function, together with insights drawn from an extensive animal model of PHN, suggests that in PHN there is a loss of primary afferent fibers. Together with insights drawn from an extensive animal model of PHN, these patient studies have provided

Three varieties:

1. Hyperexcitable C fibers
2. Loss of thin (C) fibers
3. Loss of thick *and* thin fibers

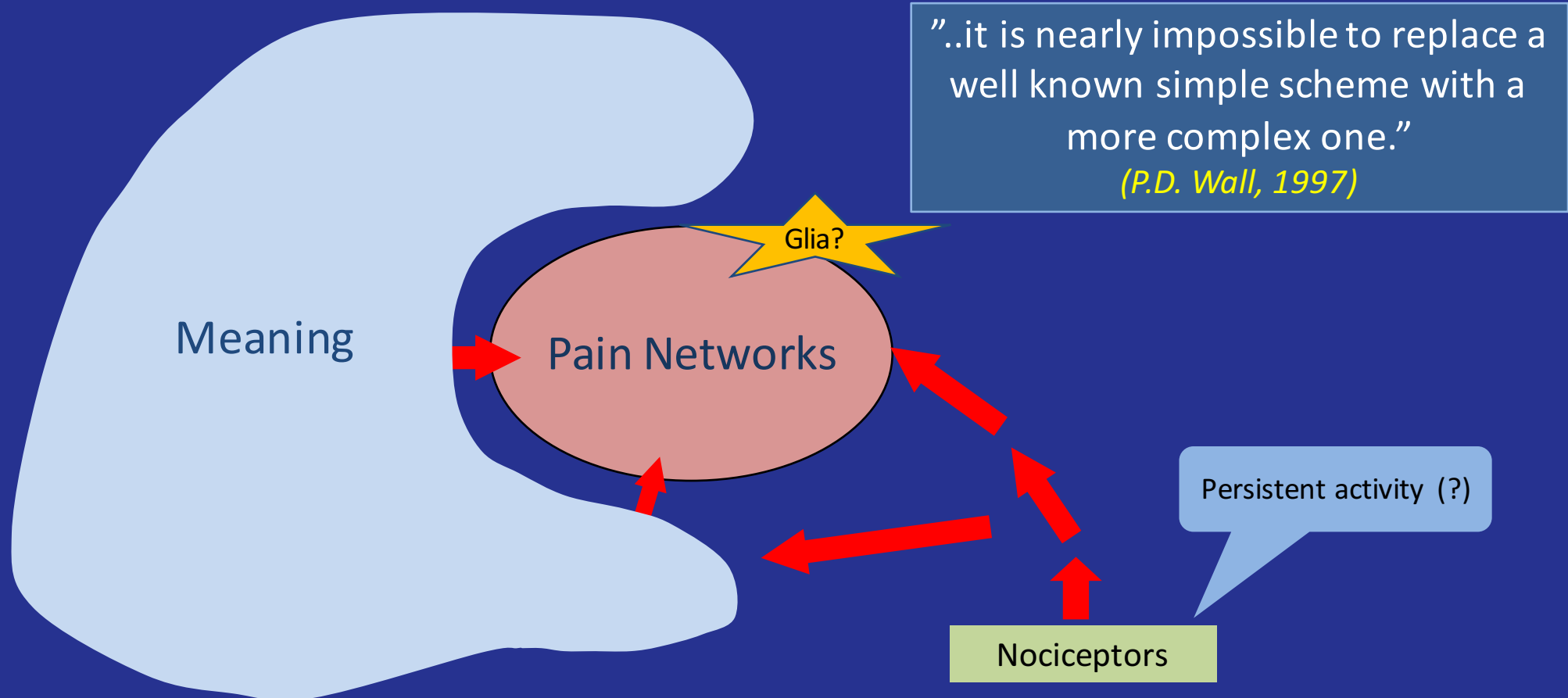
Specific brain activity patterns are associated with the feeling of pain (?)



Similar pattern of activity evoked by

- nociceptors
- hypnotic suggestion
- expectation of pain-provoking event

What can "drive" the pain networks in persistent pain?



What does the pain mean to this particular person?

