Hello? is better than Hello: Effects of greeting intonation on participation in survey invitations

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Voice, language, participation, and greetings

- Telephone interviewers’ success obtaining interviews is due, at least in part, to what they communicate over the phone
  - *How they Sound* -- vocal attributes
  - *How and What they Speak* -- manner and content of speech
  - *How they Interact* with potential respondents

- Over their careers, some *Iwers* are more and others less successful; this strongly implies that differences in their verbal attributes play an important part in outcomes

- At the same time, potential respondents *quickly* make a participation decision, often within 30 seconds or less.

- The initial portion of the survey invitation, the *greeting*, is likely to play a critical role in the participation decision.
Example “Hello” pairs

Invitation 1:

Invitation 2:

Invitation 3:

Invitation 4:

Note that we are focusing in this paper on the greeting and decision to participate, not on the interview itself.
Attributes of a successful greeting: survey methodology

- Survey methodology literature has considered invitations from a speech perspective but not greetings specifically (Oksenberg, Coleman & Cannell, 1986; Oksenberg & Cannell, 1988)
- Higher pitch (Sharf & Lehman, 1984; Groves, O’Hare, Gould-Smith, Benki, Maher 2008)
- Lower pitch for male interviewers (Benkí, Broome, Conrad, Groves, and Kreuter 2011)
- Less scripted, more extemporaneous deliveries (Groves, et al. 2008), perhaps mediated by moderate levels of disfluency, rate, and pausing (Conrad, et al. 2013; Benkí, Broome, Conrad, Groves, and Kreuter 2011)
Attributes of a successful greeting: conversation and pragmatics

• “Prosodically-large” face-to-face greetings (Pillet-Shore 2012)
  - Signal familiarity, approval, and the special status of the meeting
  - Longer
  - Overlapping
  - Louder
  - Higher pitch
  - Wider pitch range

• “Prosodically-small” face-to-face greetings
  - Signal unfamiliarity, a neutral stance (at best), that the addressee has already been greeted, and potential for disapproval.
  - Shorter
  - Consecutive
  - Softer
  - Lower pitch
  - Narrower pitch range

• High-pitched greetings in telephone conversations signal enthusiasm, recognition, and friendliness (Schegloff 1998)
Focusing on “Hello” in the survey invitation

• The “hello” is one of the first sources of information the householder receives in making her participation decision

• The “hello” greeting is the most frequent telephone greeting in the US

• Restricting the study to this single utterance within the invitation allows us to control for linguistic content while reducing the sample size only moderately.
Our Project

• Examines impact of *Iwers’* voice, speech and interaction with phone answerer on decision to
  – Participate (*Agree*)
  – Refuse to Participate (*Refuse*)
  – Defer (*Scheduled Callback*)

• Measures:
  – Transcription and turn marking
  – Acoustic (e.g., pitch or f0, speech rate, vowel quality)
  – Paralinguistic (e.g., fillers, i.e., *uh, um*)
  – Move coding (e.g., self-identification, duration question)
  – Global ratings: (e.g., animation, similarity of *I* and *A* accent)

• 1380 audio recorded telephone introductions from 5 studies at University of Michigan SRC

• 100 interviewers
Multilevel Data Set

- Interviewer is cross-classified with study.
- Interviewer is cross-classified with cases/samples.
- Each level is completely nested in the subsequent upper level.

1380 contacts, transcribed and coded

Cases

Study

Interviewers

Contact

Turn

Move

Turn

Move

Move
Transcription and acoustic analysis

Hello my name is Bill. I’m calling from the University of Michigan in Ann Arbor and we’re doing a nationwide study on the economy. We just want to include some questions on other countries the world and a few other things.
Hypothesis: High pitched greetings lead to participation

<table>
<thead>
<tr>
<th>Householder</th>
<th>Interviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Friendliness</td>
<td>• Enthusiasm</td>
</tr>
<tr>
<td>• Recognition</td>
<td>• The householder and/or her concerns are special to the interviewer (Groves, Singer, &amp; Corning 2000)</td>
</tr>
<tr>
<td>• Approval</td>
<td></td>
</tr>
</tbody>
</table>
Distinguishing between higher overall pitch and higher pitch in the greeting

• Previous work by our group (AAPOR 2011) has documented an inverse association between participation and the overall pitch of male interviewers (n.s. trend for female interviewers)

• Here we focus specifically on the pitch during “Hello”.

