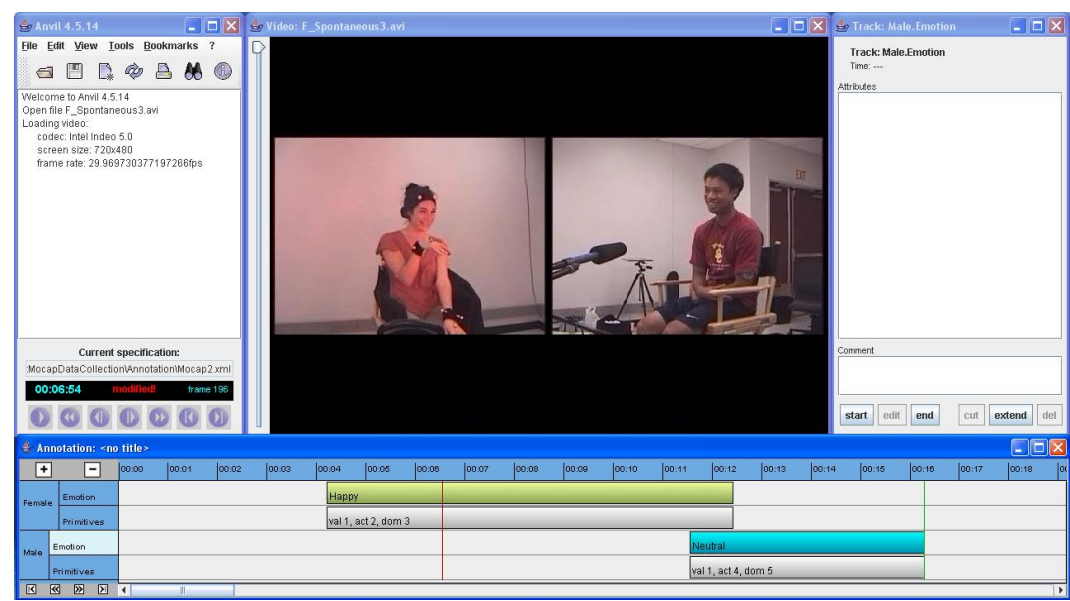


Kartik Audhkhasi, Shrikanth S. Narayanan
 audhkhas@usc.edu, shri@sipi.usc.edu
 Signal Analysis and Interpretation Lab (SAIL)

DIVERSE HUMAN ANNOTATORS ARE USED EVERYWHERE!



Emotion Recognition (SAIL/USC IEMOCAP Database: Acted, multimodal, multi-speaker)



User Behavior Analysis (SEMAINE Database: Interactions with automated agent)



Theatrical Performance Analysis (SAIL/USC Creative IT Database: Acted, multimodal, multi-speaker)



Family Studies (SAIL/USC Couples Therapy Database)

Other Clinical Domains: Autism Spectrum Disorder (ASD), Psychotherapy for **Addiction**

Ambiguity in production and perception of human behavioral phenomena → **Absence of ground truth** labels.



All these human behavioral datasets involve **labeling by diverse human annotators**.

Why model diverse human annotators?

- **Simple plurality** has strict **assumptions**.
- Need to **infer** the latent **true label**.
- Need interpretable **feedback** about **annotator reliability**.

