Spoken language technologies and psychosocial interventions: Automating performance-based feedback for training, supervision, and quality assurance

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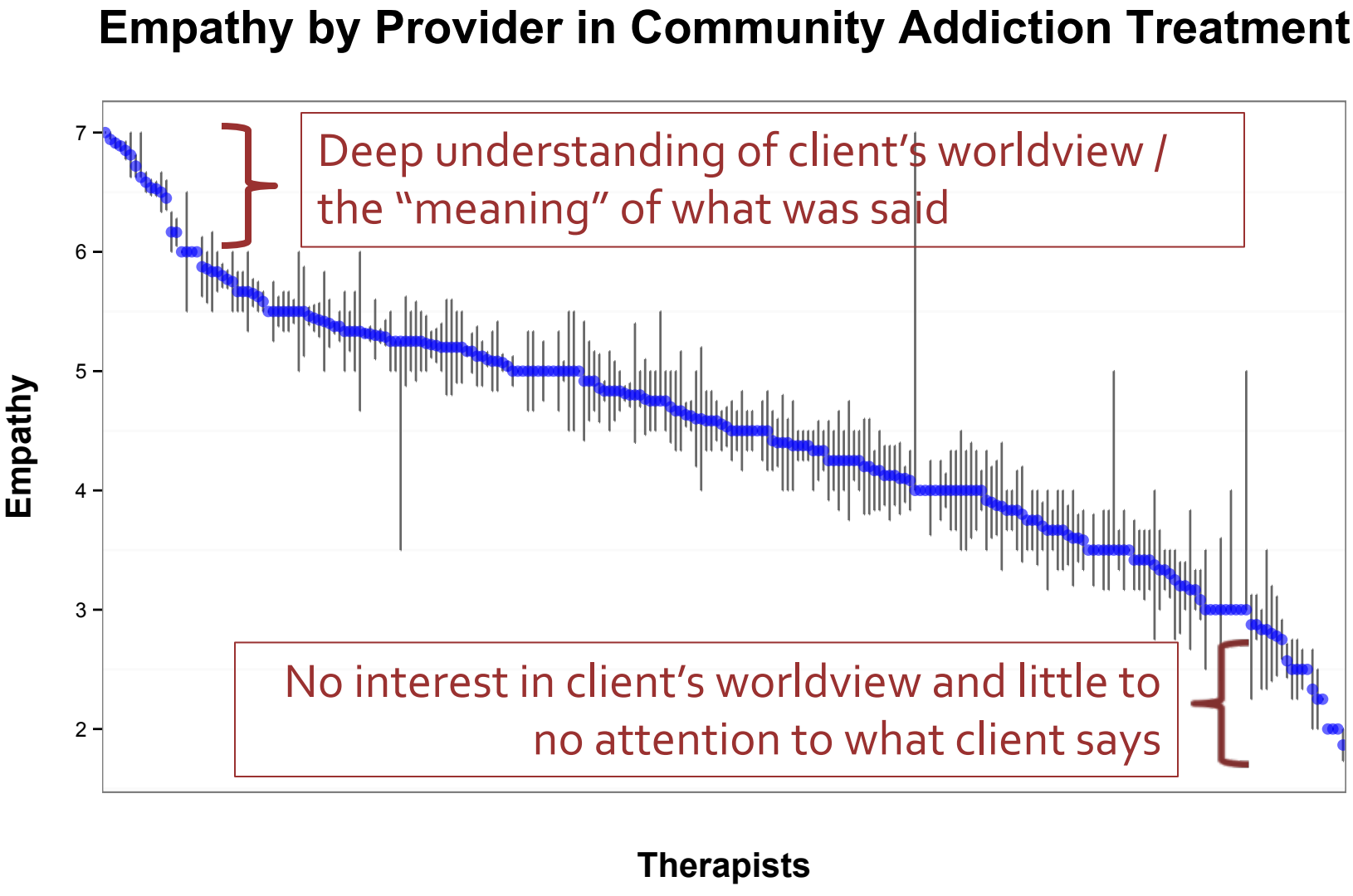
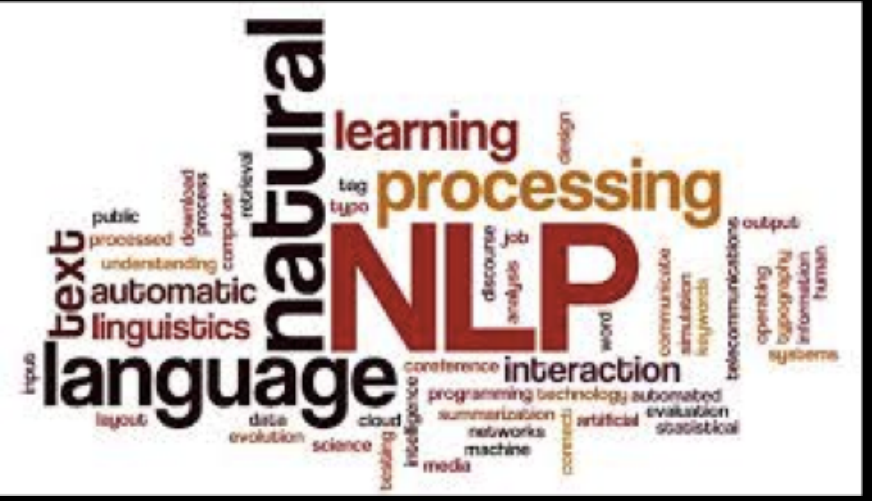
Graphic by Alice Gray

