Navigating Interpretive Spaces Across Models

A Comparative Framework for Computational Hermeneutics

Zachary K. Stine

Dept. of Computer Science & Engineering

James E. Deitrick
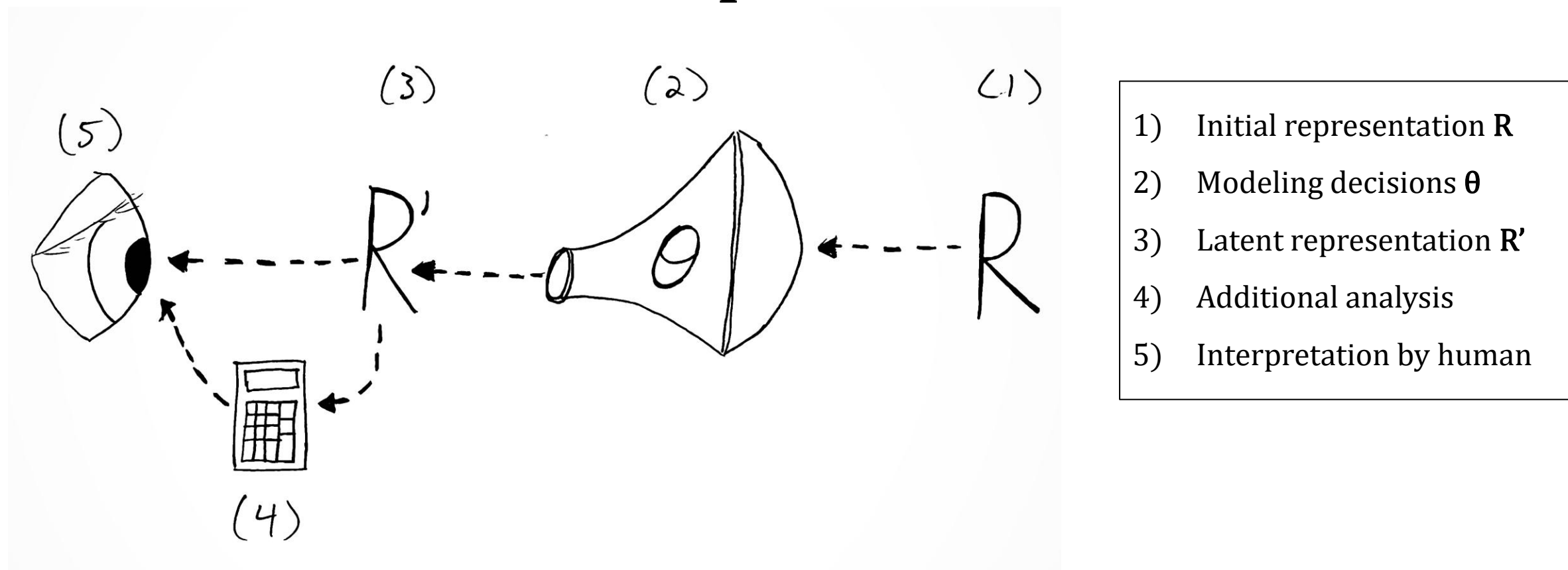
Dept. of Philosophy & Religious Studies

UNIVERSITY OF CENTRAL ARKANSAS

Summary

a)   Models of cultural signifiers are interpretive intermediaries that measure semantics as topology of signifier relationships

b)   The dominant framework for model evaluation often assumes the existence of singularly optimal interpretations

c)   This evaluative framework is unjustified when one assumes a set of signifiers permits a multiplicity of interpretations

d)   We propose a comparative framework for navigating models under the assumption of interpretive pluralism

1 Models are interpretive lenses

1) Initial representation **R**
2) Modeling decisions **θ**
3) Latent representation **R'**
4) Additional analysis
5) Interpretation by human

Distributional hypothesis: A kind of material semantics for signifiers **S** is given by the latent statistical relationships between signifiers as described in representation **R** by a common set of attributes/contexts

E.g., latent semantic analysis, BERT, etc.

