Adapting Research to the Clinical Environment

Computer-aided Verbal Behavior Analysis

Angela Cathey, MA[1], Gareth Holman[3], PhD, Matt Villatte[4], PhD, Robert Zettle[1], PhD, Dominic Canare[2], MSc, & Jeff Swails[1], MA

Wichita State University (Clinical[1] and Human Factors[2]), OpenTeam[3], Evidence-based Practice Institute[4]

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Computer-aided Verbal Behavior Analysis

Contextual Behavioral Scientific Innovation

Angela Cathey
Concept & Logistics

Gareth Holman
Clinical Utility

Matt Villatte
RFT Consult

Progress

- ✔ Patent obtained
  (Cathey, 2016; Patent # 62/307,226)
- ✔ NSF i-Corps Stage 1 funding

Next Steps

Clinician/researcher participation in development
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Phase 2 NSF i-Corps and SBIR/STTR Funding

Let's walk together towards a solution.

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Standard assessment

Contextually insensitive
Function?

Retrospective report bias

Mood/state dependent bias

Assessments in practice…

Take away valuable client-therapist time

Clients are rarely adherent

Don't like them
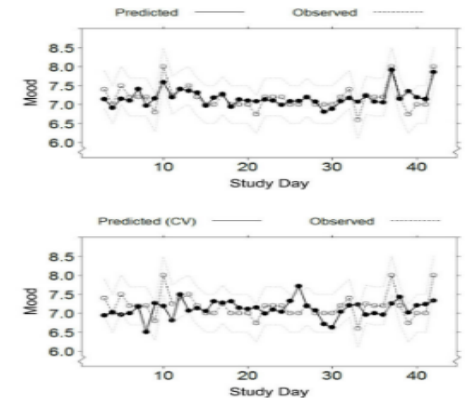
Don't understand them

CBS consistent solutions have been proposed, including EMA

EMA allows for single-subject real-time data on client progress

But for the average clinician or researcher…

Not feasible

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What else can we do?

Cloud computing

Bandicoot – MIT Media

Biometrics

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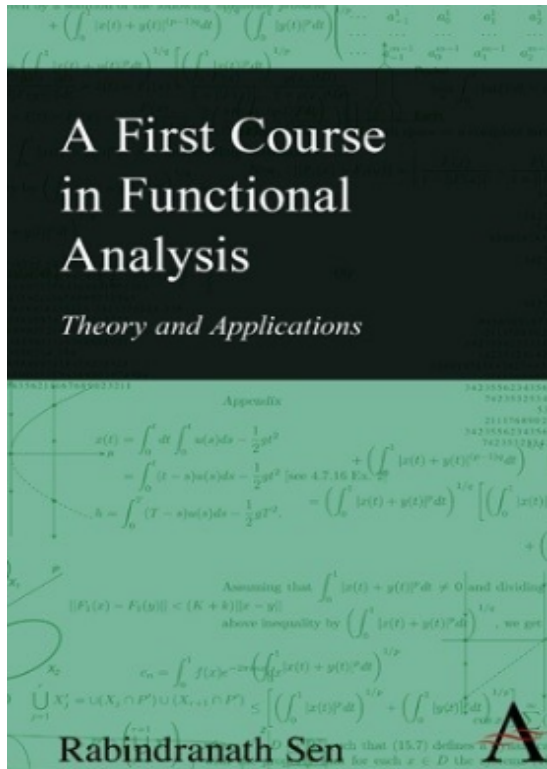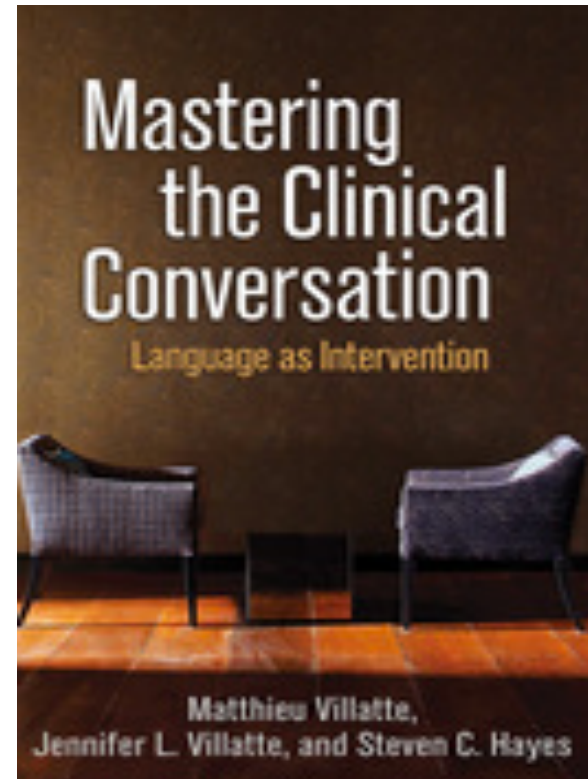
External Relating