Eric Cassell (The Nature of Healing, 2013; The Nature of Suffering, 2004)

- Sickness and its manifestations are inextricably bound up with the phenomenon of meaning
- Everything that happens to people – events, relationships, every sight and sound, everything that befalls the body – is given meaning
- The dimensions of chronic illness extend to virtually all levels of human existence from the molecular to the social

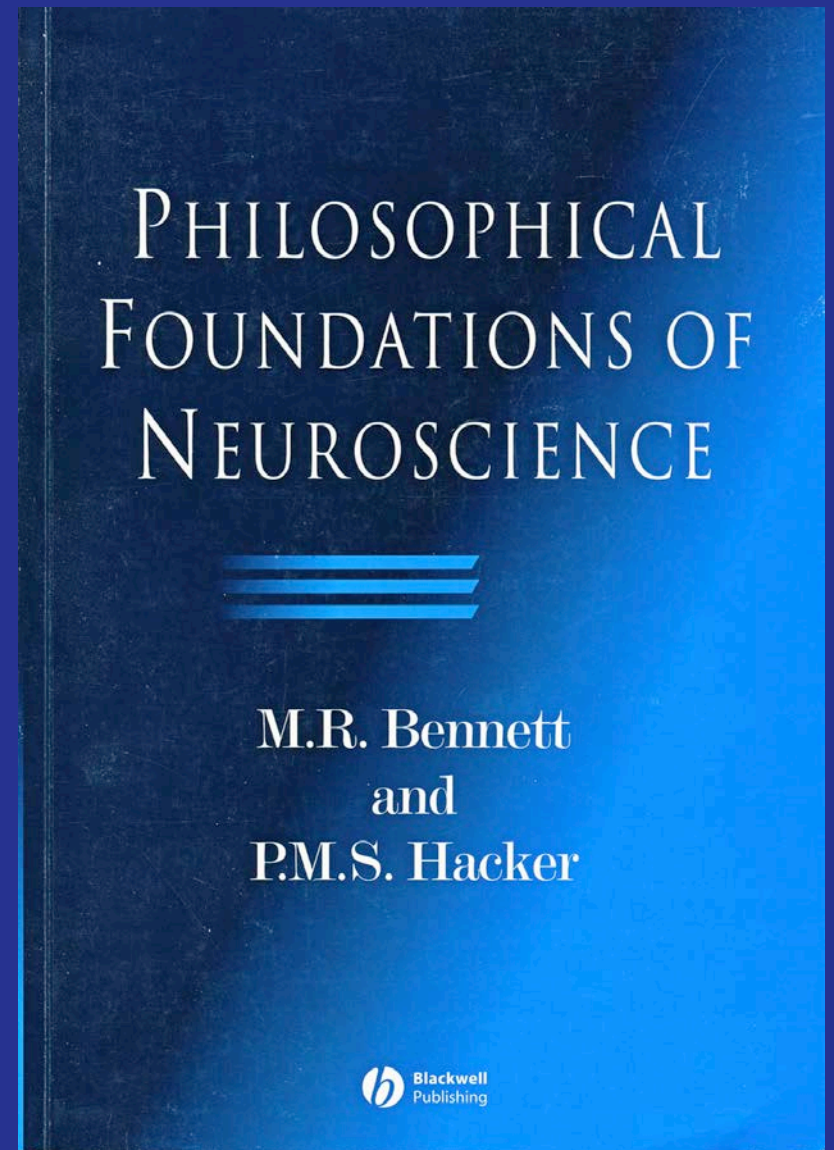
Reductionist tendency and disciplinary bias hampers understanding of complex phenomena

Johnson et al. 2009 (Progr.Brain Res. 174:319)

- ..despite our best intentions, as disciplinary trained scientists the default is to concern ourselves with only our chosen domain of study,
- and to impose our own unique perspectives on any research questions
- Perhaps the single largest threat to true and comprehensive understanding...is the reductionist tendency

Conceptual Confusion?

- We say that a person has a mind and has a body.
 - Are there three different entities here - a person, a mind and a body?
 - Or two - a mind and a body?
 - Or only one - a person?
-
- The subject of pain is the person that manifests it, not his mind or brain
 - the *location of the cause of a pain* must be distinguished from the *location of the pain itself*



Open minded *and* sceptical (easily said but hard to live by)

- Sit down before fact as a little child, be prepared to give up every preconceived notion, follow humbly wherever or whatever abysses nature leads or you shall learn nothing (*Thomas H. Huxley, 1825-1895*)
- What we observe is not nature itself, but nature exposed to our method of questioning (*W. Heisenberg (1958)*)