CS 224S / LINGUIST 285
Spoken Language Processing

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Lecture 8: Interpersonal Stance
Scherer’s typology of affective states

**Emotion**: relatively brief episode of synchronized response of all or most organismic subsystems in response to the evaluation of an external or internal event as being of major significance

- angry, sad, joyful, fearful, ashamed, proud, desperate

**Mood**: diffuse affect state ... change in subjective feeling, of low intensity but relatively long duration, often without apparent cause

- cheerful, gloomy, irritable, listless, depressed, buoyant

**Interpersonal stance**: affective stance taken toward another person in a specific interaction, coloring the interpersonal exchange

- distant, cold, warm, supportive, contemptuous

**Attitudes**: relatively enduring, affectively colored beliefs, preferences predispositions towards objects or persons

- liking, loving, hating, valuing, desiring

**Personality traits**: emotionally laden, stable personality dispositions and behavior tendencies, typical for a person

- nervous, anxious, reckless, morose, hostile, envious, jealous
Interpersonal Stance: Our Goals

- Friendliness
- Assertiveness
- Flirtation
- Awkwardness
Methodology

- Speed-dating
- Participants rate each other
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.


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]
Background: Previous work on Pickiness in Dating

- Finkel and Eastwick 2009, Psych Science
- Men are less selective than women in speed dating
- Novel explanation: act of physically approaching a partner increases attraction to that partner
  - traditional events, always men rotates
- Ran 15 speed dating events
  - in 8, men rotated: men more selective
  - in 7, women rotated: men equally selective to women
- Conclusion?
Background: Friendliness

- English  (Liscombe et al.; 2003)
  - Friendly speech: higher f0 min, mean, max
    - but all other positive valence similar
  - Higher spectral tilt (H2-H1) of stressed vowel

- Swedish  (House; 2005)
  - Higher F0 in questions (especially late in syllable)
    friendlier than low F0 or a peak early in the syllable.

- Chinese  (Chen et al. 2004, Li and Wang 2004)
  - statements and questions produced by actors,
  - Friendly speech had higher mean F0, faster
Background:
Flirtation/Attractiveness

• Attractiveness
  • Raised F0 in women’s voices
    • Preferred by men (Feinberg et al 2008, Jones et al 2010)
    • Rated more attractive by men (Collins and Missing, 2003; Puts et al., 2011).
  • Lowered F0 or close harmonics in men’s voices
    • labeled by women as more attractive or masculine (Collins and Missing, 2003; Puts et al., 2011).

• Flirtatiousness:
  • Higher F0 or dispersed formants in women’s voices
    • perceive as more flirtatious by other women (Puts et al., 2011).
Experimental setup
Extracting social meaning

- **Stance**
  - Friendly, flirt, awkward, assertive

- **Social Bond**
  - Clicking or Connection
  - Romantic Interest

- **946 4-minute dates**
  - ~800K words, hand-transcribed
  - ~60 hours, from shoulder sash recorders
  - 3 events, 20x20=400 dates x 3
  - Date perceptions, demographics, preferences
Data annotation

- Each speaker wore a microphone
- So each date had two recordings
- The wavefile from each speaker was manually segmented into 4-minute dates
- Professional transcription service produced:
  - words, laughter, disfluencies
  - timestamps for turn beginning and end (1 second)
    - for 10% of the dates, timestamp at 0.1 second granularity
  - using both recordings
Study 1: What we attempted to predict

- Conversational style:
  - How often did they behave in the following ways on this date?
    - On a scale of 1-10 (1=never, 10=constantly)

  awkward
  friendly
  flirtatious
  assertive
Features

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

- **Lexical**
  - negation words (don’t, didn’t, won’t, can’t, not, never)
  - hedges (kind of, sort of, probably, I don’t know)
  - personal pronouns (I, you, we, us)

- **Dialog**
  - questions
  - backchannels (“uh-huh”, “yeah”)
  - appreciations (“Wow!”, “That’s great!”)
  - sympathy (“That’s awful!” “Oh, that sucks!”)
LIWC

