It's Not You, It's Me: Automatically Extracting Social Meaning from Speed Dates

Dan Jurafsky,
Rajesh Ranganath,
Dan McFarland
Background: Extraction of Social Meaning from Speech and Text

- **Uncertainty** (students in tutoring)
  - Liscombe et al. (2005), Forbes-Riley et al. (2008), Black, Chang, Narayanan (2008)

- **Annoyance** (callers to dialog systems)
  - Ang et al. (2002), Liscombe, Riccardi, Hakkani-Tur (2005)

- **Personality** (extroversion)
  - Mairesse et al., 2007

- **Deception**
  - Newman et al. (2003)

- **Charisma**
  - Rosenberg and Hirschberg (2005)

- **Trauma** (after 9-11)
  - Cohn et al. (2004), Rude et al. (2004), Pennebaker and Lay (2002)

- **Dating interest**
  - Madan et al., 2005, Pentland 2005
Why should we care about extracting social meaning?

- **Social computing** relies on automatic extraction
  - Cassell (2001), Nass & Brave (2005), Pentland (2008), etc.
- Better conversational agents
  - Detecting student is uncertain -> more sophisticated educational apps
  - Detection of annoyance -> better dialogue
  - Better matching of style, accommodation, etc.
- Analysis of inherently social data (meetings, conversations, email, text messages, social networks, etc)
  - trauma -> psychological interventions
  - deception -> forensic computing
- Linguistic analysis of social signals
  - Important sociolinguistic and social psycho task
Detecting social meaning: our study

- Given speech and text from a conversation
- Can we detect `styles’, like whether a speaker is
  - Awkward?
  - Flirtatious?
  - Friendly?
- Can we tell if the speakers like each other?
- Dataset:
  - 991 4-minute “speed-dates”
  - Each participant rated their partner and themselves for these styles
speed dating [uncountable]
an event at which you meet and talk to a lot of different people for only a few minutes at a time. People do this in order to try to meet someone and have a romantic relationship.
Our speed date setup
Our speed date setup
What do you do for fun? Dance?
Uh, dance, uh, I like to go, like camping. Uh, snowboarding, but I'm not good, but I like to go anyway.
You like boarding.
Yeah. I like to do anything. Like I, I'm up for anything.
Really?
Yeah.
Are you open-minded about most everything?
Not everything, but a lot of stuff-
What is not everything [laugh]
I don't know. Think of something, and I'll say if I do it or not. [laugh]
Okay. [unintelligible].
Skydiving. I wouldn't do skydiving I don't think.
Yeah I'm afraid of heights.
F: Yeah, yeah, me too.
M: [laugh] Are you afraid of heights?
F: [laugh] Yeah [laugh]
The SpeedDate corpus

- **991 4-minute dates**
  - 3 events, each with \(\sim 20 \times 20 = 400\) dates, some data loss
  - Participants: graduate student volunteers in 2005
    - participated in return for the chance to date

- **Speech**
  - \(\sim 60\) hours, from shoulder sash recorders; high noise

- **Transcripts**
  - \(\sim 800K\) words, hand-transcribed, w/turn boundary times

- **Surveys**
  - (Pre-test surveys, event scorecards, post-test surveys)
  - Date perceptions and follow-up interest
  - General attitudes, preferences, demographics

- Largest experiment with audio, text, + survey info
What we attempted to predict

- **Conversational style:**
  - How often did **you** behave in the following ways on this date?
  - How often did **they** behave in the following ways on this date?
    - On a scale of 1-10 (1=never, 10=constantly)
  1. flirtatious
  2. friendly
  3. awkward
  4. assertive
Features

- **Prosody/Intonation**
  - pitch (min, mean, max, std)
  - intensity (min, max, mean, std)
  - duration of turn
  - rate of speech (words per second)

- **Dialog**
  - questions
  - backchannels ("uh-huh", "yeah")
  - appreciations ("Wow!", "That’s great!")