Verbal/Symbolic Relating

These solutions do not utilize our most powerful tools.

Teach computers functional analysis and a nearly all encompassing theory of human symbolic thought?
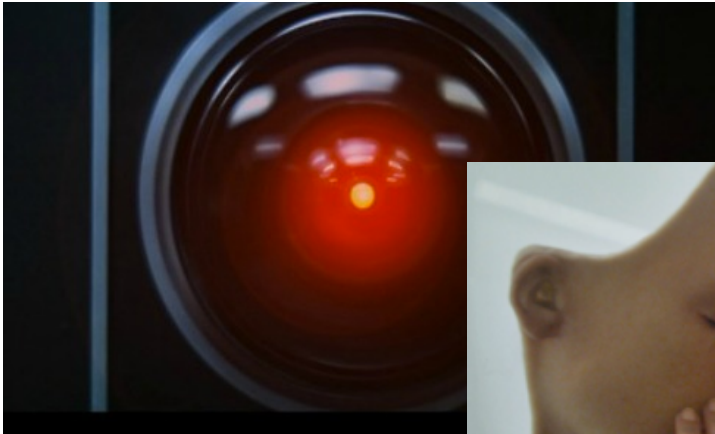
Signal Processing

FA & RFT

When stimuli are related, the amount and way predict the outcome

Patterns in language, external environmental cues, and physiological response

Simone M.

She's a 40 year-old, nurse with two children.

She's been married for six years and reports history of difficult relationships, depression, and anxiety.

She also reports a long history of binge/ purge behavior and cutting.

You've had a few sessions together and begun to work on Interpersonal mindfulness and mood regulation.

She's been fairly distressed but seems to find your work together helpful.

However, she misses sessions frequently and its unclear why.

You've now had four sessions with her and she's missed three.

During this session she talks about fairly benign material and seems sad. She discusses difficult interactions with her loved ones.

You respond with empathy, understanding, normalization.

Unexpectedly, she becomes angry with you and walks out.

What happened?

Let's dive into the layers
of signal and context

Client – Client's environment

Relational environment
within and outside session

Current environment vs.
verbal symbolic
environment
(learning history)

How does this show up?

Content   Changes in language that reliably precede or follow behavior of interest

         Paraverbals (speech tone, rhythm, etc.)

         Latent semantic content (metaphor, etc.)

Affect   Changes in affect that precede or follow behavior events

         Changes in physiology related to environment

Biometric   Mimetics, proxemics

         Level and directedness of attention

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It's easy to get swept away in all the information…

But what if there were a single system that made sense of it?

Computer-aided Verbal Behavior Analysis

A system to collect, analyze, and return data in useful form to clinicians and researchers

Simone's EMA Data

EMA Responses by Context

Legend: Neg. Self, Urge to Binge, Urge to Cut

Y-axis: None to Many (0–10)

X-axis: With Husband, With Friend, Alone, At Work

Treatment Week

Legend: Time with Husband, Time with Friend, Time Alone, Time at Work

Y-axis: Hours (0–200)