There are 100M counseling sessions each year, and we do not know the quality of any of them

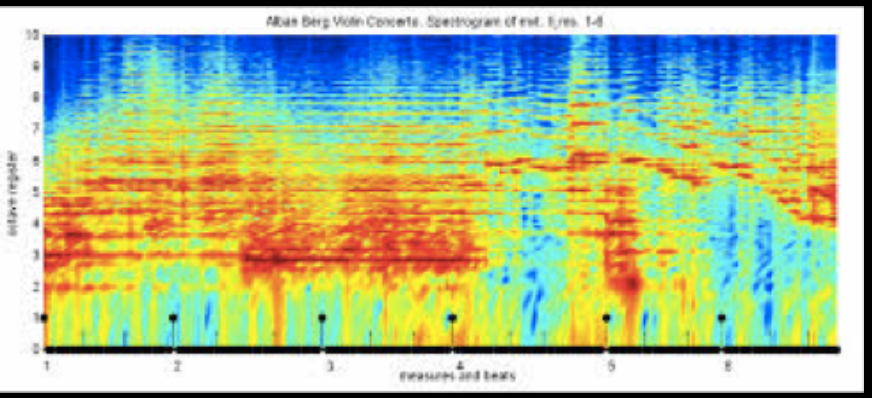
Baer et al., 2009



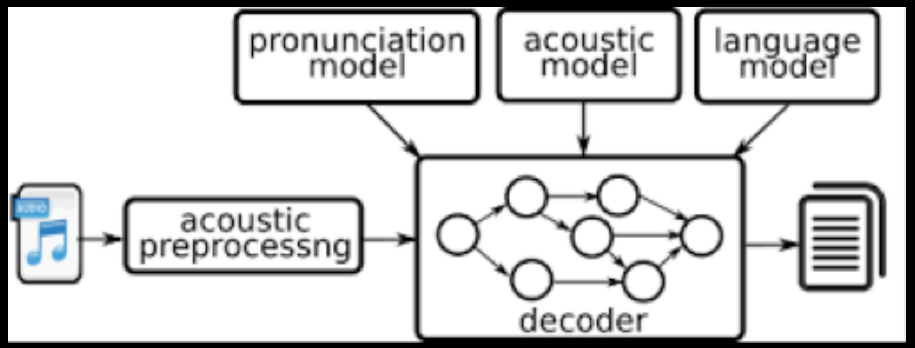
Technological advances now enable automated processing of counseling sessions



