Using Virtual Meetings as a Research Context

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Heavy Reliance on Virtual Means of Collaboration Is Likely to Persist Beyond COVID-19

- REI abandoned its corporate HQ before ever using it; Dropbox said that it will become a “virtual first” company – a shift from pre-pandemic 3% employees working remote

- From a survey of 80 companies: 86% reported that people will work between 1 and 4 days at home going forward

- From a KPMG survey: 69% of CEOs are planning to downsize office space

- Bloom: “Working from home is here to stay”
Purpose & Need

Even before COVID-19, knowledge work has been gradually shifting to virtual modalities. With COVID-19 accelerating this shift, there is an urgent need for tools to help...

• ...researchers understand virtual interactions
• ...students develop virtual collaboration skills
Positive Externalities

Virtual meetings can also be a useful context for studying long-standing research questions:

- Group dynamics and interpersonal relations
- Negotiation & conflict management
- Leadership

Virtual interactions are a rich source of high-resolution data on interpersonal interactions.
Overview & Focal Topics for Today

Setting Up Zoom & Extracting Output Files
- Recommendations for how to best configure Zoom
- Suggestions for what files to use for further analysis

Analyzing Language
- Using R to parse text-based output from Zoom
- Analyzing conversation dynamics and sentiment

Analyzing visuals
- Using R to process video output from Zoom
- Analyzing facial attributes and expressions
A Few Ground Rules for our Session

- Play an active role in the workshop—ask questions and offer your ideas and insights
- Highlight “use cases” that help to bring to life how you would apply something to your research
Making the Most out of the Session

- Follow along with the code and examples that I am sharing
- Download your own files from your Zoom account and try to run your own files alongside me

Link to Tutorial Guide
Link to the Tutorial Code
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The Usability of Zoom for Research Can Be Enhanced by Tweaking Settings

- Available options depend on the attributes of your Zoom subscription
- For research projects where you are asking others to record, you should develop a standardized protocol

<table>
<thead>
<tr>
<th>Security</th>
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<tbody>
<tr>
<td>Require that all meetings are secured with one security option</td>
</tr>
<tr>
<td>Require that all meetings are secured with one of the following security options: a passcode, Waiting Room, or &quot;Only authenticated users can join meetings&quot;. If no security option is enabled, Zoom will secure all meetings with Waiting Room. <a href="#">Learn more</a></td>
</tr>
<tr>
<td>Waiting Room</td>
</tr>
<tr>
<td>When participants join a meeting, place them in a waiting room and require the host to admit them individually. Enabling the waiting room automatically disables the setting for allowing participants to join before host.</td>
</tr>
<tr>
<td>Waiting Room Options</td>
</tr>
<tr>
<td>The options you select here apply to meetings hosted by users who turned 'Waiting Room' on</td>
</tr>
<tr>
<td>✓ Everyone will go in the waiting room</td>
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*Illustration*
By Tweaking Settings, You Have Several Files Available for Download after the Meeting

- Audio, Video, and Text records of what occurred during the meeting
- Some limited meta data about the meeting

*Illustration*
zoomGroupStats

- An in-progress set of R functions for processing data from recorded Zoom meetings.
- Relies on open source software and AWS

Include in your R code:

```r
source("http://apknight.org/zoomGroupStats.R")
```
Utilities Currently in zoomGroupStats

### “Helper” Functions

**Processing Audio Files**
- Transcribe audio
- Parse transcription

**Parsing Text-Based Output**
- Chat output
- Transcribed audio feed

**Processing Video Files**
- Sample still frames
- Recognize and label “known” participants

**Temporal Windowing**
- Create windows in text, audio, or video output

### “Analysis” Functions

**Conversation Analysis**
- Text-based chat
- Transcribed audio

**NLP-Based Sentiment Analysis**
- Text-based chat
- Transcribed audio

**Analysis of Detected Faces in Video File**
- Attributes (e.g., glasses)
- Emotional expressions (e.g., smile, happy, sad)

**Windowed Analyses**
- Produce metrics in specified temporal windows
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Data Streams for Analyzing Language

Written Feed through Text Chat

Illustrations

Auditory Feed through Microphones
Analyzing Simple Conversation Dynamics

WEBVTT

1 00:00:54.300 --> 00:00:55.740
Andrew Knight: Good evening, everyone.

2 00:00:57.060 --> 00:00:57.780
Andrew Knight: Can you hear me.