X-axis: Week 1, Week 2, Week 3, Week 4, Week 5, Week 6, Week 7
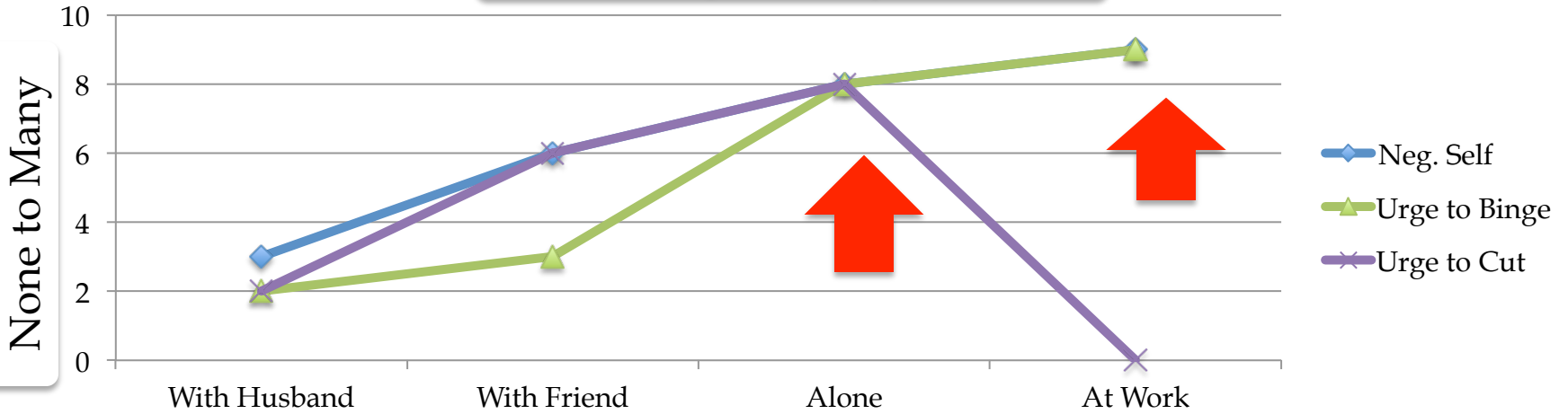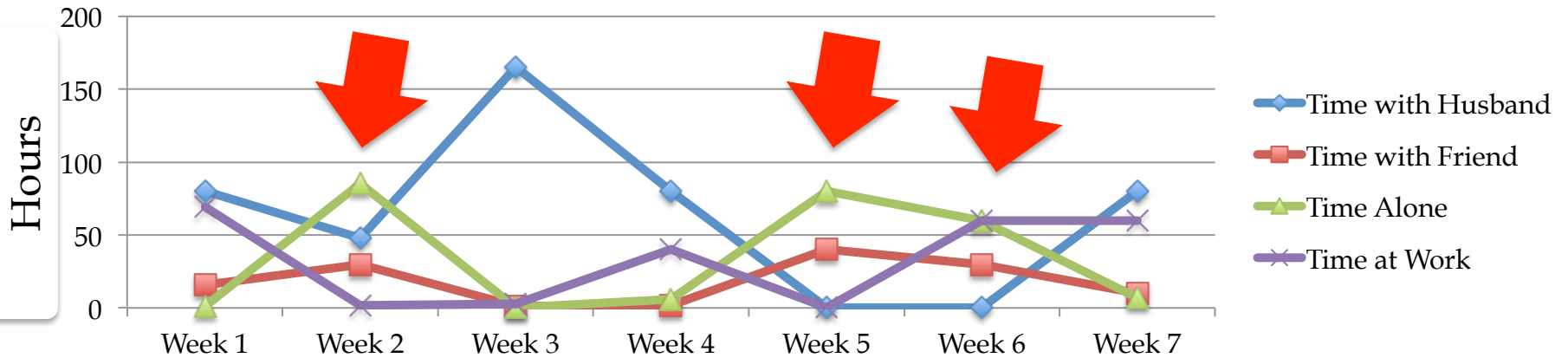
What about in session behavior?

Simone

Other people just don't see me. They don't understand my needs. I'm glad I made it in today.

Sadness…

Oh. I just haven't felt well…

…Shame

What do you think it looks like?

…Anger

Therapist

I'm glad you made it in as well. What's been keeping you away so often? I noticed that you've missed a few sessions.

Okay, well let's talk more about others not understanding your needs. What does that look like?

What could we have done for Simone?

If we'd have known
. . . her work is punishing?

. . . that when she doesn't
    feel seen, she becomes fused and
    insensitive to the context?

What if you could prompt her with intervention
support between sessions?

What if…

…we could know how our clients
function across life contexts?