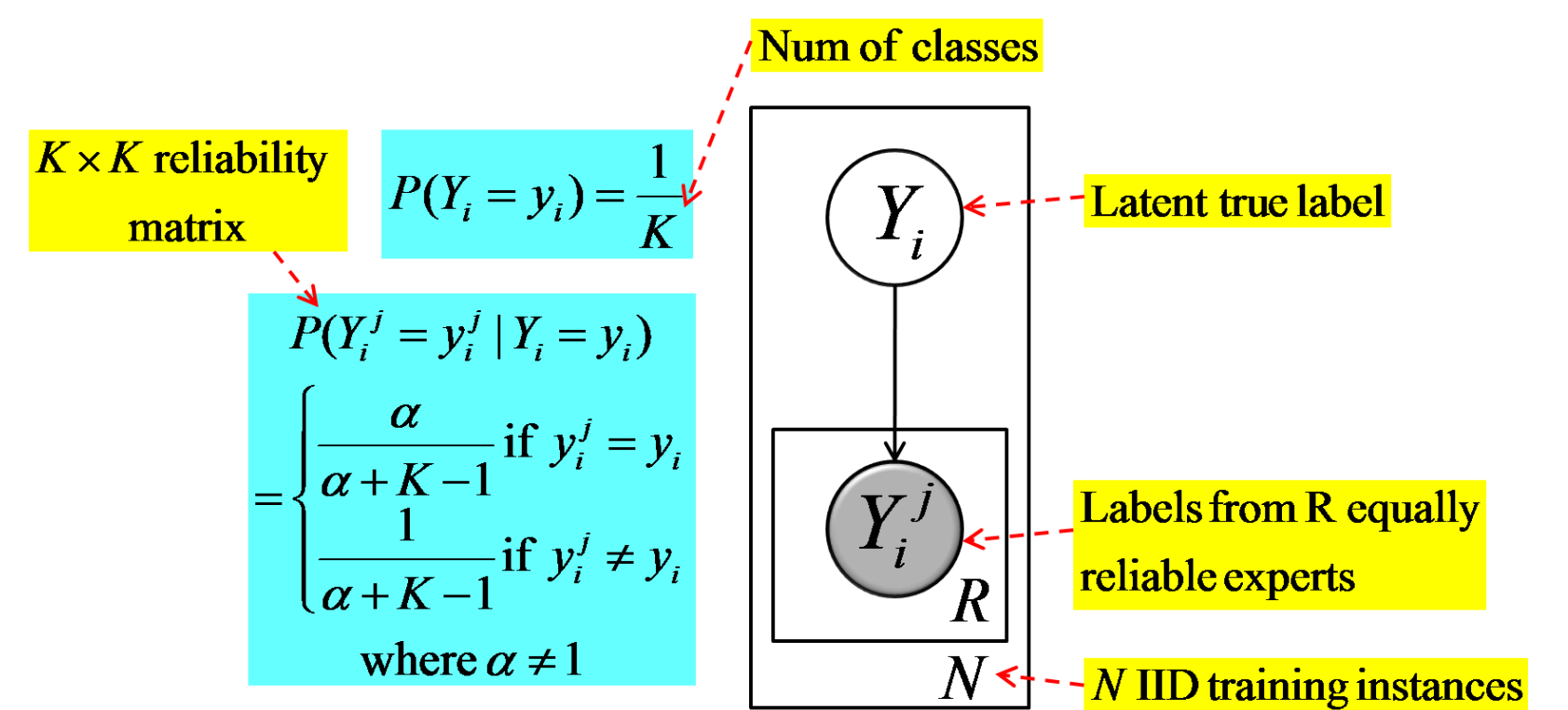
SOME CHALLENGES

- We **don't know** the **true label**.
- Need to **jointly** learn a behavioral **classifier** with the **annotator model**.
- **Most importantly:** Need a **realistic** annotator model!
- **Key:** Annotator **reliability varies with data**.
 → Globally-variant, locally-constant.