3 00:01:08.900 --> 00:01:08.790
Andrew Knight: Okay, excellent. Yeah, I'm seeing, seeing a lot of folks there. And again, if you are able to broadcast your video that always helps

4 00:01:09.300 --> 00:01:15.840
Andrew Knight: Always helps preserve the discussion and also just avoid some of the coordination breakdown that happens when we're online.

5 00:01:16.300 --> 00:01:26.040
Andrew Knight: I am delighted to be here again this evening, Violet, thanks for kicking it off with the chat. I do want to highlight at the outset that tonight chat is going to be our friend.

6 00:01:26.550 --> 00:01:33.720
Andrew Knight: This is going to be our more technical session when it comes to measurement and so I would strongly, strongly, strongly encourage you

Using Either Transcription or Chat

Parse the Zoom Output
- Convert the text file into a usable dataset
- Fix identifier and timestamping issues

Analyze the conversation to derive metrics at the meeting, individual, and dyad levels
- Volume of linguistic contributions
- Gaps between contributors
- Flow of conversation from one person to the next
A Little More Complex: Turntaking

Background
- The flow of a conversation is akin to a network of utterances
- Turntaking analysis considers who follows whom in the conversation
- Can measure leading and following

Derivative Metrics at the Speaker Level
- Percent of other speakers’ utterances that follow a given speaker’s utterances

Analysis of Turntaking in Transcript

Illustration
Sentiment of Language

Using Either Transcription or Chat

Use natural language processing to assess the sentiment of each of a speaker’s utterances

- Rely on AWS Comprehend

Aggregate individual linguistic contributions to the level of a given person or to the meeting as a whole:

- Percent classified as positive, negative, neutral, or mixed
- Mean of the probability value for each utterance in each category
A brief peak into the black box of sentiment analysis using natural text data

Approach relies on a trained model. The text as a whole is considered as communicating a particular sentiment.

- First, a model is trained to classify a text as positive, negative, or neutral. Training set has quantitative sentiment markers already (e.g., open-ended comments at the end of a quantitative survey; Yelp reviews)
- Second, the model is applied to new text data that lacks quantitative sentiment markers and used to score the valence of comments

Illustration
Conducting a “Windowed” Analysis

Virtual meetings afford the ability to analyze the flow of constructs over time

• Cut a single meeting up into several windows (e.g., every 10 minutes; pre intervention / post intervention)

• Analyze the conversation within each of these windows
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Use facial recognition and analysis software to detect people and assess their affective expressions

- Split feed into image frames
- Detect identity of people in each frame
- Analyze face
- Rely on AWS Rekognition

Aggregate the sentiment of the speaker’s expressions across the duration of the meeting:

- Percent classified into discrete emotions (e.g., happy, angry)
- Mean of the probability value for each detection in each category
A brief peak into the black box of facial expression analysis
### Big Picture Aims of this Project

<table>
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<tr>
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| 1. Develop Methods to Collect Meeting-Based Metrics | - Freely available  
- Accessible to researchers with varying skills  
- Cross-platform (eventually) |
| 2. Examine Validity of Meeting-Based Metrics | - Do the metrics perform as we would expect?  
- Connections with other methods and constructs |
| 3. Identify Drivers & Markers of Meeting Effectiveness | - Do effective meetings have an unobtrusively observable “signature”?  
- What leader (and member) behaviors increase effectiveness? |
| 4. Create a Feedback Mechanism for Participants | - Parsimonious & actionable  
- Rapid-cycle  
- Does feedback change behavior? |
On the Horizon (1)

Building Database of Meetings

- Compile validation data
- Expand the range of tasks and types of participants
- Identify drivers and markers of effectiveness

Examine Effects of Feedback

- Changes in speaking time
- Changes in sentiment
Meeting Measures

http://www.meetingmeasures.com

Web-based feedback platform to provide rapid-cycle feedback on meeting dynamics and effectiveness

- Survey-based measures
- Zoom-based measures
On the Horizon (2)

Technical Extensions

• Expand and refine conversation analysis (help!)

• Incorporate non-verbal auditory signals (e.g., Praat)

• Standardizing templates and building wrappers
Microsoft to make changes to Productivity Score after privacy complaints

After criticism from a known privacy advocate and others, Microsoft is tweaking how its Productivity Score tool for Microsoft 365 looks and operates.

Final Thought

Just like any new method of quantifying human behavior, validation and caution are necessary

- Cannot presume plug-and-play validity
- Must scrutinize data security & privacy practices
- How prepared are social science IRBs for this?
If you have a project in mind that might fit and are interested in collaborating, please contact me:

knightap@wustl.edu