Brief Bio and $(PR)^2$: Problems & Pitches – Rants & Raves by Ozzy Pessoa

Self-referential presentation

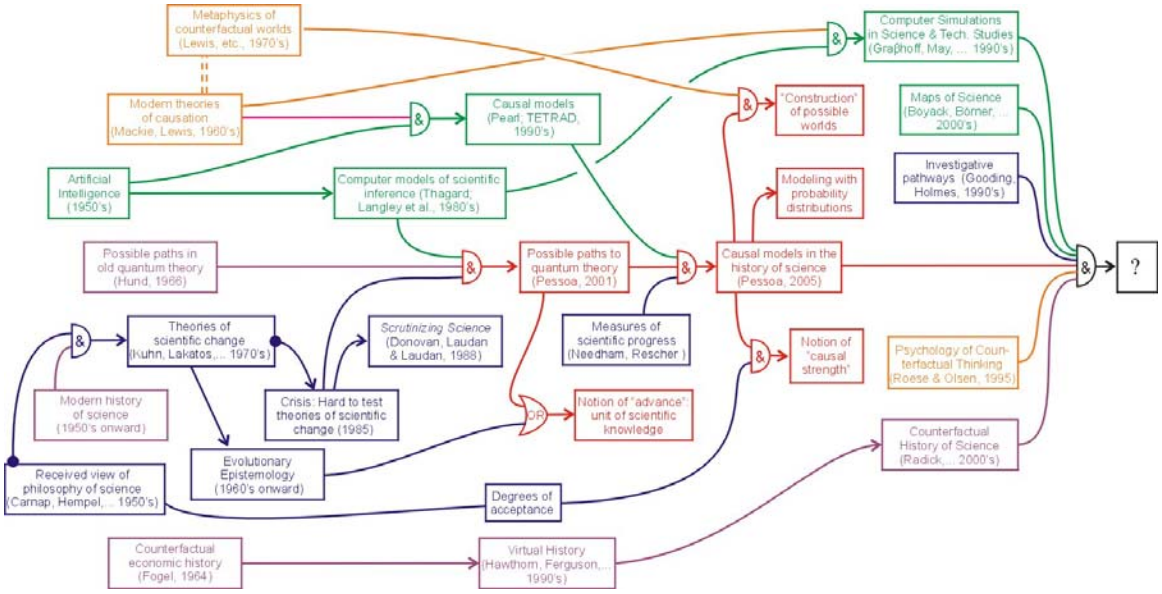
Photo and Biography:

PESSOA

Osvaldo Pessoa Jr. (1959-)

Studied physics and philosophy at the U. São Paulo, Brazil. After a Master's in experimental physics at the U. Campinas (1985), did his Ph.D. in Philosophy of Science at Indiana U. (1990), focusing on the philosophy of quantum mechanics. Wrote the book *Concepts of Quantum Physics*, in Portuguese. Is presently hired at the Philosophy Dept. at the U. São Paulo, and spending a semester at IU. Works mostly on "causal models in the history of science", to be implemented computationally, and involving counterfactual scenarios. Other interests cover philosophy of physics (interpretations of quantum physics, the reductionism debate) and a bit of philosophy of mind. Homepage: http://www.fflch.usp.br/df/opessoa/opessoa-eng.htm

Image: Self-referential causal map of research in "causal models in the history of science".



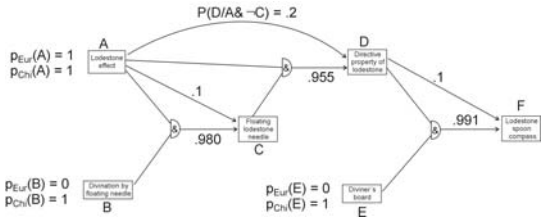
Advances from our approach are shown in red; those from philosophy of science are in blue, from history in purple; those involving computation are in green, and philosophical-psychological in orange. The combination of different traditions might bring interesting results: "?". Arrows represent causal relations, alternative paths are represented by an "OR", and the conjunction of causes by an "&". Dark circles indicate opposing views, while a dashed pair of lines indicates proximity.

