

EVOLUTION OF THE
S-SEMANTICS
SCHOOL

M A R C O C O M I N I

incidentally taking about the others

GIORGIO'S GROUP HISTORY DESCRIPTION

- ✻ Martelli talk: First Age
- ✻ Giacobazzi talk: Middle Age
- ✻ this talk: New? Age (1993-today)

THE LOGIC PROGRAMMING CASE

- ✻ Imperative paradigm canonical behavior:
input/output
- ✻ Functional paradigm canonical behavior:
ground (functional) values
- ✻ Logic paradigm canonical behavior:
computed answers NOT logical truth
 - ✻ s-semantics approach

DENOTATIONAL SEMANTICS PRINCIPLES

- ✱ Defined by syntax induction
 - => Compositional
- ✱ Each syntactic category has a denotation
 - ⌘ Goal-independence
- ✱ Can “represent” operational behavior
 - ⌘ Behavioral program equivalence
 - ⌘ Correctness & full abstraction
 - ⌘ Explicitly exploit semantic properties

MY S-SEMANTICS “SLICE”

☼ My Origins

M. Gabbrielli
PhD Thesis

R. Giacobazzi
PhD Thesis

standard & non-standard
semantics

- ☼ Goal: build a Framework parametric w.r.t. a chosen (abstract) program property
 - correct & fully abstract semantics
 - goal-independent program denotation

TAXONOMY OF BEHAVIOR PROPERTIES

- ✿ with Chiara Meo (and Giorgio obviously!)
 - ✿ Semantic Framework for all abstractions of SLD-trees
 - ✿ A priori properties of the derived semantics

☀ Theoretical staff that should be useful for applications

ABSTRACT DIAGNOSIS

- ✻ with Chiara Meo and Giuliana Vitiello:
Algorithmic Detection of Program Errors
 - ✧ w.r.t. an abstract behavior property
 - ✧ effective for Nötherian Domains
- ✻ it is based on one application of the abstract immediate consequences operator

ABSTRACT VERIFICATION

✻ with Roberta Gori: Algorithmic Proof of Abstract Properties

✻ Abstract Park's Induction Principle

$$T_P^\alpha(\mathcal{S}) \leq \mathcal{S}$$

✻ Can reconstruct all had-oc precise (non-effective) proposals

✻ type checking is an instance

✻ plenty of new hybrid effective (incomplete)

OTHER PARADIGMS

☀ with Moreno Falaschi, Maria Alpuente & others

- Abstract Diagnosis for Term Rewriting Systems
- Abstract Diagnosis/Verification for integrated paradigms (FLP) and multi-paradigm declarative languages (Curry, ...)
 - Polyhedral Domains will be essential for numerical language primitives

☀ ...we're getting closer

SO...

✻ Giorgio, did we complete “our mission”?

MY MODEST VISION

- ✿ A Curry extension that
 - ✿ provides programmer not only type specifications but also
 - groundness
 - depth(k)
 - ...
 - ✿ supported by an implementation with mixed analysis/verification (inference/checking)

EVOLUTION OF THE GROUP