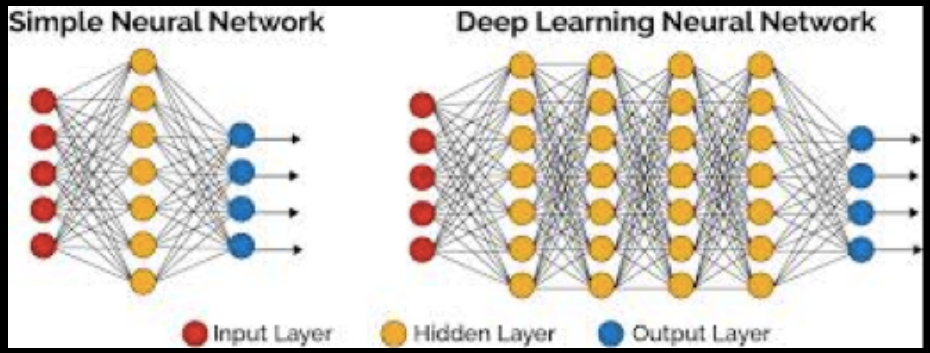
Natural Language Processing



Paralinguistics and vocal acoustics

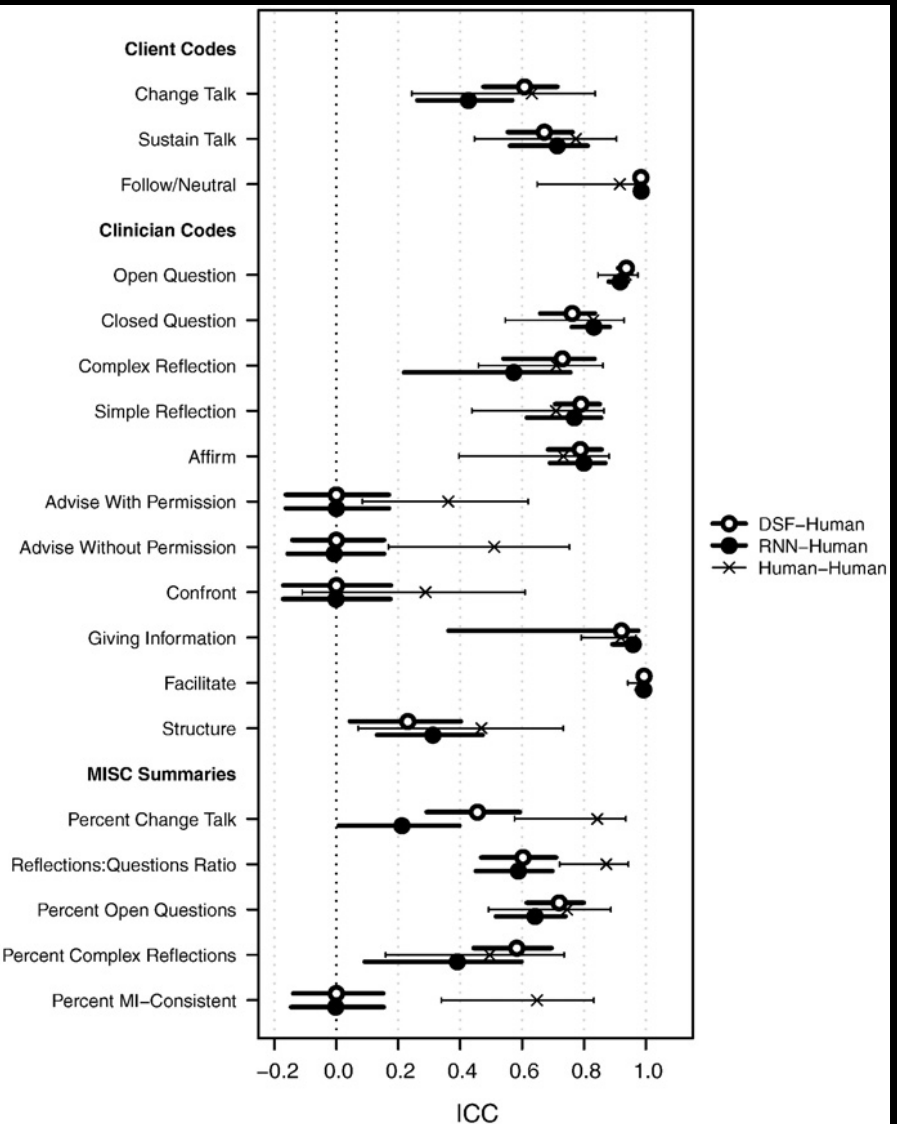


Automatic Speech Recognition



Machine ('deep') Learning

It is possible to predict MI fidelity codes 'automatically' using machine learning



Contents lists available at ScienceDirect

Journal of Substance Abuse Treatment

A Comparison of Natural Language Processing Methods for Automated Coding of Motivational Interviewing

