

Facial Displays and their dialogical meanings: Lecture 1

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Outline

Overview

Laughter: early history

Humour theories

Conversation Analysis and Laughter

Laughter as content bearing and interacting with verbal content

KoS: extending a theory of dialogue with laughter and other NVSS

References

Overview I

- ▶ Laughter originally studied by philosophers (Plato, Aristotle, Hobbes, Kant, Schopenhauer, Bergson, . . .) and writers (Stendahl, Baudelaire, . . .), Freud etc
- ▶ Modern era: Darwin's *The expression of the emotions in man and animals* (Darwin, 1877)
- ▶ Darwin provides extensive evidence that a variety of non-human species have systematic means (non-verbal social signals [NVSS]) of displaying/making manifest their emotional states.
- ▶ These signals have origins in non-communicative acts:
 - ▶ sighing: a physiological requirement for deep breath periodically to avoid alveolar collapse in the lungs,
 - ▶ frowning: can be caused by need to avoid glare,
 - ▶ laughing: can be caused by tickling (in the right circumstances)

Overview II

- ▶ Forgotten until the 1950s; rediscovered inter alia by Paul Ekman, who went on to show that NVSS such as smiling, frowning, glaring etc universally recognisable across cultures (lots of caveats!)
- ▶ Much interest by social psychologists, biologists. (Gervais & Wilson, 2005) and by neuroscientists (Szameitat, Alter, Szameitat, Wildgruber, Sterr, & Darwin, 2009) since, in contrast to verbal signals, there is significant evidence for continuity with apes (Ross, Owren, & Zimmermann, 2010)
- ▶ These emerge at a far earlier stage than verbal signals with infants (Sroufe & Wunsch, 1972).
- ▶ Goes back even to rats? (Panksepp & Burgdorf, 2003) and more recently (Ishiyama & Brecht, 2016)
- ▶ Some dubious that this is connected to the same system (Gervais & Wilson, 2005).
- ▶ But similar connection to moods and ticklishness.

Overview I

- ▶ In fact, laughter is pervasive in conversation:
- ▶ 30k tokens in the spoken British National Corpus (BNC) (1 every 14 turns)
- ▶ 5.8–57/10 minutes of conversation (Vettin & Todt, 2005; Mazzocconi, Tian, , & Ginzburg, 2016)
- ▶ How much laughter and what functions it has widely divergent across corpora (e.g., DUEL (Hough et al., 2016) v. BNC).

Overview II

- ▶ how to systematically characterise the functions of laughter?
- ▶ a variety of incommensurate taxonomies have been proposed for classifying the functions of laughter (Poyatos, 1993; Shimizu, Sumitsuji, & Nakamura, 1994; Campbell, Kashioka, & Ohara, 2005; Reuderink, Poel, Truong, Poppe, & Pantic, 2008; Szameitat et al., 2009) as we discuss in day 3.
- ▶ Not so much work among linguists, until recently, and most of that by speech scientists/phoneticians.
- ▶ Why? Assumption that NVSS system distinct and non-interacting with the linguistic system.
- ▶ A crucial assumption in the literature, usually implicit (but see e.g., (Glenn & Holt, 2013) for an explicit statement in this regard for laughter) is that laughter does not have propositional content (though see (Bavelas & Chovil, 2000; Wierzbicka, 2000) for proposals that facial gestures do have symbolic meaning)

Some basic questions, aims I

- ▶ A world sans laughter (cf (Smullyan, 1986)): less fun, is it less expressive?
- ▶ Does laughter (and more generally non-verbal social signals like smiling, frowning etc) have propositional content? Is it input to pragmatic processes? (Yes; yes).
- ▶ Is laughter/NVSS less under 'intentional control' than verbal communication? (No)
- ▶ Does laughter interact with spoken language? (Yes)
- ▶ Does adding NVSS into semantics/pragmatics require major changes? (No, but . . . : requires recognition (already needed e.g., for repair processes—clarification requests, self-repair) that utterances, not (language independent) contents are the input to sem/prag processes.)
- ▶ Add laughter into grammar? (Complex answer, but probably yes, at least on one view of what grammar is for (Ginzburg & Poesio, 2016))

Some basic questions, aims II

- ▶ Aim: develop a theory of interaction that can incorporate laughter (and other non-verbal social signals (NVSSs)), explain the range of uses it has by positing a small number of meanings and deriving the uses by dialogical and domain-based reasoning.
- ▶ Recent evolutionary stage in human communication—emojis in chat-based communication.
- ▶ What do emojis express? The user's emotional state? pragmatic (illocutionary) markers? (Neither. A text-based analogue of NVSS)
- ▶ How should emotion be integrated in dialogue information states?