Normalizing by the speaker’s baseline pitch

For a talker $T_i$ in contact $i$ and turn $j$ where $T$ can be either householder (H) or interviewer (lwer), Praat measures the following values:

$F_{0o}(T_i) = \text{median}(F0)$ during the /o/ of the “hello” of $T_i$

$F_{0j}(T_i) = \text{median}(F0)$ during turn $j$ of $T_i$

From the turn- and contact-level datasets, we compute the following contact-level values, where $N$ is the total number of turns $j$ in contact $i$ for each $T_i$:

$F_{0\text{baseline}}(T_i) = \sum_j F_{0j}(T_i)/N$

$F_{0\text{delta}}(T_i) = \left[ F_{0o}(T_i) - F_{0\text{baseline}}(T_i) \right] / F_{0\text{baseline}}(T_i)$
Hypotheses

- $F_{0\text{delta}}$ is a signed measure of pitch change in the (hell)“o” of the greeting, normalized by $F_{0\text{baseline}}$.
- $F_{0\text{delta}}(\text{Householder})$ will be positively correlated with participation.
  
  **High-pitched HH greetings signal approval and potential willingness to participate**

- $F_{0\text{delta}}(\text{Interviewer})$ will be positively correlated with participation.
  
  **High-pitched Iwer greetings signal enthusiasm and that the HH is special to the interviewer**
Sample for analysis

<table>
<thead>
<tr>
<th>Outcome</th>
<th>All contacts</th>
<th>Iwer hello</th>
<th>HH hello</th>
<th>Both hellos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refusal</td>
<td>566 (41)</td>
<td>290 (40)</td>
<td>206 (33)</td>
<td>199 (32)</td>
</tr>
<tr>
<td>Agree</td>
<td>263 (19)</td>
<td>125 (17)</td>
<td>125 (20)</td>
<td>124 (20)</td>
</tr>
<tr>
<td>SCB</td>
<td>537 (39)</td>
<td>301 (42)</td>
<td>294 (46)</td>
<td>291 (47)</td>
</tr>
<tr>
<td>Other</td>
<td>14 (1)</td>
<td>8 (1)</td>
<td>8 (1)</td>
<td>8 (1)</td>
</tr>
<tr>
<td>TOTAL CONTACTS</td>
<td>1380</td>
<td>724</td>
<td>633</td>
<td>622</td>
</tr>
</tbody>
</table>

• KEY: Counts (Column percentages)
• All contacts (column 1): 100 interviewers, 671 households
• Both hellos (column 4): 86 interviewers, 426 households
$F_{0\text{delta}}$ (Interviewer) for agrees ($F[1, 87] = 4.21; \text{Prob} > F = 0.0433$) and SCBs ($F[1, 87] = 6.82; \text{Prob} > F = 0.0106$) are significantly higher than refusals (S.E.s are adjusted for clustering by interviewers). $F_{0\text{delta}}$ (Householder) differences by outcome are n.s.
Evaluating for interaction between householder and interviewer hello

- Interviewers do not appear to match the intonation pattern of the householder greeting:
  \[ r [F_0_{\text{delta}}(lwer), F_0_{\text{delta}}(HH)]=0.0651, \ p>0.10 \]
- Nevertheless, the householder greeting precedes the interviewer greeting
- We can analyze the householder greeting intonation as a context or condition on the interviewer greeting
Evaluating for interaction between householder and interviewer hello

- Contacts were classified according to whether $F_{0\text{delta}}(T_i)$ exceeded the corpus means.
- Means (SD): $F_{0\text{delta}}(Iwers)=0.236 \ (0.306)$
  $F_{0\text{delta}}(HH)=0.215 \ (0.332)$
- Four categories according to HH and Interviewer $F_{0\text{delta}}$ (intonation on the hello):
  - HH\&I High $I>HH$ Iwer high, HH low
  - HH\&I Low $HH>I$ HH high, Iwer low
### Interaction of hellos

<table>
<thead>
<tr>
<th>Hello intonation pattern</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH&amp;I Low</td>
<td>0.3</td>
</tr>
<tr>
<td>I&gt;HH</td>
<td>1.0</td>
</tr>
<tr>
<td>HH&gt;I</td>
<td>8.1</td>
</tr>
<tr>
<td>HH&amp;I High</td>
<td>3.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key: Frequency (column percentage)</th>
<th>chi2 contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson chi2(6)=12.4228 Pr =0.053</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>HH&amp;I Low</th>
<th>I&gt;HH</th>
<th>HH&gt;I</th>
<th>HH&amp;I High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refusal</td>
<td>64 (34)</td>
<td>45 (29)</td>
<td>53 (42)</td>
<td>37 (26)</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.5</td>
<td>3.8</td>
<td>1.9</td>
</tr>
<tr>
<td>Agree</td>
<td>40 (21)</td>
<td>35 (23)</td>
<td>15 (12)</td>
<td>34 (24)</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.4</td>
<td>4.2</td>
<td>0.9</td>
</tr>
<tr>
<td>SCB</td>
<td>87 (46)</td>
<td>75 (48)</td>
<td>57 (46)</td>
<td>72 (50)</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.0</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>191 (100)</td>
<td>155 (100)</td>
<td>125 (100)</td>
<td>143 (100)</td>
</tr>
</tbody>
</table>
Logistic regression models of nonrefusal

