

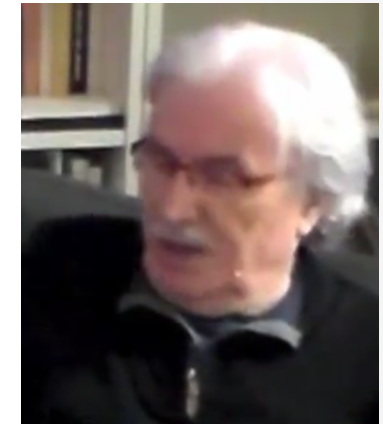
# Introduction to the French didactic tradition: Roots and development

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# Outlines

- Historical considerations
- Three pillars: Brousseau, Chevallard, Vergnaud
- Dynamics and developments

<http://www.cfem.asso.fr/cfem/ICME-13-didactique-francaise>



# A long term investment of mathematicians



Condorcet

The period of the French revolution

The 1902 Reform



Darboux

The period of the New Math reform



Lichnerowicz

# The emergence of research: The crucial role of the IREMs



- A recurrent demand of the APMEP concretized thanks to the events of Mai 1968: Three IREMs first, and quickly, a network of IREMs covering the whole country.
- A very innovative structure where didactic research emerges through the collaborative work of teachers and university mathematicians, and finds a natural habitat there.

# The rapid institutionnalization of the didactic field

- **In 1975:** The creation of the first doctorate programs (Bordeaux, Paris, Strasbourg).
- **In 1980:**
  - The creation of the journal *Recherches en Didactique des Mathématiques*;
  - The creation of the National Seminar of Didactics of Mathematics;
  - The creation of the Summer School of Didactics of Mathematics.
- **In 1992:** The creation of the ARDM (Association for Research in Didactics of Mathematics).

# The first theoretical pillar: The Theory of Didactical Situations

With the voice  
of Guy Brousseau



# Brousseau's initial project

- A project emerging in the early sixties to prevent the deviations that the New Math are likely to generate, and suggested by Lichnerowicz: « Finding the limit conditions of an experiment in the pedagogy of mathematics ».
- A project that requires « to make experiments, understand what happens,..., their conditions of realization, the effects of decisions ».
- And associated with this project, « the 'revolutionary idea' that the object of research is the situation ».

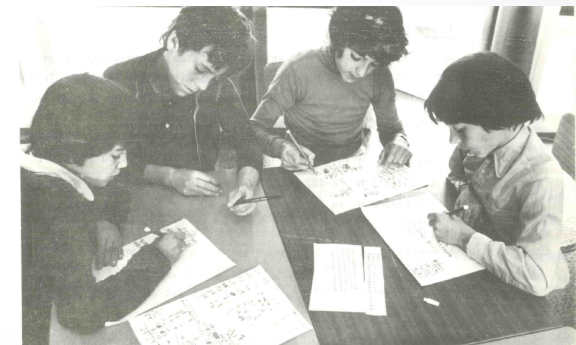
# The COREM



A centre of observation for research associated with the primary school Michelet, created in 1972



An essential structure for the development of the theory of didactical situations



# The development of the theory

- A development also fostered by the creation of a doctoral programme in Bordeaux in 1975, and the necessity to develop a specific didactic discourse.
- Core concepts such as those of adidactic and didactic situations, fundamental situation, didactical variable and milieu, the three dialectics of action, formulation and validation, devolution and institutionalization, didactical contract, firmly established in the eighties.
- From that time, the theory will go on evolving, especially thanks to its use in the analysis of the functioning of ordinary classrooms.

# A second pillar: The theory of Didactic Transposition and the ATD

With the voice of  
Yves Chevallard



# The theory of Didactic Transposition and the ATD

- A first elaboration of the theory presented by Yves Chevallard in a course given at the first Summer School he co-organizes with Claude Comiti in 1980, followed by a book published in 1985.
- A theory that enlarges into an Anthropological Theory of the Didactic in the late eighties, with the notion of institution and institutional relationship to objects of knowledge as basic concepts.
- A theory which is then reorganized around the notion of praxeology as model of human practices, and the concept of Study and Research Path.