- **Words**
  - negative emotion (bad, weird, crazy, hate) words
  - storytelling words (past tense) + food words (eat, dinner)
  - love and sexual/emotional words (love, passionate, screw)
  - personal pronouns (I, you, we, us)
Features extracted within turns

- **F0 max in this turn**
- **F0 max in this turn**
- **F0 min in this turn**

So I was like

all right, I'll go
Livejournal.com:

*l, me, my* on or after Sep 11, 2001


Graph from Pennebaker slides
September 11 LiveJournal.com study: 
We, us, our


Graph from Pennebaker slides
LiveJournal.com September 11, 2001 study:
Positive and negative emotion words

LIWC

- Linguistic Inquiry and Word Count
  - Pennebaker, Francis, & Booth, 2001
- dictionary of 2300 words grouped into > 70 classes
  - negative emotion (bad, weird, hate, problem, tough)
  - sexual (love, loves, lover, passion, passionate, sex,)
  - 1st person pronouns (I me mine myself I’d I’ll I’m...)
  - 2nd person pronouns (you, you’d you’ll your you’ve...)
  - ingest (food, eat, eats, cook, dinner, drink, restaurant...)
  - swear (hell, sucks, damn, fuck,...)
  - ...
- after 9/11
  - greater negative emotion
  - more socially engaged
Architecture: 6 binary classifiers

- Female ±Awkward, Male ±Awkward,
- Female ±Friendly, Male ±Friendly,
- Female ±Flirtatious, Male ±Flirtatious,
- Multiple classifier experiments
  - L1-regularized logistic regression
  - SVM w/RBF kernel
Our results:

predicting flirt intention

- Using my speech to predict whether I say I am flirting

<table>
<thead>
<tr>
<th></th>
<th>Male speaker</th>
<th>Female speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>I say I’m flirting</td>
<td>72%</td>
<td>76%</td>
</tr>
</tbody>
</table>
Predicting flirt perception

- Using *my speech* to predict whether partner says I am flirting

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<td>Partner says I’m flirting</td>
<td>80%</td>
<td>68%</td>
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Summary: flirt detection

- Using *my speech* to predict whether I am flirting

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Fine, but how good is 72 or 76?

- In NLP we use human performance as a “ceiling”
- Checking human performance:
  - If John says Jane is flirting
  - And Jane says Jane is flirting
  - Then we say John is right.

<table>
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<tr>
<th>Male speaker (female perceiver)</th>
<th>Female speaker (male perceiver)</th>
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<tbody>
<tr>
<td>64%</td>
<td>57%</td>
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Implication #1

- Females are better than males at detecting flirting
- or males give off clearer flirting cues

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Implication #2: Machines are better than humans at detecting flirting

<table>
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<tr>
<th></th>
<th>Overall</th>
<th>Male Speaker</th>
<th>Female Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer detector</td>
<td>74%</td>
<td>72%</td>
<td>76%</td>
</tr>
<tr>
<td>Human detector</td>
<td>61%</td>
<td>64%</td>
<td>57%</td>
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</table>
How can this be?

- Why are humans so bad at detecting flirtation?

- Our Intuition:

<table>
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<tr>
<th></th>
<th>I am flirting</th>
<th>Other is flirting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male 101 says:</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Female 127 says:</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
What correlates with my perception of others flirting

- Pearson correlation coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \rho )</th>
</tr>
</thead>
<tbody>
<tr>
<td>How I see other flirting &amp; How other sees themself flirting</td>
<td>.15</td>
</tr>
<tr>
<td>How I see other flirting &amp; How I see myself flirting</td>
<td>.73</td>
</tr>
</tbody>
</table>
What correlates with my perception of others style

- Pearson correlation coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>My perception of other &amp; self-intention</th>
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</thead>
<tbody>
<tr>
<td>Flirting</td>
<td>.73</td>
<td>.15</td>
</tr>
<tr>
<td>Friendly</td>
<td>.77</td>
<td>.05</td>
</tr>
<tr>
<td>Awkward</td>
<td>.58</td>
<td>.07</td>
</tr>
<tr>
<td>Assertive</td>
<td>.58</td>
<td>.09</td>
</tr>
</tbody>
</table>
“It’s not you, it’s me”

- My perception of whether my date is flirting
- Is the same as my perception of whether I am flirting
- Why?
  - Speakers aren’t very good at capturing intentions of others in 4 minutes
    - Speakers instead base judgments on their own behavior/intentions
Gender differences in flirt intention

- **Both genders when flirting:**
  - use words related to negative emotion
    - especially men
    - didn’t use words related to academics

- **Women when flirting:**
  - use words related to love or sex
  - use appreciations
  - laugh, and use I

- **Men when flirting:**
  - raise their pitch floor
What are these “negative emotion” words we use when flirting?