Michael Tanana, M.Stat. [a,*], Kevin A. Hallgren, Ph.D. [b], Zac E. Imel, Ph.D. [c], David C. Atkins, Ph.D. [b], Vivek Srikumar, Ph.D. [d]

Extract features: Vocabulary and 'parse tree'

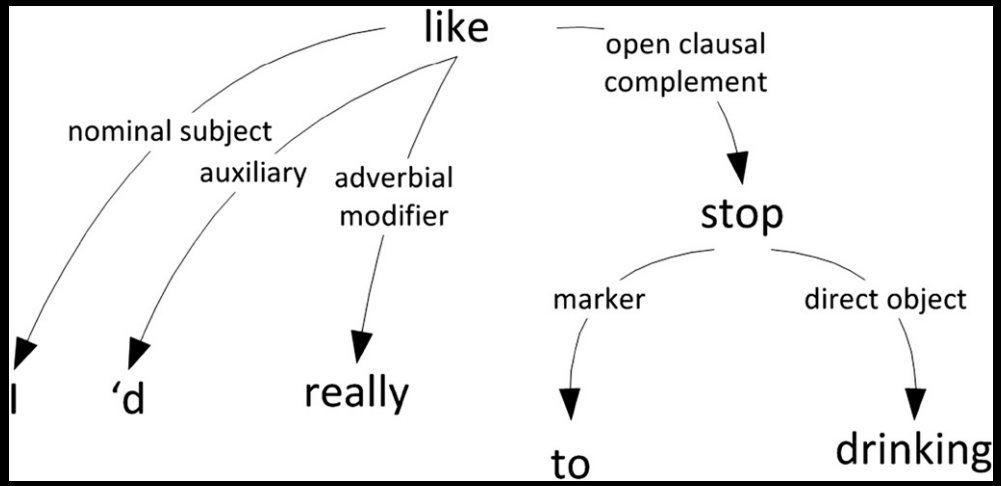
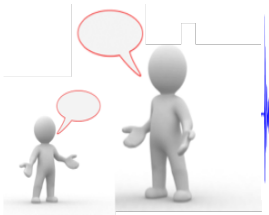
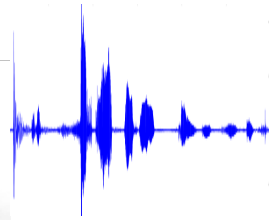
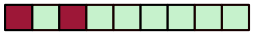
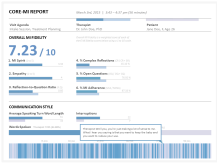


Fig. 1. Dependency tree for a hypothetical change talk statement.

"Okay, so we can predict codes, but… how would you deliver feedback to therapists?"