Linguistic Inquiry and Word Count
   Pennebaker, Francis, & Booth, 2001
   dictionary of 2300 words grouped into > 70 classes, modified:
I: I’d, I’ll, I’m, I’ve, me, mine, my, myself (not counting I mean)
YOU: you, you’d, you’ll, your, you’re, yours, you’ve (not counting you know)
SEX: sex, sexy, sexual, stripper, lover, kissed, kissing
LOVE: love, loved, loving, passion, passions, passionate
HATE: hate, hates, hated
SWEAR: suck*, hell*, crap*, shit*, screw*, damn*, heck, f.ck*, ass*, ...
NEGEMOTION: bad, weird, hate, crazy, problem*, difficult, tough, awkward, boring
NEGATE: don’t, not, no, didn’t, never, can’t, doesn’t, wasn’t, nothing, isn’t, ...
Additional lexical features

- **Hedges**
  - kind of, sort of, a little, I don’t know, I guess

- **Work terms**
  - research, advisor, lab, work, finish, PhD, department

- **Metadiscussion of dating**
  - speed date, flirt, event, dating, rating

- **UH or UM:**
  - M: Um, eventually, yeah, but right now I want to get some more experience, uh, in research.

- **Like, you know, I mean:**
Speed date features extracted within turns: used for whole side

F0 max in this turn

F0 max in this turn

F0 min in this turn

Uh-huh

So I was like

all right, I'll go
Features: Pitch

- F0 min, max, mean
  - Thus to compute, e.g., F0 min for a conversation side
    - Take F0 min of each turn (not counting zero values)
    - Average over all turns in the side
    - “F0 min, F0 max, F0 mean”

- We also compute measures of variation
  - Standard deviation, pitch range
  - F0 min sd, F0 max sd, F0 mean sd
  - pitch range = (f0 max – f0 min)
## Prosodic features

- **F0 MIN**: minimum (non-zero) F0 per turn, averaged over turns
- **F0 MIN SD**: standard deviation from F0 min
- **F0 MAX**: maximum F0 per turn, averaged over turns
- **F0 MAX SD**: standard deviation from F0 max
- **F0 MEAN**: mean F0 per turn, averaged over turns
- **F0 MEAN SD**: standard deviation (across turns) from F0 mean
- **F0 SD**: standard deviation (within a turn) from F0 mean, averaged over turns
- **F0 SD SD**: standard deviation from the f0 sd
- **PITCH RANGE**: f0 max - f0 min per turn, averaged over turns
- **PITCH RANGE SD**: standard deviation from mean pitch range
- **RMS MIN**: minimum amplitude per turn, averaged over turns
- **RMS MIN SD**: standard deviation from RMS min
- **RMS MAX**: maximum amplitude per turn, averaged over turns
- **RMS MAX SD**: standard deviation from RMS max
- **RMS MEAN**: mean amplitude per turn, averaged over turns
- **RMS MEAN SD**: standard deviation from RMS mean
- **TURN DUR**: duration of turn in seconds, averaged over turns
- **TURN DUR SD**: standard deviation of turn duration
Replace 18 factors with 6

- Factor analysis, 6 factors explain 85% of variance

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<th>Factor 2 Loudness</th>
<th>Factor 3 Min F0</th>
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Prosodic Features: 6 factors

- Higher Pitch Ceiling
- Louder (Min, mean and max)
- Higher Pitch Floor
- Variable Loudness
- Longer Turns
- Variable Pitch

- plus Rate of Speech
Positive and negative assessments

(Goodwin, 1996; Goodwin and Goodwin, 1987; Jurafsky et al., 1998)

Sympathy
(that’s | that is | that seems | it is | that sounds)
(very | really | a little | sort of)?
(terrible | awful | weird | sucks | a problem | tough | too bad)

Appreciations (“Positive feedback”)
(Oh)? (Awesome | Great | All right | Man | No kidding | wow | my god)
That
(‘s | is | sounds | would be)
(so | really)?
(great | funny | good | interesting | neat | amazing | nice | not bad | fun)
Clarifications

I’ve been goofing off big time

You’ve been what?