…we could show our clients and
insurance that we make real change?

…what if data from what *really* happens
in sessions was available to researchers?

It can be…

Assessing our impact

In-session behavior

1. Natural Language Processing

2. Biometrics

In-life behavior

1. EMA

2. Natural Language Processing

…we need your
support
and
feedback
to navigate the seas ahead.

What would it need to have to be helpful to you, in practice?

… in research

Questions?

Need credit for this session?

Please don't forget to
scan out.

ACBS
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CONFERENCE 14
Seattle, Washington
June 14-19, 2016

What did you think?....

**complete the 3 question quickeval
for this session at**

https://contextualscience.org/quickeval

This was presentation was session # BB

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Clinician Analytics

The Clinician Analytics Dashboard will contain cross client and process data.

Insights: How good am I at moving flexibility? How good am I at moving clients with _____ class of behavior?

Database: Cross theoretical search of techniques that move a process of interest.

	Relational Frame Theory (RFT)	Ecological Momentary Assessment (EMA)	Natural Language Processing (NLP)	Data Science: Machine Learning, analytics, etc.
Application	Everything post-verbal learning	Real-time data collection and intervention	Processing of language as it relates to real-world outcomes	Preferred for anything that involves high velocity, variability, and volume data
Fields using	CBS	CBS + many, many others	Business English (Lit.) Medicine	Business Medicine
Evidence	20+ years	20+ years	20+ years	20+ years
Reason for lag in use	Basic to applied gap	Skills needed to design system & do analyses	Expensive until recently	Expensive until recently

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EMA items: Vilardaga, McDonell, Leickley, & Ries (2014)

Table 4
Sample of items from mindfulness and acceptance-based studies

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Vilardaga et al. 2013; *Since the last survey did any of the following things happen to you?*; *(Box Check)*

"I heard things that others could not hear"
"I felt that someone was spying or plotting against me"
"I felt that someone could communicate with me through the TV/radio"
"I felt possessed or controlled by someone or something"
"I felt I had special powers to do something nobody else could do"
"I felt stressed"

"I saw things that others could not see"
"I felt that people could read my thoughts"
"None of the above"

Vilardaga et al. 2013; *How did you react?*; *(7-point Likert scale)*

"I stopped doing the things I wanted to do" (External avoidance)
"I tried to control my thoughts and feelings" (Suppression)
"I made myself think about it in a way to make me stay calm" (Cognitive reappraisal)
"I simply noticed my feelings and continued with what I was doing" (Experiential acceptance)

Vilardaga et al. 2013; *Which emotion do you feel most strongly right now?*; *(Box Check)*

"Down"
"Relaxed"
"Happy"
"Lonely"
"None of the above"

"Guilty"
"Anxious"
"Cheerful"
"Satisfied"

Vilardaga et al. 2013; *How are you doing right now?*; *(7-point Likert scale)*

"I enjoy what I'm doing" (Anhedonia)
"I feel connected to others" (Social support)
"I am comfortable with myself" (Self-esteem)

"I feel competent" (Self-esteem)
"I feel free to act" (Autonomy)
"I have energy" (Physical well-being)

Udachina et al., 2009, and Varese et al. 2011; *(7-point Likert scale)*

"Since the last beep my emotions have got in the way of things which I wanted to do"
"Since the last beep I've tried to avoid painful memories"
"Since the last beep I've tried to block negative thoughts out of my mind"

Note. Context items were omitted from this table but were adapted from Granholm et al., 2008. These Items can be found in Vilardaga et al., 2013.

CAVBA Programming/Data Flow Architecture

Figure 1.

Computer-aided Verbal Behavior Analysis (CAVBA) System Architecture

Input Data Sources

- Unique Client Identifier
- Analysis of in-session Verbal Behavior
- Analysis of out-session Verbal Behavior
- Ecological Momentary Assessment (EMA)
- Ecological Continuous Assessment (e.g. bio, GPS)
- Clinician Indicated Targets to Track

Meta Data Capture

Spark Streaming

Data Stream → Spark Streaming → Micro-batches of Data → Spark Core → Processed Data

Machine Learning Guided Functional Analysis

Output Data

- Dashboard for Clinician/Researcher
- Analytics
- Databases from Meta Data