Today's lecture I

- ▶ Laughter as treated by philosophers: Plato, Aristotle, Hobbes, Kant, Freud, Bergson
- ▶ Insights from work on humour, primarily intended for jokes and wit, which work “context independently”; but much laughter does not have these characteristics and does not deal with other NVSS.
- ▶ Laughter as treated by conversation analysis (CA); importance of an empirically–driven theory, which reveals wide range of uses of laughter; but CA offers no explicit semantics.
- ▶ Wide range of evidence (going back to Greek rhetoric and Genesis) that laughter has content that affects conversational interaction and composes with verbally–derived content.
- ▶ So need to integrate into a semantic/pragmatic theory of dialogue for verbally based interaction.

Today's lecture II

- ▶ Begin to sketch a semantic/pragmatic theory of dialogue using the framework of KoS.
- ▶ Overview of the rest of the course.

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Laughter: early history I

- ▶ Useful overviews: (Morreal, 2017), (Larkin-Galiñanes, 2017)
- ▶ Biblical laughter:
 1. Disbelief: God tells Abraham at age 99 that he and his aged wife Sarah will have a son, Abraham, out of foolish disbelief, *fell on his face and laughed*. (Genesis 17:17).
 2. Mocking: when a group of boys laughed at the prophet Elisha for being bald, *he cursed them in the name of the Lord: and two she-bears came out of the woods and mauled forty-two of the boys* (Kings 2: 23–24)
- ▶ Plato: laughter intrinsically associated with ridicule of the other; non-ethical . . .
- ▶ Hobbes: laughter as “sudden glory”, triumph from recognition of superiority over some other target. (Hobbes, 1651)

Laughter: early history I

laughter arises out of the sudden transformation of a strained expectation into nothing, or, in other words, its reduction to absurdity . . . a parallelism between body and mind: the body's convulsions reflect its sympathy with the mind's jostling. (Kant, Critique of Judgment)

- ▶ *Laughter originates in every instance from nothing other than perceived incongruity between a concept and the real objects that had been thought through it... and is itself only the expression of this incongruity, a reflex reaction to mental stimuli. (Schopenhauer, The World as Will and Representation, vol. 1)*
- ▶ Freud: Certain events create sexual/aggressive energy; when the tension is undone dramatically , energy release and result: laughter. (Freud, 1905, 2003)

Laughter: early history II

- ▶ So key notions associated with laughter:
 1. Superiority
 2. Release
 3. Incongruity
- ▶ In fact, there exists much laughter without Spkr/Addr superiority, that does not give rise to 'release', and (to a lesser extent) that is not based on incongruity, but their potential needs capturing.
- ▶ (Raskin, 1985) no contradiction:
 - ▶ superiority relates to social relations between interacting parties,
 - ▶ release relates to participants' emotional states,
 - ▶ incongruity is a semantic-pragmatic characteristic of the *laughable*—laughter's trigger.

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Humour theories I

- ▶ Theories that try to characterize 'funniness', 'wit' as it occurs in jokes, puns, humorous texts etc.
- ▶ Recent handbooks see e.g., (Raskin, 2008; Attardo, 2017)

Raskin's script-based semantic theory of humour I

- ▶ Intended coverage: short verbal jokes.
- ▶ 'Ideally, a linguistic theory of humor should determine and formulate the necessary and sufficient linguistic conditions for the text to be funny' (Raskin, 1985): p.47).
- ▶ Aim: a theory of *humour competence*.
- ▶ Still essential basis for subsequent, more general humour theories, e.g., the GTVH discussed below.
- ▶ Main hypothesis:
 1. A text can be characterized as a single-joke-carrying text if both of the conditions in (2) are satisfied.
 2. (i) The text is compatible, fully or in part, with two different scripts (ii) The two scripts with which the text is compatible are opposite in a special sense defined below.
 3. The two scripts with which the text is compatible are said to overlap fully or in part on this text.
- ▶ Explicating script overlap/clash:

Raskin's script-based semantic theory of humour II

1. oppositions between the 1) actual and non-actual, non-existing situation, 2) expected and abnormal, unexpected states of affairs, 3) possible, plausible and impossible, less plausible situation.
 2. And the scripts evoked by jokes often involve some binary categories which are essential to human life, like real/unreal, true/ false, good/bad, death/life, obscene/decent, rich/poor, etc.
- ▶ A: Is the doctor at home? the patient asked in his bronchial whisper.
 - ▶ No, the doctor's young and pretty wife whispered in reply. Come right in.