I’ve been goofing off big time
Regular Expression Patterns for Clarifications

- What?
- Sorry
- Excuse me
- Huh?
- Who?
- Pardon?
- Say again?
- Say it again?
- What’s that
- What is that
Laughing at your date’s joke:

MALE: .. “speed filling out forms” is what this should be called.
FEMALE: [laughter] Yeah.

or teasing:
MALE: You're on the rebound.
FEMALE: huh--uh.
MALE: [laughter] Defensive.
Laughing at yourself

- FEMALE: Why are you single?
- MALE: Why I'm single? That's a good question. [laughter]

- MALE: And I stopped by the--the beer party the other day.
- FEMALE: Oh goodness. And you saw me in- [laughter]
Other features

• DISFLUENT RESTARTS: # of disfluent restarts in side
  - Uh, I–there’s a group of us that came in–

• INTERRUPT: # of turns in side where speakers overlapped
  - M: But-and also obviously–
    - F: It sounds bigger.
  - M: –people in the CS school are not quite as social in general as other–
Accommodation features

- 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:
  - Is accommodation characteristic of certain interpersonal styles?
Simple measures of accommodation

- Words that I used in turn i
  - that you used in turn i-1
    - function words (I, you, the, if, and, it, to...)
    - content words (department, party, lunch....)

- correlation between our rates of speech
  - if I get faster do you get faster?

- laugh accommodation
  - if I laugh do you laugh in the next turn?
Various sets of studies

• Social science
  • mixed-effects logistic regressions with many control factors
    • BMI, height, age difference
    • foreign versus non-foreign student

• Engineering
  • various classifiers, without the control factors
Controls for Social Science Studies

- **Actor and Partner Traits**
  - Male gender – male (1,0)
  - Height – inches (standardized by gender)
  - BMI – Body mass index = \( \frac{\text{weight (lb)}}{[\text{height (in)}]^2} \times 703 \) BM standardized by gender
  - Foreign – foreign born (1,0)
  - Dating experience – respondent’s dating expertise
    
    (7=several times a week, 6=twice a week, 5=once a week, 4=twice a month, 3=once a month, 2=several times a year, 1=almost never)
  - Looking for relationship – whether respondent is seeking relationship or not (goal is to meet new people, get a date, or a serious relationship, = 1; if it seemed like fun, to say they did it, or other, = 0)

- **Dyad Traits**
  - Order – date’s order in evening (1=first, 20=last).
  - Met before – dummy variable for knowing one another prior.
  - Age difference – actor’s age in days – partner’s age in days.
Feature Normalization

• word features are normalized by speakers total #words
• log rate of speech
• All the features standardized (mean=0, variance=1) globally across the training set before training.
Engineering studies
16 binary classifiers

- Female ±Awkward, Male ±Awkward,
- Female ±Friendly, Male ±Friendly,
- Female ±Flirtatious, Male ±Flirtatious,
- Female ±Assertive, Male ±Assertive

- Each study run twice, on:
  - self-assessed
  - alter-assessed

- Multiple classifier experiments
  - L1-regularized logistic regression
  - SVM w/RBF kernel
Test set

- For each of the 16 experiments
  - Sort all 946 dates
  - Choose top 10% as positive class
  - Choose bottom 10% as negative class
  - Ignore 80% of dates in the middle!
- 5-fold cross-validation within this small training and test set

- Goal: Distinguishing social interactants who are reported to exhibit (or not exhibit) clear social intentions or styles
Results using SVM Classifier

Using my speech to predict what my date says about me

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<th>Male speaker</th>
<th>Female speaker</th>
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Results using SVM Classifier

- Using my speech to predict what I say about myself

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<tr>
<td>Assertive</td>
<td>73</td>
<td>64</td>
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What do flirters do?