Processing Steps	Signal Aquisition	Voice Activity Detection	Segmenting and Role Assignment	Automatic Speech Recognition	Predictive Models	CORE-MI Report
		 No Speech Speech	 Therapist Patient	I don't like hangovers It sounds like ...	Text-based + speech predictive models	
Goal of Each Step	Digital Recording to Server	Is Someone Speaking?	Who is the Speaker?	What did they say?	Use words to predict Codes	Feedback to Counselor
Data Collection		Speech Signal Processing			Prediction	Report Generation

Speech Signal Processing Tasks

Not just prediction

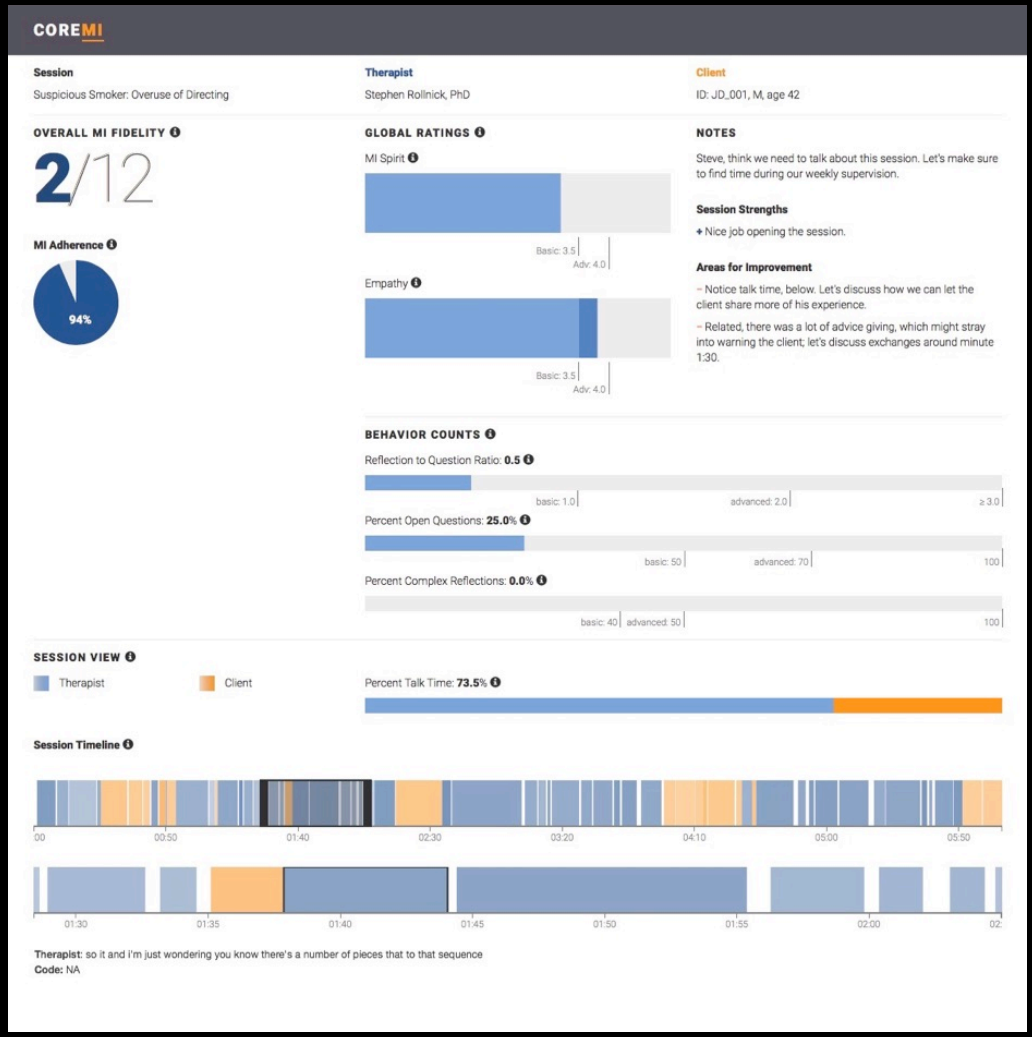
Good news! You are Empathy = 4.2!