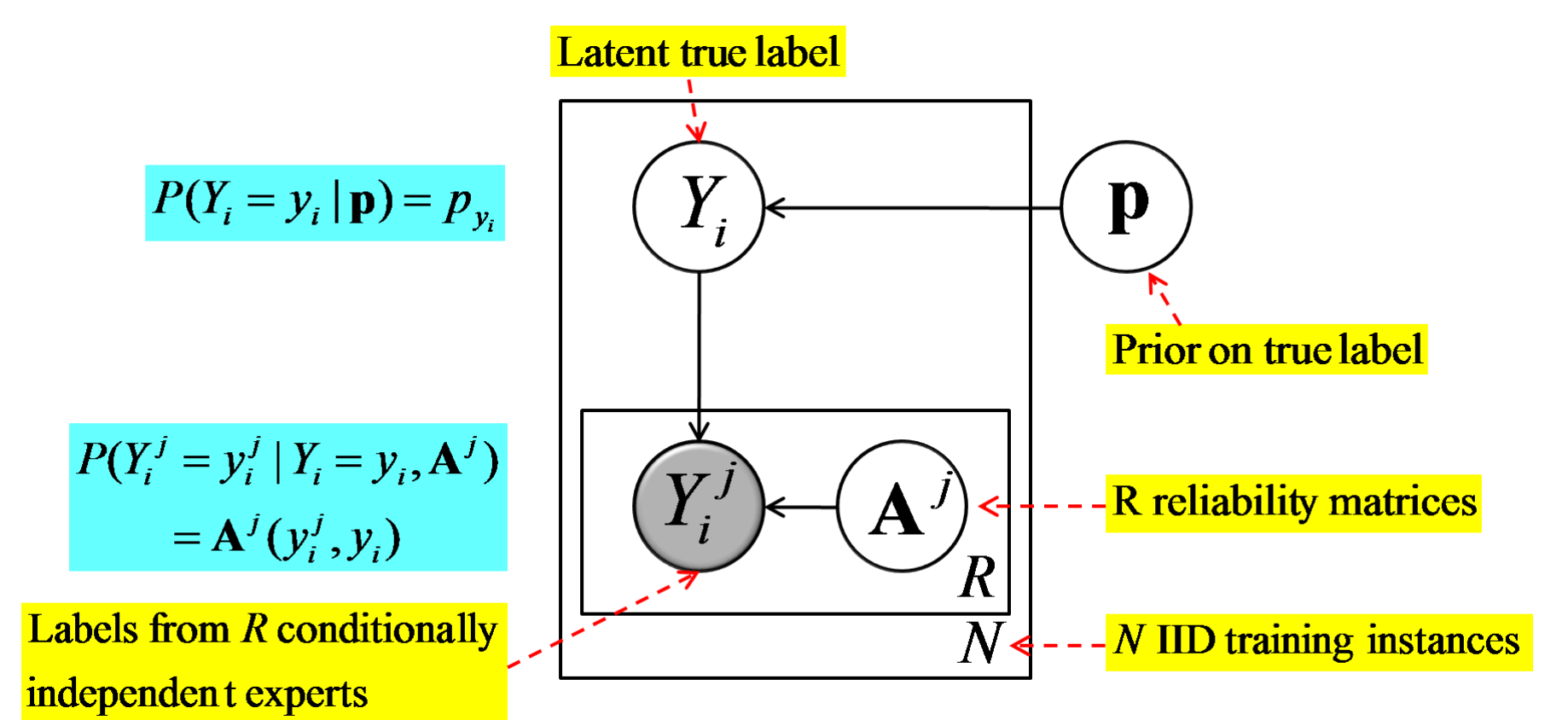
STATISTICAL MODELS OF DIVERSE HUMAN ANNOTATORS

Noisy-channel models: Annotators