The view offered by a model depends on all modeling decisions in **θ**

2 Model evaluation
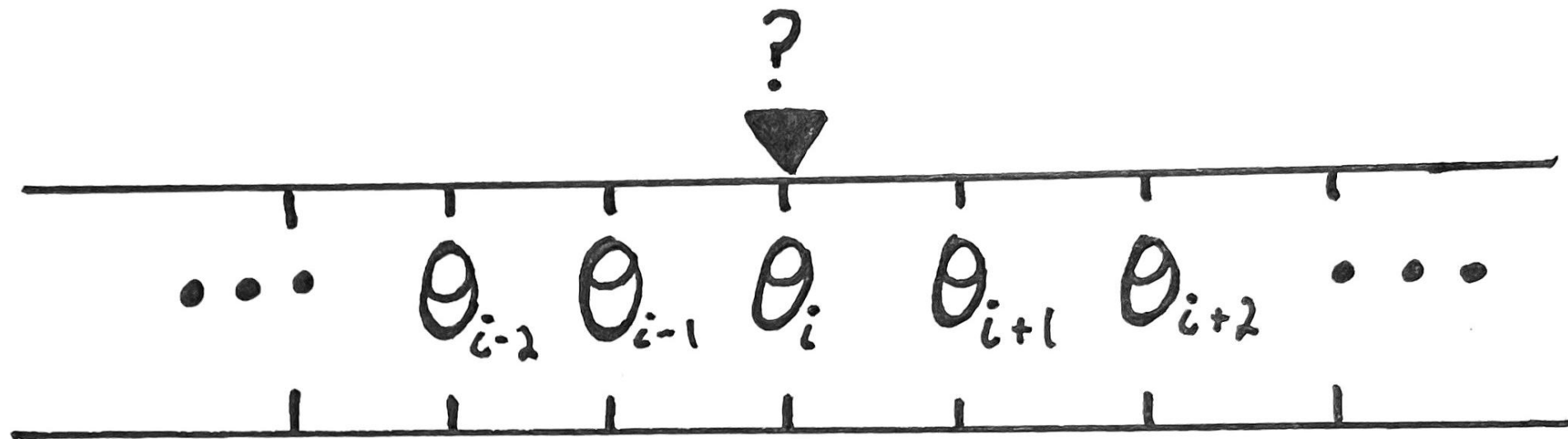
Dominant evaluation framework: Choose a set of modeling decisions θ that optimizes for some mixture of well-defined performance measures on well-defined tasks

E.g., out of sample word prediction, classification tasks like entailment, etc.

Ordinal ranking of models assumes ontologically real, singularly optimal interpretations

Performance measures describe a specific facet of the geometry of $\mathbf{R'}$ (e.g., the degree to which its geometry enables an optimal decision boundary for a classification task)

3 Models of differential meaning
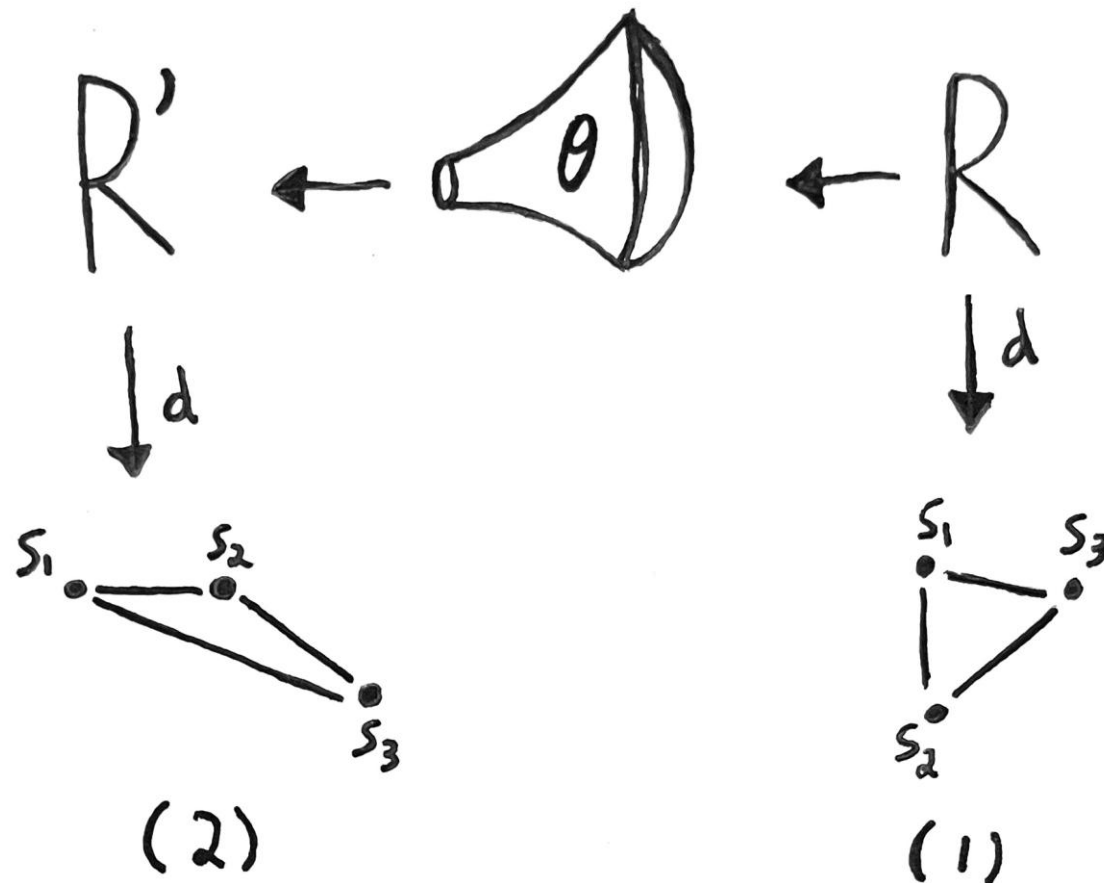
1) Differential meaning of **S** relative to representation **R** and difference measure **d**