Publications: five papers on causal models, represented in SCHEME language, as is done in our causal models approach to the history of science:

```
(define Pess2001                                                  name of article
  '( (Pessoa) (2001)                                              author and date
      "Counterfactual histories: the beginnings of quantum theory,
       Philosophy of Science 68, Proceedings, S519-30"                    reference
      ((Advances .3)                          )      list of advances presented in
       (Types_of_advances .2)                 }  the article with a rough estimate
       (Causality_in_history_of_science .2)   |          of their causal strengths
       (Paths_to_quantum_theory .2))          )
      (Hund1966 Jamm1966 Brus1976)                          a sample of citations
      historical-philosophical))                                  type of article

(define Pess2005
  '( (Pessoa) (2005)
      "Causal models in the history of science,
       Croatian Journal of Philosophy 5, 263-74"
      ((Advances .3)
       (Causality_in_history_of_science .3)
       (Paths_to_early_magnetism .2)
       (Measure_of_progress_of_science .1))
      (Pess2001 Mack1965 Need1962 Pear2000)
      historical-philosophical))

(define Pess2006
  '( (Pessoa) (2006)
      "Computation of probabilities in causal models of history of science,
       Principia 10, 109-24"
      ((Causality_in_history_of_science .4)
       (Paths_to_early_magnetism .3)
       (Causal_analysis_with_probability_distributions .2)
      (Pess2005 Ross1997)
      philosophical-mathematical))

(define Pess2008
  '( (Pessoa) (2008)
      "Scientific progress as expressed by tree diagrams of possible histories,
       Principia 12, forthcoming"
      ((Construction_of_possible_world .2)
       (Trees_of_scientific_progress .2)
       (Einstein_violinist_scenario .2)
       (Degree_of_dispersion_of_possible_histories .1)
       (Problem_of_distance_between_theories .2)
       (Objectivism .2))
      (Pess2005 Popp1963 Kuhn1970)
      historical-philosophical))

(define Pess2009
  '( (Pessoa) (2009)
      "The causal strength of scientific advances, in
       Krause & Videira (eds.), Brazilian Studies in HPS, forthcoming"
      ((Causal_strength .2)
       (Paths_in_19thcent_spectroscopy .2))
      (Pess2005 McGu1969 Sieg1976 Radi2008)
      historical-philosophical))
```

Sample of Advances appearing in the above publications:

Exposition of the advance (not used in computer simulations):



PATHS_TO_EARLY_MAGNETISM

theoretical-explanation

Based on the accounts of Mitchell (1932) and especially Needham (1962), one may construct a simplified causal model for the beginning of the science of magnetism. The difference between the developments in China and in Europe, up to around the 5th century, is accounted for by different prior probabilities for divination techniques (A, E). Probabilities with three significant digits were calculated from the empirical time span between the advances in China, using causal analysis with an exponential probability distribution. The figures with only one significant digit are guesses. The model gives a probability of p_{Eur} = .76 for the discovery of the primitive compass (F) in China, within the reference time interval of 400 years since the discovery of the lodestone effect (A), while for Europe it gives p_{Eur} = .02 . Haven't taken into account the North-pointing lodestone turtle constructed by the Olmecs around 1000 BCE.

Computational representation of the advance (with information on causes and strengths):

```
(define Paths_to_early_magnetism                          name of advance
  '(theoretical-explanation                               type of advance
    ( ( ((History_of_Chinese_magnetism .8)          )     conjunction of previous
        (History_of_European_magnetism .8)          }     advances taken to be the
        (Causality_in_history_of_science .2))       )     cause of the present one
      (4) (.2) )                                          ; Pess2005
    ( ((Paths_to_early_magnetism .2)
       (Causal_analysis_with_probability_distributions .2))
      (1) (.3) ) )))                                      ; Pess2006
Years between   Causal strength                           Associated article
cause and effect
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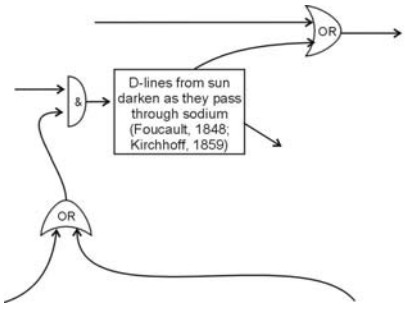
The advance advance:



ADVANCE

theoretical-definition

Advances are units of scientific knowledge, passed explicitly or tacitly among scientists. The prototype of an advance is an idea, but there are other types of theoretical advances, such as explanations, laws, problems, theory development, as well as experimental advances, such as data, experiments, and instruments. Other advances include the comparison between theory and experiment, methodological theses, metaphysical assertions, projects, and tacit knowledge. An "advance" does not have to be a positive contribution to the progress of science. Alternative names are: contributions, achievements, manifestations, novelties, cognitive memes.

```
(define Advance
  '(theoretical-definition
    ( ( ((Problem_of_computational_description_of_HS .5)
         (Problem_of_counterfactual_HS .4))
        (.5) (.3) ) )))                              ; Pess2001
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General Questions

1)2) What is (are) your main interest(s) in attending the workshop? What would you like to learn / achieve at the workshop?

Submit my ideas to criticism, learn from other approaches, have new ideas, have fun suggesting ideas to others, and learn practical aspects of conducting a project that involves computation.

3) If you are a philosopher of an historian of science: In what ways might people that study and map science benefit from your work?

Networks of scientific citations will improve when more qualitative and cognitive features of the scientific works can be incorporated into the nets. Maybe causal models can contribute to this goal.