# Chevallard's voice

*The didactic transposition is the germ of everything that followed it. It showed that the shaping of objects to teach them at a given grade could not be explained just by mathematical reasons. There were other constraints, not of a mathematical nature.... When we do mathematics, we do more than just mathematics... The activity of a classroom, of a student, of a learned person is embedded in the anthropological reality... Initially, I called this the anthropological affordance: one embed again an activity into a whole whose ecology is studied.*

# The third pillar: The Theory of Conceptual fields



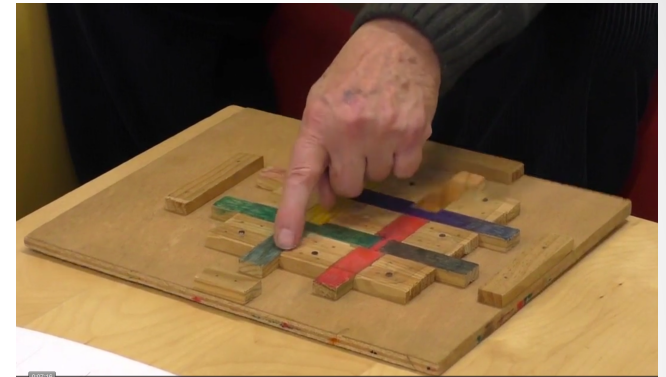
With the voice  
of Gérard Vergnaud

# Understanding conceptualization

- The genesis of a theoretical thinking : a personal inclination (theatre, mime, psychology...); a structuring encounter with Piaget; interactions with Brousseau
- Understanding conceptualization throughout the development of schemes for facing situations
- At the heart of schemes : operational invariants (theorems-in-action as well as concepts-in-action)
- A concept is defined by a set of situations, a set of operational invariants, a set of representatives
- Psychology and didactics of mathematics (PME); didactics of mathematics and « professional didactics ».

# Rationality of activity

- Epistemology is exactly “rational activity for facing situations”
- « Thinking ordinary situations in which things germinate »
- « a diversity of situations giving access to a diversity of concepts components of a conceptual field »
- « Weakness of the French didactics of mathematics: not interested enough in conceptualisation over a long period, not sensitive enough to the complexity of learning »



Understanding  
constraints for moving a  
given piece  
(Vergnaud's PhD)