2) Differential meaning of **S** relative to representation **R**, modeling decisions **θ**, and difference measure **d**

Distributional semantic models assume that semantics is differential structure of signifiers **S**

With choice of difference measure **d**, can abstract this structure from the space of a particular representation

The difference in structure between (1) and (2) above is an index of **θ**

4 The problem
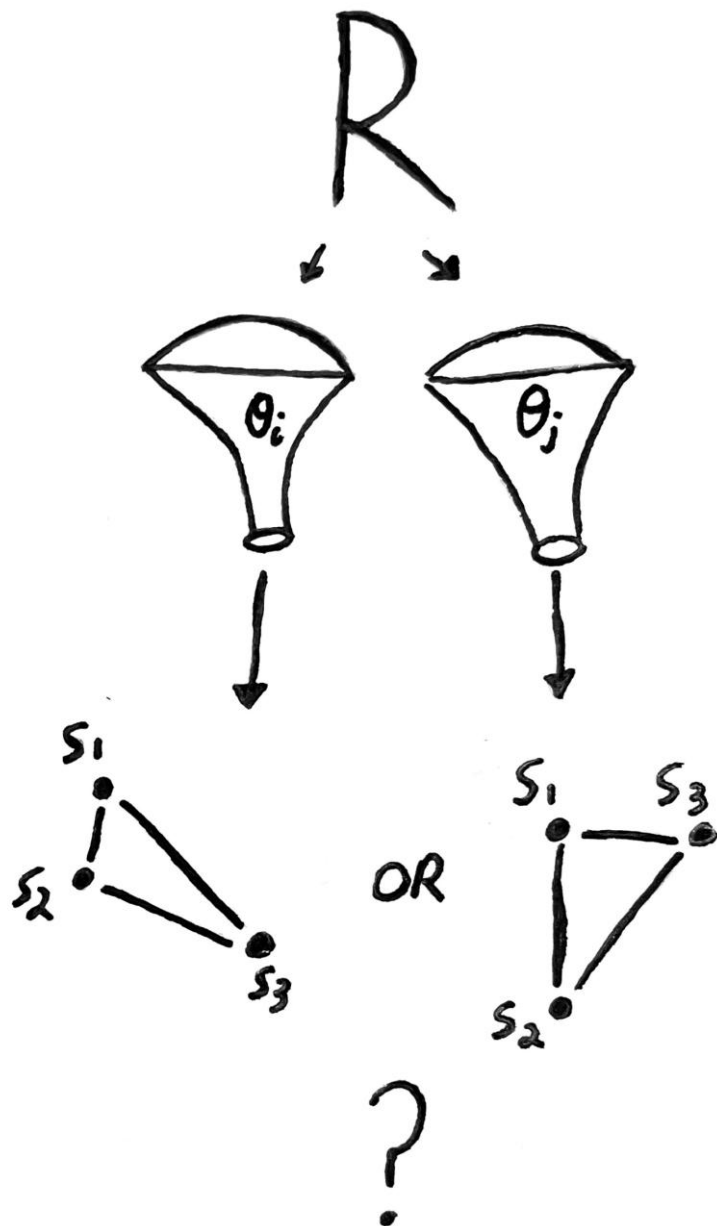
The standard evaluation framework says which modeling decisions θ capture the semantics of **S** relative to a mixture of performance measures
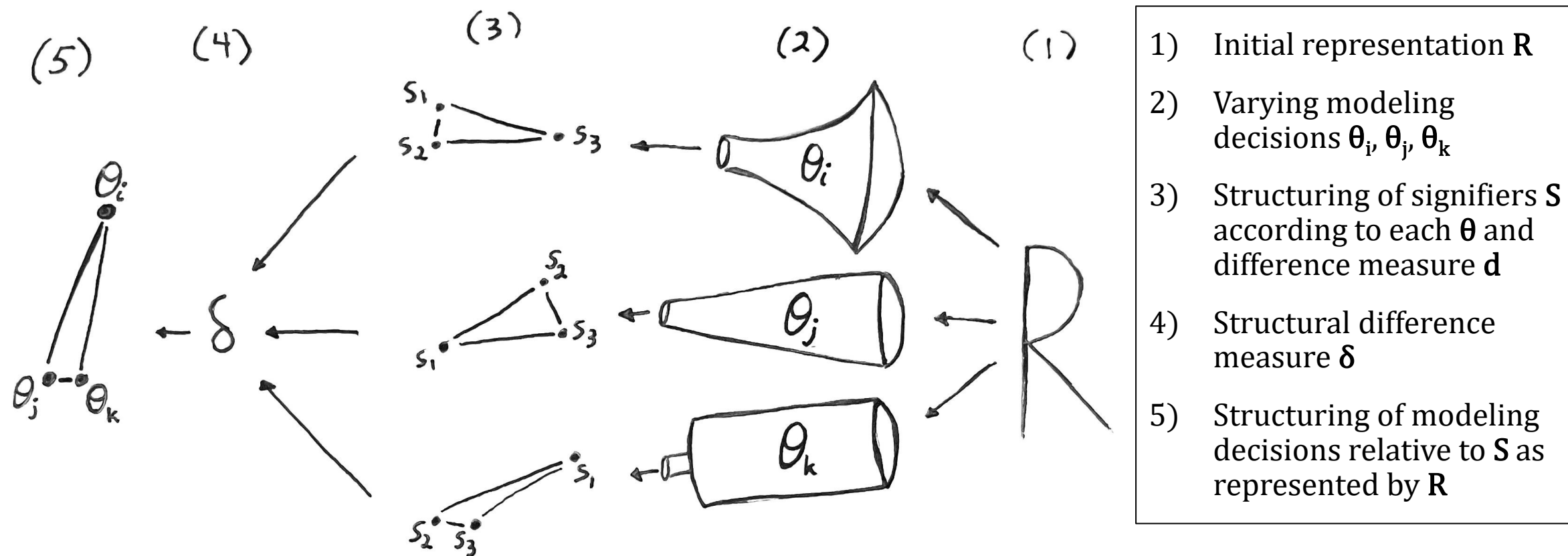
Standard evaluation framework: θ_i or θ_j