flip latent true label

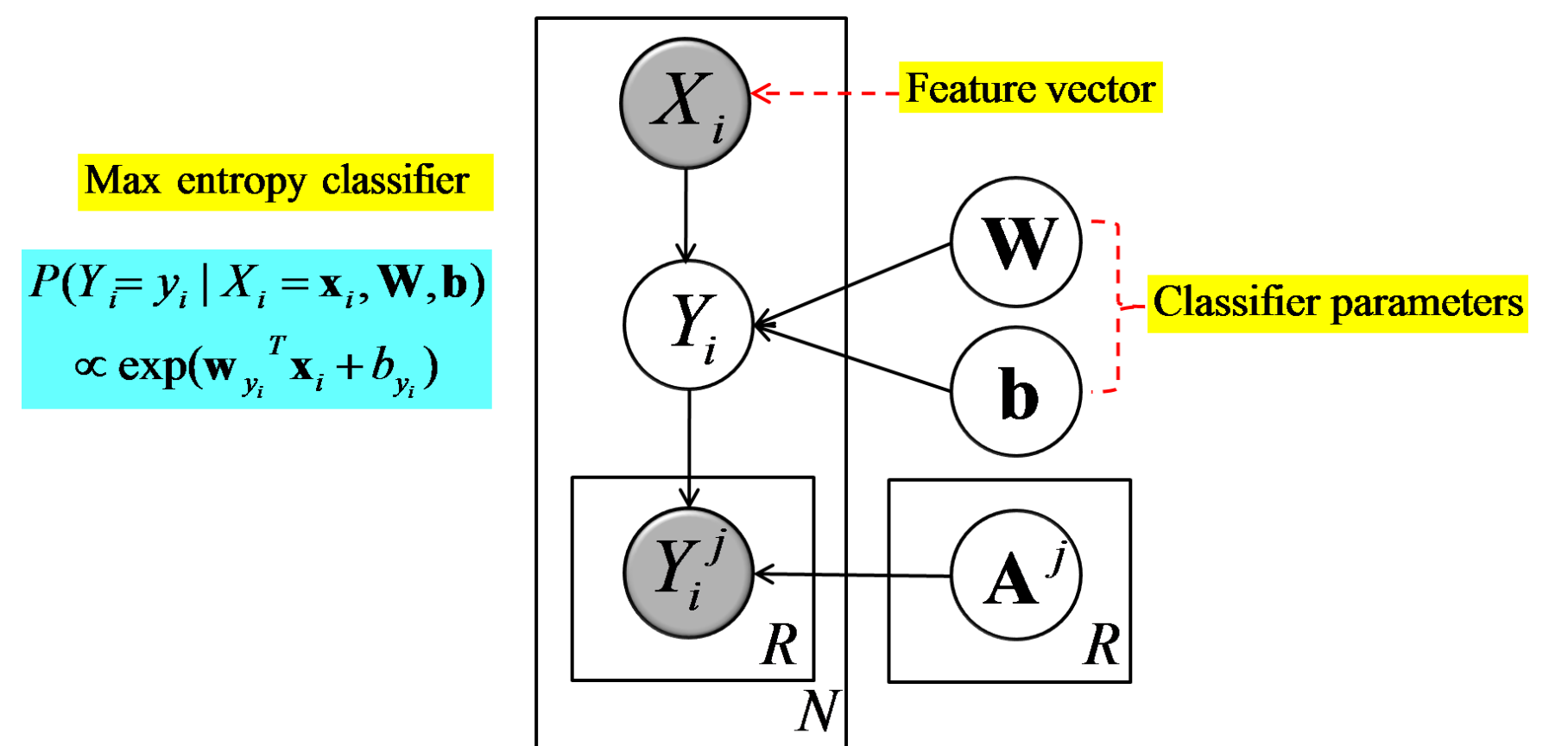
1. Equal annotator reliability (simple plurality)