• M: “Oh wow, that’s terrible”
• M: “That is awful”
• M: “Wow, are you serious?”
• M: “Yeah, like, I hated it too”

• F: That’s crazy.
• M: It’s like kind of weird

Sympathy!
Likely (positive or negative) words for flirting

- **More likely to flirt:**
  - phone
  - party
  - girl
  - dating
  - hate
  - weird

- **Less likely to flirt:**
  - academia
  - interview
  - teacher
  - phd
  - advisor
  - lab
  - research
  - management
What are these “love/sex” words women use when flirting?

- **love**, loved, loves, passion, passionate
  
  - Well, I **love** to cook.
  
  - I really **love** San Francisco.
  
  - Oh, I **love** that show
  
  - ...my **passion** is teaching.
  
  - ...cooking is my **passion**.
  
  - Um, right now I’m **passionate** about getting through my first year of my PhD program.

**Strong positive affect toward hobbies or interests!**
Missing the cues!!

- **Women think men are flirting when:**
  - men ask questions
  - men speak faster.
- **But men who are flirting actually:**
  - raise their pitch floor
  - are sympathetic
  - are more fluent
Missing the cues!!

- **Men think women are flirting when women:**
  - use love/sex words,
  - tell stories
  - have higher pitch max,
  - vary their loudness.

- **But women who are flirting actually:**
  - use love/sex words [men get this right]
  - use more I
  - laugh more
  - use more appreciations
What about friendliness, awkwardness, etc?
Detecting awkward and friendly speakers

- Using *what I do* & *what my date does* to predict what my date calls me
- Simpler (logistic regression) classifier

<table>
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<tr>
<th></th>
<th>Awkward</th>
<th>Friendly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Using speaker words/speech</td>
<td>63%</td>
<td>51</td>
</tr>
<tr>
<td>+ partner words/speech</td>
<td>64</td>
<td>64</td>
</tr>
</tbody>
</table>
What makes someone seem friendly?
“Collaborative conversational style”
Clarifications

I’ve been goofing off big time

You’ve been what?

I’ve been goofing off big time
Collaborative Completion

- I finish your sentence

And I’m wearing a yellow shirt

And black pants
What makes a man seem awkward?

- More disfluent
  - Increased uh/um and restarts
- Not collaborative conversationalists
  - (no appreciations, repair questions, collab completions, you)
- Take fewer turns
- Don’t overlap
Work in progress:
Can we predict liking?

• That is, can we predict the binary variable:
  • ‘willing to give this person my email’
    • Either for a single speaker (baseline 53%=no)
    • Or for a dyad (baseline 81% = no)
What you do when you like someone: Preliminary results

- **Men when they like their date**
  - use more appreciations ("Great!", "Wow!", "That’s cool")
- **Women when they like their date**
  - vary their pitch and loudness more,
  - raise their max pitch
  - laugh
  - tell stories
Who do you say yes to?

Preliminary results

- **Men say yes to women who:**
  - show interest by asking *clarification questions* (“excuse me?”)
  - use “love” and “passion”
  - talk about food

- **Women say yes to men who:**
  - don’t use appreciations
  - talk about food
  - tell stories
  - laugh
Current work: Accommodation

- In general, speakers change their behavior to match (or not match) their interlocutor


  - Matching rate of speech
  - Matching F0
  - Matching intensity (loudness)
  - Matching vocabulary and grammar
  - Matching dialect

- Our question:
  - Do we see more accommodation when people like each other?
Conclusions – for daters

- Talking about your advisor is a bad idea on a date
- Sympathy is a good idea, if you’re a guy
- Passion is good, if you’re a woman
- Food is good, if you eat
Conclusions – for psychology

• Humans project their internal state on others
• Men and women (at least in 4 minutes) seem to focus on the wrong verbal cues to flirtation
Conclusions – for computer science

- We can do automatic extraction of rich social variables from speech and text.
- For at least this variable (“does speaker intend to flirt”) we beat human performance.