- **Women when flirting:**
  - raise pitch ceiling
  - talk faster
  - say “I” and “like”, use more hedges
  - laugh at themselves

- **Men when flirting:**
  - raise their pitch floor
  - laugh at their date (teasing?)
  - say “you”
  - don’t use words related to academics
  - say “um”, “I mean”, “you know”
Unlikely words for male flirting

academia
interview
teacher
phd
advisor
lab
research
management
finish
What makes someone seem friendly?
“Collaborative conversational style”


- **Friendly people:**
  - laugh at themselves
  - don’t use negative emotions

- **Friendly men**
  - are sympathetic and agree more often
  - don’t interrupt
  - don’t use hedges

- **Friendly women:**
  - higher max pitch
  - laugh at their date
What makes an awkward conversationalist?

- Awkward people:
  - use more hedges
  - ask more questions

- Awkward men
  - don’t talk about academics
  - do swear or use negative emotion

- Awkward women:
  - do talk about academics
  - talk more, and talk faster
  - don’t laugh at their date
  - don’t use “I”
Assertive

• Assertive men
  • talk more
  • use more negative emotion
  • lower their pitch floor
  • use more agreements and appreciations
  • use more “um”, “you”
  • use less negation

• Assertive women:
  • use more negation (“no”, “didn’t”, “don’t”)
  • talk about academics
  • are less sympathetic
  • accommodate more (content words)
  • use more “I” and “I mean”
  • use less negative emotion
How useful are linguistic features?
How useful are linguistic features?

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<tr>
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<td>Male assert</td>
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</table>
Nonlinguistic features

- Nonlinguistic features help mainly in detecting flirting men
- Men are more likely to (say they) flirt:
  - If alter has low BMI
  - If self has high BMI
  - Later in the evening

- (Men more sensitive to physical features?)
Study on Bond formation

Click:
- How well did I click with this person? (1-10)

Willing:
- Do I want to go on a date with this person?
How does clicking happen?

- Sociology literature:
  - bonding or “sense of connection” is caused by
    - homophily: select mate who shares your attributes and attitudes
    - motives and skills
    - mutual coordination and excitement
      - (Durkheim: religious rituals, unison singing, military)
  - What is the role of language?
    - Background: speed dating has power asymmetry
      - women are pickier
      - Lot of other asymmetric role relationships (teacher-student, doctor-patient, boss-employee, etc.)
Our hypothesis: targeting of the empowered party

- The conversational target is the woman
  - both parties should talk about her more

- The woman’s face is important
  - the man should align to the woman and show understanding

- The woman’s engagement is key
  - in a successful bonding, she should be engaged
Results: Clicking associated with:

Hierarchical regression dyad model, net of actor, partner, dyad features

- both parties talk about the woman
  - women use *I*,
  - men use *you*
- man supports woman’s face
  - men use *appreciations* and *sympathy*,
  - men *accommodate* women’s laughter
  - men interrupt with *collaborative completions*
- woman is engaged
  - women raise their pitch, vary loudness and pitch
  - women avoid hedges
Conclusions

• How to date:
  • Don’t talk about your advisor
  • Focus on the empowered party
  • Flirting women raise pitch ceiling – flirting men raise pitch floor

• How to be friendly
  • be sympathetic, ask clarification questions, agree, accommodate
Potential Projects

- Following up on each of our psychological hypotheses
- New Variables!
  - “How would you rate the other person on each of the following attributes? (1=not at all, 10=very much)”
    - Attractive
    - Sincere
    - Intelligent
    - Funny
    - Ambitious
    - Courteous
Potential Projects: Richer forms of Alignment

Reformulations

A: She was being a nuisance
B: Oh, they thought it was too much of a bother

A: And then we went to the western Caribbean, uh, Cancun, Cozumel,
B: Oh, the Mexican coast.

Collaborative Completions

A: So are you almost--
B: On my way out, yeah-