2. Unequal annotator reliability

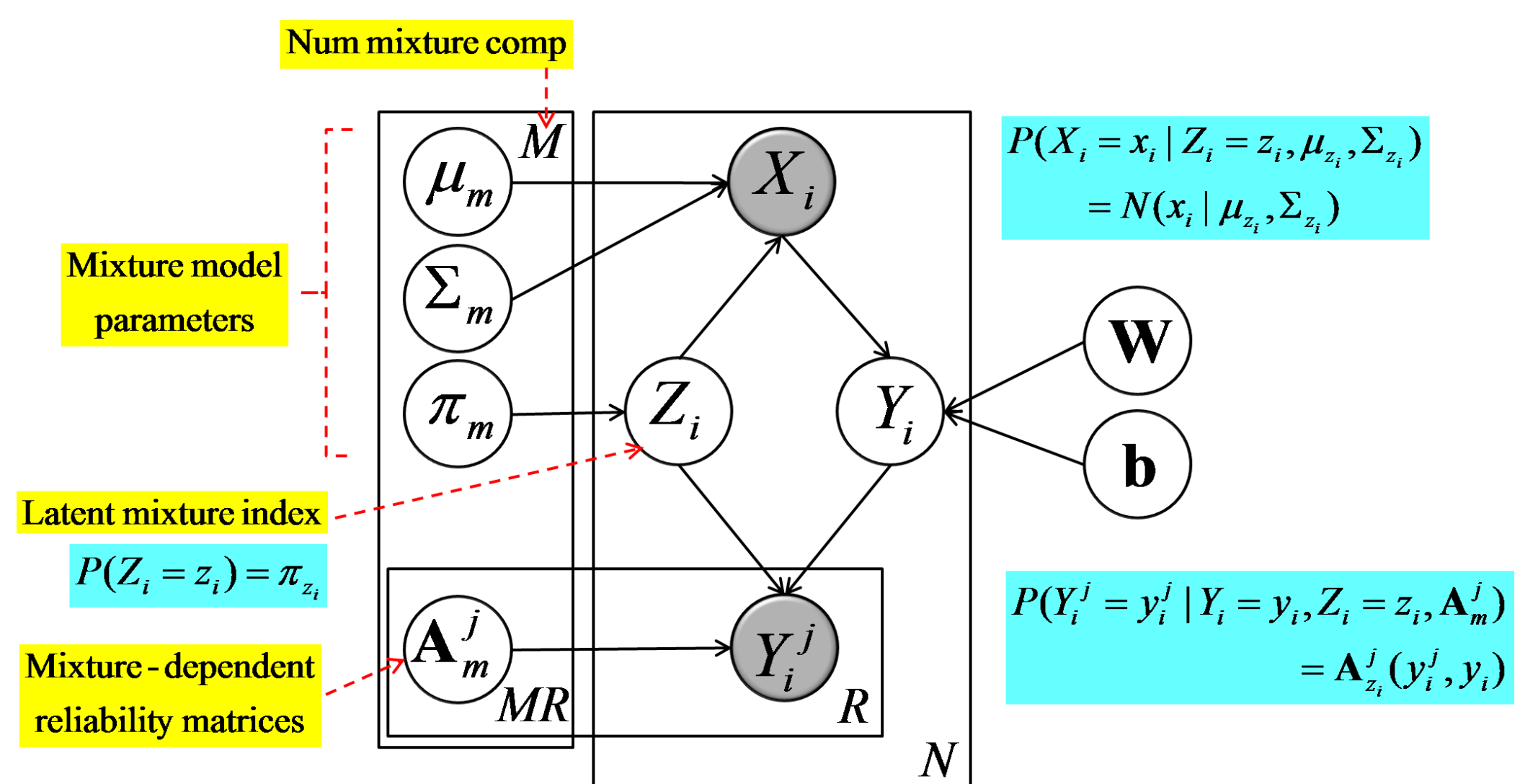


3. Unequal annotator reliability + classifier



4. Unequal data-dependent annotator reliability + classifier (GVLC model)

(In press) K. Audhkhasi and S. S. Narayanan, "A Globally-Variant Locally-Constant Model for Fusion of Labels from Multiple Diverse Experts Without Using Reference Labels", IEEE Trans. On Pattern Analysis and Machine Intelligence, 2012



Performance gains over many **affective computing** (human annotators) and **UCI** (machine classifiers) datasets.

TEEM (v1.0): MATLAB TOOLKIT

• Toolkit of **Expert Ensemble Models (Download: www-scf.usc.edu/~audhkhas/software/teem.zip)**.

• **Expectation-Maximization** training and testing, **logistic regression** (Max. Entropy) classifier.