I. Expert Knowledge-Based Performance Programs
   A. Distinguishing characteristics
      1. Intensive use of Domain-specific Knowledge
      2. Use of Heuristic or Informal Knowledge
         Capturing expertise, to maximum extent formalized knowledge (algorithm) is subsumed
   B. Survey and Contrast
      1. Case Studies: DENDRAL, MYCIN, NSS Chess Program, Equipment diagnosis, KOALA
      2. Contrast: Theorem Provers and General Problem Solvers

II. A Case Study: KOALA

III. Issues
   A. Choosing Feasible AI Application Programs
      1. problem formulation
      2. Knowledge base
      3. Problem Difficulty
      4. Resources
   B. Knowledge Extraction
      1. Design
         a. Identifying levels of knowledge structure
         HEARSAY, KOALA
         b. Domain primitives on which the rest of the knowledge will be couched
      c. Domain expert usually not computer expert
      2. Data
         a. Piecemeal accumulation and testing
         b. debugging knowledge
            1. contradictions
            2. non-contradictory, but inappropriate, inferences
            3. special cases
   C. Knowledge Integration
      1. Pipeline method: Tightly Coupled systems
         a. homogeneous representation
         b. Non-contingent coupling between knowledge sources
      c. Example: DENDRAL
      2. Pseudo-Parallel method: Event-driven Systems
         a. non-homogeneous representation of knowledge sources
         b. contingent coupling between knowledge sources
      c. Examples: HEARSAY, KOALA
      3. Changing Importance of Knowledge Source
         a. depending on situations
         example: NSS Chess Program
         b. depending on levels of abstraction
         example: KOALA, HEARSAY, NSS Chess
   D. Incremental Formation of Solutions
      1. Alternative Hypotheses
         Example: HEARSAY, SPEECHLIS
      2. Information Feedback: Interacting levels of Abstractions
         Example: HEARSAYIII, KOALA
   E. Degree of Certainty of Informal Knowledge
      1. nature of inexact reasoning
      2. Measures of Certainty
         MYCIN experience
   F. Self-Explaining Systems
      1. For acceptance by domain experts
      2. Debugging heuristics and informal reasoning
      3. Examples: MYCIN, KOALA

IV. What It all Means: What we know, What we don't Know