Adapting Research to the Clinical Environment

Computer-aided Verbal Behavior Analysis

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Computer-aided Verbal Behavior Analysis

Contextual Behavioral Scientific Innovation

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Concept & Logistics

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Clinical Utility

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RFT Consult

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Angela Cathey has received a small seed grant from the NSF for development, no other contributors have received any funding or benefit from their contributions
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.
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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These solutions do not utilize our most powerful tools.

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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

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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 it’s 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?

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Changes in language that reliably precede or follow behavior of interest</td>
</tr>
<tr>
<td></td>
<td>Paraverbals (speech tone, rhythm, etc.)</td>
</tr>
<tr>
<td></td>
<td>Latent semantic content (metaphor, etc.)</td>
</tr>
<tr>
<td>Affect</td>
<td>Changes in affect that precede or follow behavior events</td>
</tr>
<tr>
<td></td>
<td>Changes in physiology related to environment</td>
</tr>
<tr>
<td>Biometric</td>
<td>Mimetics, proxemics</td>
</tr>
<tr>
<td></td>
<td>Level and directedness of attention</td>
</tr>
</tbody>
</table>

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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

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Simone’s EMA Data

EMA Responses by Context

Treatment Week

- Time with Husband
- Time with Friend
- Time Alone
- Time at Work
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.

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.

Oh. I just haven’t felt well…

Sadness…

…Shame

What do you think it looks like?

...Anger
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...

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Assessing our impact

In-session behavior
1. Natural Language Processing
2. Biometrics

In-life behavior
1. EMA
2. Natural Language Processing

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...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?

Twitter: @catalyst_reach  www.surveymonkey.com/r/CAVBA
Need credit for this session?

Please don’t forget to scan out.

What did you think?....

complete the 3 question quickeval for this session at

https://contextualscience.org/quickeval

This was presentation was session #BB
References


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References


References


References


References: Natural Language Processing

Atkins & Styles (2016). Measuring the self and rules in what people say:
   Exploring whether self-discrimination predicts long-term well being.
   *Journal of Contextual Behavioral Science, 5*, 71-79.


References: Natural Language Processing


References: Modeling


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

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

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"

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"

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

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

Figure 1.
Computer-aided Verbal Behavior Analysis (CAVBA) System Architecture

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

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