This does not cohere with interpretive pluralism

All models are ~~wrong~~ right as distinct vantage points from which we can view different facets of **S**

We want to utilize θ_i *and* θ_j in order to widen the semantic aperture through which we encounter the representation of signifiers **S**

5 Computational hermeneutics

1) Initial representation **R**

2) Varying modeling decisions θ_i, θ_j, θ_k

3) Structuring of signifiers **S** according to each θ and difference measure **d**

4) Structural difference measure δ

5) Structuring of modeling decisions relative to **S** as represented by **R**

The goal of the framework is to enable comparative analyses between the externalized interpretive structures encoded by different models

Need to understand the structural relationships between models by identifying regularities and disparities between how they structure various systems of signifiers

Can map out the differential meaning of θ relative to choice of structural difference measure δ (e.g., Procrustes distance)

References

1. Mohr, J.W., R. Wagner-Pacifici, R.L. Breiger, P. Bogdanov. 2015. "Toward a Computational Hermeneutics." *Big Data & Society* 2 (2): 1–8. https://doi.org/10.1177/2053951715613800.

2. Sahlgren, M. 2008. "The Distributional Hypothesis." *Italian Journal of Linguistics* 20 (1): 33–53.

3. Underwood, T. 2014. "Theorizing Research Practices We Forgot to Theorize Twenty Years Ago." *Representations* 127 (1): 64–72. https://doi.org/10.1525/rep.2014.127.1.64.

Thank you

Contact us to let us know what you think or to read an upcoming preprint:

Email: zstine@uca.edu

Bluesky: @zacharykstine.bsky.social

Zachary K. Stine

Dept. of Computer Science & Engineering

James E. Deitrick

Dept. of Philosophy & Religious Studies

UNIVERSITY OF
CENTRAL
ARKANSAS™