• Cross-classified multilevel logistic with random effects of interviewer and household (xtmelogit in Stata 12)
• Model 1: $F_0$ delta (Iwer) All contacts
• Model 2: $F_0$ delta (Iwer) Contacts with low-pitched householder greeting (columns 1 & 2)
• Model 3: $F_0$ delta (Iwer) Contacts with high-pitched householder greeting (columns 3 & 4)
• Model 4: $F_0$ delta (Iwer), Householder greeting pattern (HHigh), + interaction, All contacts
# Logistic regression models of nonrefusal

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model 1 Coeff (SE)</th>
<th>Model 2 Coeff (SE)</th>
<th>Model 3 Coeff (SE)</th>
<th>Model 4 Coeff (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.763** (0.162)</td>
<td>0.817** (0.183)</td>
<td>0.442* (0.211)</td>
<td>0.922** (0.201)</td>
</tr>
<tr>
<td>F0_{delta(lwer)}</td>
<td>0.763* (0.366)</td>
<td>0.306 (0.423)</td>
<td>1.398* (0.547)</td>
<td>0.277 (0.474)</td>
</tr>
<tr>
<td>HHigh</td>
<td></td>
<td></td>
<td>-0.398 (0.271)</td>
<td></td>
</tr>
<tr>
<td>F0_{delta(lwer)} x HHigh</td>
<td></td>
<td></td>
<td>1.165 (0.734)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>622</td>
<td>351: HHigh=0</td>
<td>271: HHigh=1</td>
<td>622</td>
</tr>
<tr>
<td>Goodness of fit</td>
<td>( \chi^2=4.34, \text{df}=1, p=0.037 )</td>
<td>( \chi^2=0.53, \text{df}=1, p=0.468 )</td>
<td>( \chi^2=6.53, \text{df}=1, p=0.011 )</td>
<td>( \chi^2=6.95, \text{df}=3, p=0.073 )</td>
</tr>
</tbody>
</table>

Random effects

| Interviewer       | 0.421 (0.152) | 0.394 (0.206) | 0.419 (0.268) | 0.424 (0.153) |
| Household         | 0.924 (0.249) | 0.406 (0.488) | 0.656 (0.434) | 0.926 (0.251) |

* \( p<0.05 \) ** \( p<0.01 \)
Model 4 Predictions of Pr(Nonrefusal)
95% CIs, Fixed Effects Only

Pr(Nonrefusal)

F0delta(Interviewer)

HH low-pitched hello
HH high-pitched hello
Discussion

• Pitch in householder hellos does not appear to be strongly correlated with participation
• However, householder hello intonation does appear to predict when a high-pitched interviewer greeting is most important
Discussion

• Householders with low-pitched hellos show little preference for interviewer high-pitched hello intonation

• Householders with high-pitched hellos do prefer high-pitched interviewer hellos

• For these householders: Participation increases with interviewer hello pitch:
  
  30% increase in $F_0_{\text{delta(lwer)}}$ (~1 SD) results in a 9 point increase in nonrefusalS
Why the interaction between householder and interviewer greeting?

• Perception follows production: the householders who produce high-pitched (prosodically-large) greetings also respond to (and expect) this greeting style from interviewers.

• For householders who produce low-pitched (prosodically-small) greetings: a low-pitched interviewer greeting is truly neutral (and not negative)
Practical Implications

• Based on these data, interviewers should use a *high-pitched greeting generally* (in this particular linguistic/cultural context)
  
  A high-pitched is neither helpful nor harmful in response to a householder low-pitched greeting
  
  However, a low-pitched interviewer greeting in response to a high-pitched householder greeting is particularly detrimental to participation

• Interviewers should be aware that as early as the greeting, householders provide important information regarding their specific expectations (cf. tailoring and leverage-saliency theory: Groves, Singer, & Corning 2000)
Practical Implications

Why do some interviewers produce low-pitched hellos, particularly following a high-pitched householder hello (125 contacts)?

- These interviewers may be less-skilled or less-experienced.
- Some interviewers may be anticipating a negative householder reaction to a greeting implying recognition when in fact there is no recognition.
- Use of the prosodically-small greeting may also reflect interviewer recognition of the intrusiveness of the RDD call.
Next Steps

• It is critical to consider the potential for interaction between householders and interviewers in this line of research.
• Based on positive findings on a controlled greeting type, we can focus on specific linguistic hypotheses for other greetings, such as “Hi” or “Good morning”
• We can also investigate other prosodic features of the greeting, such as duration and intensity.
• Does householder greeting provide information of the effect on participation of other features (i.e., after the initial greeting) of the survey invitation?
• To what extent do particular interviewers vary in their use of householder greeting information?
Thank You

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