1. Suggested Projects

2. Normal Derivations

3. Canonical Derivations
Suggested Projects I

- A calculus of explicit substitutions [Abadi, Cardelli, Curien, & Levy 91]
- A calculus of objects [Abadi & Cardelli 94]
- Coherence of a language with subtyping and implicit coercions [Breazu-Tannen, Coquand, Gunter, & Scedrov 91]
- A lambda-calculus with intersection types [Coppo, Dezani-Ciancaglini, & Venneri 81] [Reynolds 91]
- A logic for parametricity [Plotkin & Abadi 93]
- A lambda-calculus with names [Odersky 94]
- First-order unification [Snyder & Gallier 88]
- Higher-order logic programming [Miller, Nadathur, Pfenning, & Scedrov 91]
Suggested Projects II

- Program analysis and optimization (each topic below is a possible separate project)
  - Binding-time analysis [Nielson & Nielson 92], [Davies & Pfenning 96]
    [Davies 96] [Hatcliff 96]
  - Abstract interpretation [Cousot & Cousot 77]
  - Strictness analysis [Hankin & Metayer 94]

- The Categorical Abstract Machine [Cousineau, Curien, & Mauny 87]

- Closure conversion and lambda-lifting [Reynolds 72]
Suggested Projects III

- Extending Mini-ML (each topic below is a possible separate project)
  - with exceptions
  - with references
  - with general datatype definitions
  - overloading and typecase

[Milner, Tofte, & Harper 90]

- Mini-Forsythe [Reynolds 88]
Suggested Project IV

- Elementary notions of rewrite systems [Bachmair 91]
- Modal logic and Kripke semantics [Basin, Matthews, Vigano 96]
- Polymorphic recursion and semi-unification [Henglein 93, TOPLAS]
- Lazy evaluation [Launchbury 93]
- Pure functional programming and monads
- Evaluation based on evaluation contexts [Felleisen]
Suggested Projects V

- Logical interpretations [Goedel, Friedman]
- Linear logic [Girard 87, Pfenning 96]
- Computational interpretations of classical logic [Ong 96, Ong & Stewart 97]
- Pi-calculus [Milner]
Suggested Projects VI

- Theorem proving
  - via tactics
  - via iterative deepening
  - other methods
  - induction
  - Presburger arithmetic
  - decision procedures for fragments

- Elementary category theory [Rydeheard & Burstall, Gehrke]

- Type-directed compilation [Morrisett 95]
Suggested Projects VII

- Shape types [Fradet & Metayer 97]
- Relational parametricity and units of measure [Kennedy 97]
- Type directed partial evaluation [Danvy 96]
- Typed closure conversion [Minamide, Morrisett, Harper 96]
- Call-by-value lambda-calculus [Plotkin 75, Sabry & Wadler 96]
- Call-by-need lambda-calculus [Ariola et al 95]
- Recursive types [Abadi & Fiore 96]
- “Logical” logic program compilation [Pfenning 97]
- LF in Elf
- Elf in Elf