If this is ever going to get used in the real world, we need a wicked cool report for the therapists…

CORE-MI Interactive Report:

1. Designed for computer or tablet
2. Overall fidelity statistics
3. Detailed session view, with talk-turn statistics

Let's take a look at a session from Steve Rollnick



http://sri.utah.edu/psychtest/misc/smoker1.html

Current work focuses on implementing and evaluating technology in community clinics

Pilot projects for training and supervision

Evergreen Treatment Services

MI (and other EBPs) for opiate addiction at publicly-funded community clinic

General mental health and addiction services + training clinic

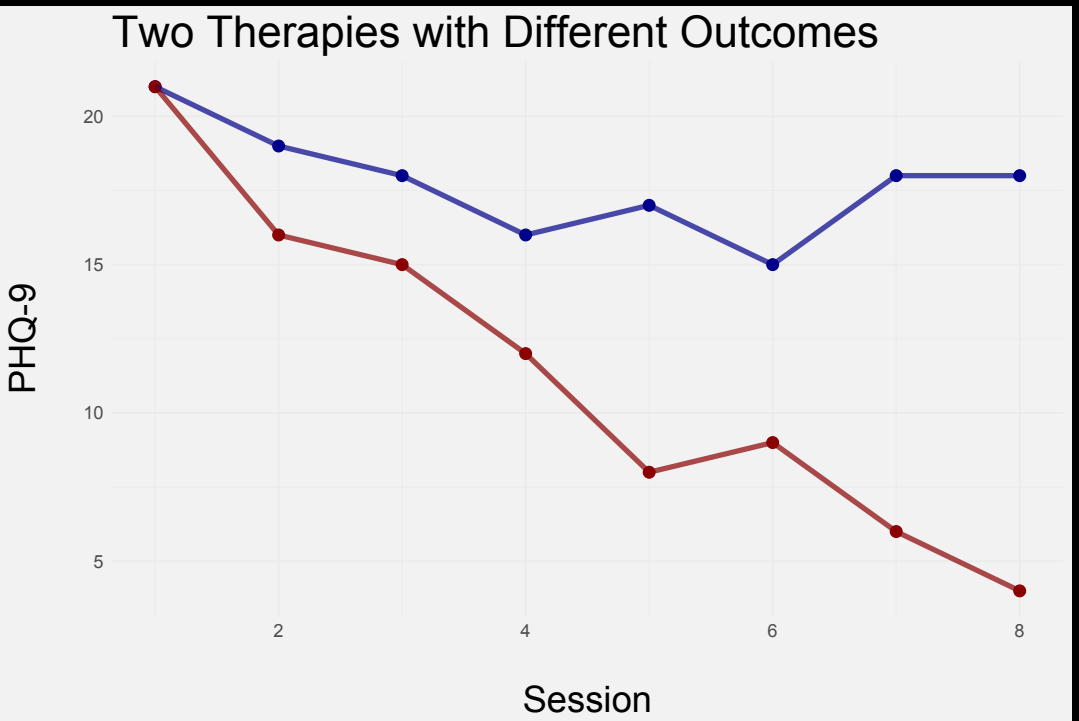
UNIVERSITY of DENVER
Morgridge College of Education

Counseling psychology training clinic

Current work

Expanding real-world testing and quality metrics:

1. Ongoing research with three implementation partners
2. Patient-centered communication in primary care sessions
3. Cognitive-behavioral therapy
4. Predicting patient outcomes from linguistic markers (below)



In the language and interaction of the sessions, what is different about these two treatment courses?

Current technology can now scale up the evaluation of evidence-based counseling to support training, supervision, quality assurance, and psychotherapy mechanism research.

Thank you! Questions?

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Project updates and project publications available on ResearchGate:
https://www.researchgate.net/project/Machine-learning-based-feedback-for-psychotherapy