

# Re:CAF, Dynamic Tasks & Writing Process Data

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ECD Reconceived

# Tasks and Task Features

- ▶ Presentation/Stimulus Material
  - ▶ Background Information
  - ▶ Prompt
  - ▶ Tools
  - ▶ Student-facing Rubric
- ▶ Work Product and Process
  - ▶ Final artifact
  - ▶ Event Log
- ▶ Features
  - ▶ Variables relating to the collection of evidence.
  - ▶ Evidence (work products and processes) are collected in a *context*
    - ▶ *key1: val1*
    - ▶ *key2: val2*

# Classes of Feature Variables

- ▶ Topic
- ▶ Setting: Time & Place
- ▶ Available Tools
- ▶ Activity Inputs
- ▶ Activity Outputs – Work Product and Process
  - ▶ Observation Checklists
- ▶ Instructions & Scaffolding/Learning Supports – Condition/Trigger
- ▶ Group Composition
- ▶ **Learner/Feature Interactions**

# Evidence Rule Books

- ▶ Identification Rules
  - ▶ Determine *observable indicators*
  - ▶ Determine *feedback parameters*
  - ▶ Determine *research data*
  - ▶ Determine *intermediate observables*
- ▶ Accumulation Rules (Statistical part)
  - ▶ Evidential Focus (which skills)
  - ▶ Skill demand (difficulty)
  - ▶ Evidential Strength (Discrimination)
  - ▶ Skill Breadth (which aspect of the skill)

An *Evidence Rule Book* is a set of evidence rules which is appropriate in a particular *Scoring Context*

# Scoring Contexts

Certain evidence rules are only appropriate in certain contexts:

- ▶ Checking for correctly spelled words requires free text input.
- ▶ Misspelled words have different evidential strength if the writer had a dictionary, spell checker.

Could vary across persons:

- ▶ Prompt “Analyze a Sonnet”
  - ▶ Has the writer read the sonnet before

# Dynamic Tasks

An activity for which some of the scoring features change during the student interacting with the task is a *dynamic task*.

- ▶ Multipart Task
  - ▶ Read Stimulus Material
  - ▶ Answer Questions about Stimulus
  - ▶ Write Essay
- ▶ Games and Simulations
  - ▶ As simulation environment changes, the scoring context might change.
  - ▶ Flight simulator: Pre-flight check, take-off, cruising, storm, more cruising, approach, landing
- ▶ Complex Production Process
  - ▶ Writing
  - ▶ Student goals and subgoals affect scoring context
  - ▶ A pause means something different depending on when it occurs

# Writing Process State as Context Feature

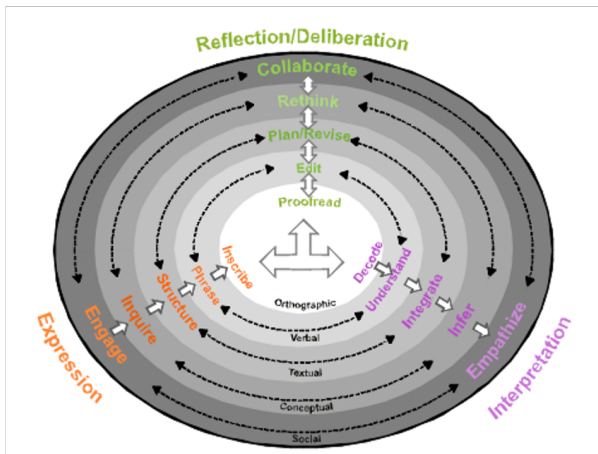


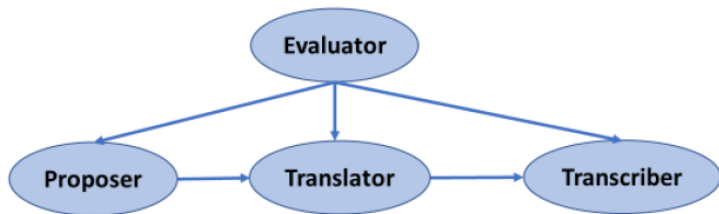
Figure 1: Deane2009WritingModel

Deane (2009) Model of Writing



# Hayes Core Cognitive Process Model

## Core Cognitive Writing Processes



Hayes, J. R. (2012). Modeling and remodeling writing. *Written communication*, 29(3), 369-388.

Figure 2: Hayes Model

# HMM Model

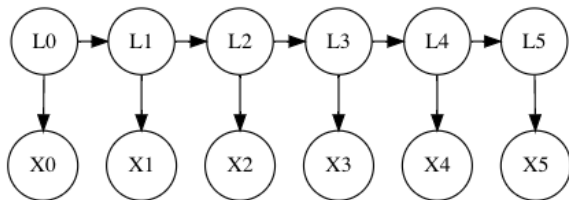


Figure 3: Hidden Markov Model

- ▶ Latent state is the process stage
- ▶ Observables are events in the keystroke log
- ▶ Evidentiary value of observables depends on latent state
- ▶ Latent state must be inferred from keystroke log

# The Papers

## Overview of the 12-Trait Model (Deane & Yan)

- ▶ 12-Traits are more like 12 Indicators/Observables/Features
  - ▶ Product Indicators
- ▶ Add about 7 Process Indicators
- ▶ Spandel & Stiggins 6-trait model was aligned with instruction.
- ▶ [Inverse] Correlations among the 12 indicators provide structural information about how the features cluster
- ▶ Would cutting breaking the process features up in time reveal interesting patterns?
  - ▶ Early (1st quarter)
  - ▶ Middle (2nd & 3rd quarters)
  - ▶ Late (4th quarter)

## Profiling ... Before and After Instruction (Deane)

- ▶ Showing before/after difference is good. Might be even able to do this at the student level.
- ▶ Are there pre-requisite effects? (e.g., mechanics before organization)
- ▶ Are there restriction of range effects?

## Leveraging Keystrokes to Identify Strategies (Kanopka)

- ▶ Moving from microfeatures to features (indicators)
- ▶ To what extent can indicator factors map to instruction
- ▶ The logistic models are hard to translate.
  - ▶ Begg question of normalization of features
  - ▶ Weight of Evidence?
  - ▶ Cross-validated accuracy
  - ▶ Regression model looks somewhat better
- ▶ Begg question to what extent typing speed limits performance

## Linking Traits to Writing Profiles (Zhang)

- ▶ Profiles are interesting, working towards what a teacher might want
- ▶ High correlations with productivity and many of the 12-product indicators
- ▶ Paragraphing and Organization also high correlation
  - ▶ Middle School?

## Linking Plan Quality to Essay Performance (Song)

- ▶ Adding another work product (plan) is an interesting way to capture data
- ▶ How much training do the students need on this planning technique?
- ▶ How do the process indicators fit with the plan features?