# Internal development, imports and hybridization

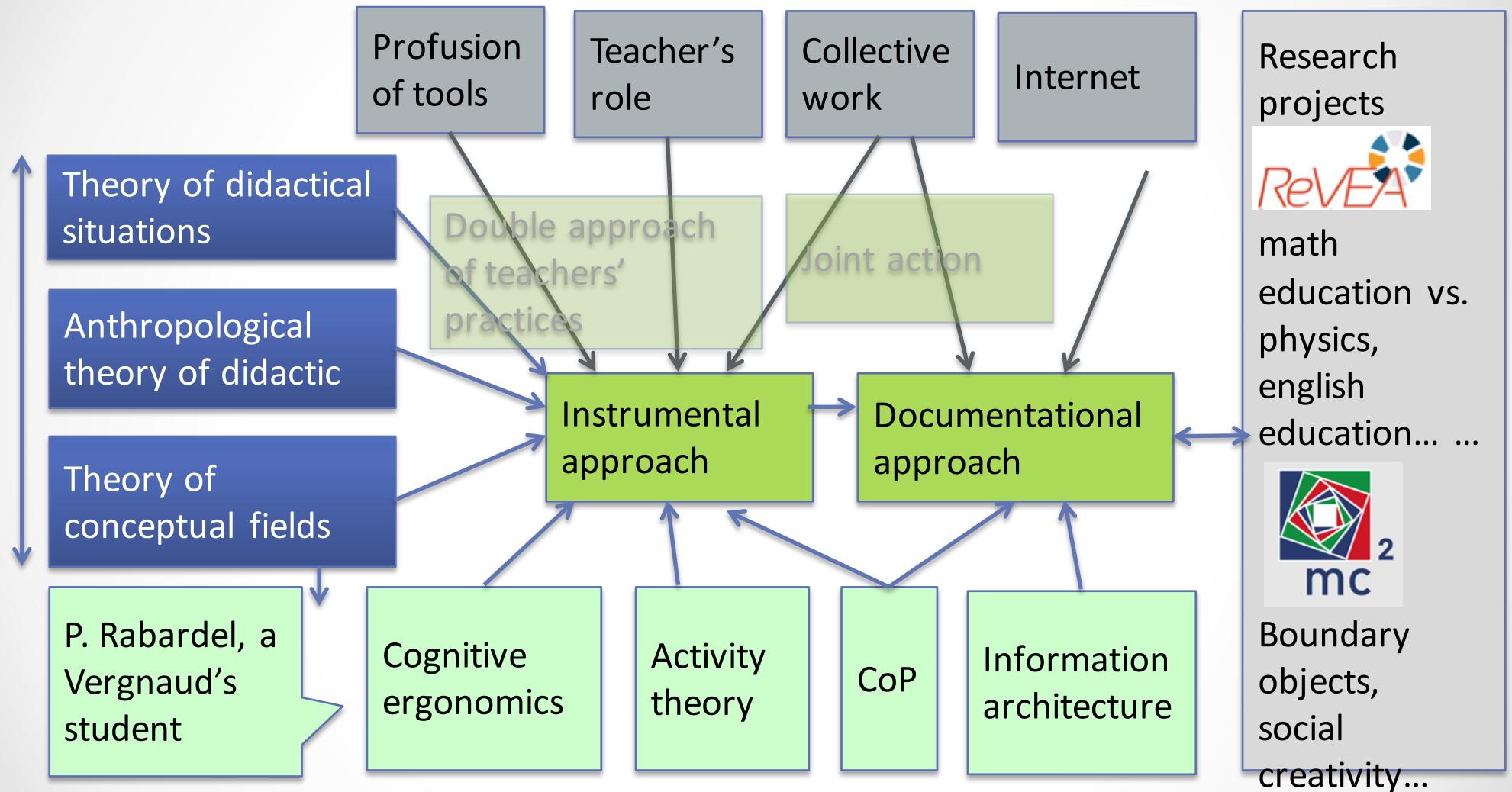
Three “mother” theoretical frameworks (TDS, ATD, TCF), with internal dynamics

New interests, objects and phenomena to be investigated (teacher's role, profusion of tools, Internet, collective work...)

Appropriation of “external” theoretical frames (cognitive ergonomics, activity theory, communities of practice...)...  
... fertilizing existing frames or resulting in new approaches (double approach of teachers' practices, instrumental approach, theory of joint action...)

National as well as european projects of research acting as theoretical cross-fertilizing laboratories (ReMath, MC2...

# A mapping of an evolving field



New approaches sensitizing existing ones to emerging phenomena (e.g. links instrumentation-conceptualization)

# Taking care of the interactions between the actors of math. teaching

CFEM, the French sub-commission of ICMI, a privileged platform for developing such interactions

Several events (annual colloquium ARDM-CFEM, Forum “living mathematics”)

A recognized legitimacy for discussing with the Ministry (new curriculum, teachers recruitment)

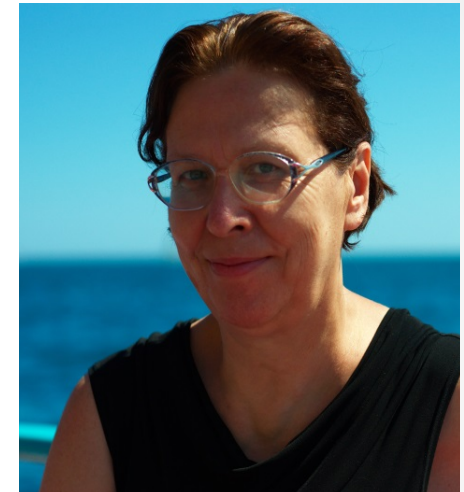
Interactions teachers, didacticians, mathematicians, needing a mutual reconnaissance, to be carefully nurtured!



# Two illustrative case studies

A. Chesnais, V. Durand-Guerrier:

*Educational research on axial symmetry in the French tradition*



M. Bosch, H. Chaachoua:

*Research on school algebra in the French tradition*