The bronchial patient joke

- ▶ The joke includes scripts of (VISITING THE) DOCTOR and (VISITING THE) LOVER; the scripts are linked via the component of whispering compatible with both. Wife's invitation to come in rudely violates the Maxim of Quantity and acts as a trigger for shifting from the first script to the second.

The General Theory of Verbal Humour I

- ▶ Developed by Attardo and Rakin (e.g., (Attardo, 2008)).
- ▶ Takes Raskin's 1985 theory as starting point and as key explanatory basis, but adds a variety of additional parameters in order to expand coverage.
- ▶ In particular
 1. Logical Mechanism (LM): the mechanism whereby the incongruity of the SO is playfully and/or partially explained away; (for a detailed discussion see (Hempelmann & Attardo, 2011))
 2. Language(LA): the actual lexical,syntactic,phonological,etc choices at the linguistic level that instantiate all the other choices.
- ▶ What, according to Freud, comes between fear and sex?

The General Theory of Verbal Humour II

- ▶ *fünf*.
- ▶ French: Qu'est-ce qui, selon Freud, se situe entre la peur et le sexe? (translation raises new possibilities . . .).
- ▶ Test theory by generating predictions about joke similarity with reference to varying the parameters associated with a joke (Ruch, Attardo, & Raskin, 1993).

Humor theories: evaluation I

- ▶ Importance of work within SSTH, GTVH:
- ▶ Attempt to develop a detailed, formal (even computational cf. (Taylor, 2010) theory of incongruity.
- ▶ Ties incongruity to general theory of scripts, ontology construction (Raskin, 2017); idiosyncratic when appeared, but currently closely related to frames (Fillmore, 1985), semantics as ontology building (cf. situation semantics (Barwise & Perry, 1983; Ginzburg, 2011)).
- ▶ Different enterprise from ours: not attempting to explicate laughter occurrence in conversation, but *humour competence*.
- ▶ Lacks contextual component, so incongruity notion needs refining.
- ▶ Much laughter in conversation is not joke oriented: in conversation high percentage of speaker laughter which lacks surprise element key to jokes (an insight originally due to (Provine & Yong, 1991)), cf. also (?)

Humor theories: evaluation II

- ▶ Not an incremental/dynamic theory.
- ▶ Does not relate to or offer clear means of scaling up to other non-verbal social signals: smiling, frowning, eye rolling etc

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Conversation Analysis and Laughter I

- ▶ Initial work by Jefferson (Jefferson, 1979): she describes various cases where laughter can be (but is not necessarily) responded to by laughter:
 - (1) a. Roger: you are what dey refer to in rougher circles as a chickn shit.
Roger: hhhhehh
Ken: heh:heh:heh
 - b. Bee: So the next class hhh!hh fer an hour and fifteen minutes I watched his ha:nds hh hh hhh Ava: What's the matter with him?
Bee: hh t hhh he keh he doesn't haff uh full use uff hiss hha fingers
- ▶ Entirely non-jokey subject matter;
- ▶ Spontaneous, note occurrence of self-repair/disfluencies

Conversation Analysis and Laughter II

- ▶ In (1a), an instance of *antiphonal* laughter, 'responsive laughter' whereby the responder shares the initial laughter's assessment of the situation.
- ▶ (1b) illustrates that laughter can raise a potential issue for discussion that the other participant need not take up, staying with the direct issue raised.
- ▶ Crucially, **Jefferson treats laughter as a possible response in the range of responses an utterance generates, on a par with verbal utterances.**
- ▶ Jefferson takes a strategic view of laughter, as a social activity a speaker can invite others to join in.
- ▶ She points out laughter as a potential parallel channel to speech, *speech laughter*:

Conversation Analysis and Laughter IV

- ▶ Much subsequent CA work along lines inspired by this (Glenn, 2003; Glenn & Holt, 2013; Clift, 2012).
- ▶ In particular, a key insight of (Glenn, 2003), the notion of *laughable*: *laughter marks its referent as laughable and potentially funny*.
- ▶ Work in CA has documented the use of laughter in a variety of settings:
 - ▶ medical (Haakana, 1999)
 - ▶ job interview situations (Glenn, 2013)
 - ▶ political: politicians use laughter to deflect questions. (Romaniuk, 2013)

Conversation Analysis and Laughter V

- ▶ Problems: as with CA work in other domains (see e.g., discussion of repair in (Ginzburg & Kolliakou, 2018)), no semantics is proposed.
- ▶ CA is in effect a *syntax* of conversation—offers a description of what sequences are possible or even preferred.
- ▶ No explanation of *how* effects arise in some sort of mechanistic way. Why these effects and not others, how does laughter relate to effects achieved verbally?
- ▶ No proposal for structure of context beyond sequentiality and co-occurrence.

Interim conclusions I

- ▶ Incongruity can serve to explicate some aspects of laughter triggering.
- ▶ Laughter not about humour per se, though connection to feeling pleasant (in some way and with caveats)
- ▶ Laughter is form-specific: its trigger need not survive translation.

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Laughter as content bearing and interacting with verbal content

- ▶ Does laughter have propositional content?
- ▶ Does laughter participate in semantic/pragmatic processes?

Bankers, Orangutans, God, and Abraham I



Bankers, Orangutans, God, and Abraham II

A: I will take care of your savings. B: (laughs)

↪ I don't think you will take care of my savings!

God: You will at age 99 with your aged wife Sarah have a son.

ABraham: laughs. ↪ I don't think I will at age 99 have a son . . .

Bankers, Orangutans, God, and Abraham III

<https://www.youtube.com/watch?v=HxN1STgQXW8> at about 2:25 Theresa May : They will know we built them a better Britain.
B: (laughs) ~→ that's a ridiculous claim (I don't believe that they will know we built them a better Britain)

Why assign content to laughter acts? I

- ▶ These previous examples and (3a–c) illustrates that laughter can occur as a stand alone utterance.
 - (3) a. Isaac: H, How long have you been here? Tracy: We were talking about you. Isaac: That's hilarious. Wh... What... Were you walking around behind us or what? Yale: (laughs) (**No response provided** ~> **this question doesn't warrant answering**)
<https://www.youtube.com/watch?v=FBn28iNcpBA>
 - b. David Gregory; interviewing Chuck Schumer:
DG: (1) Is Sarah Palin the future of the Republican party?
CS: (2) .hh hh=W(h)well(h)heh heh heh .hhuh (From (Romaniuk, 2013))
https://www.youtube.com/watch?v=Zq_o8T8q0q0
 - c. Frank: She was actually erm phonin the doctor to see if she could come in and see him that morning about her gastroenteritis. Emily: Oh. Frank: She'll love me for telling you that. (laughs) (~> **Frank doesn't think his wife will love him for telling Emily** ... (From (Hepburn & Varney, 2013))

Why assign content to laughter acts? II

- ▶ Laughter's force disputable:

Lecturer: so the Korean war started and the United Nations' forces were commanded by one General Douglas MacArthur, General Douglas MacArthur, in case you don't know, won the second world war single handedly

Audience: (laughs)

Lecturer : er (laughs)it's not funny, he believed it! (BNC)

Why assign content to laughter acts? III

- ▶ (4a,b) illustrate cases of laughter with a quite different force, not intended to weaken the speaker's assertion:

(4) a. From BNC/JNV job interview (1,23):

Interviewer: ... [cough] Right, [cough][cough] you seem to be pretty well qualified. John: I hope so (laughs)yes (laughs)

- b. Anon 1: you know you're not going to be (laughing):[able to move it any] Anon 2: (laughs) Anon 1: and it's going to stay that way. Anon 2: **(laughing):[No, Anna, you're alright.]**
Anon 1: (laughs) Anon 2: **(laughing)::[You're alright.]**
(doctor's surgery, BNC, 89-92, G4D)

Why assign content to laughter acts? IV

- ▶ (5a-c) exemplifies intra-utterance laughter, where the laughter has the effect of scare-quoting (Predelli, 2003) the sub-utterance it precedes.
 - (5) a. A : well I I'm interested in it in a (. laughs) ((comfortably)) **re:axed** way, you know, I mean I . I do keep, I have kept up with it (London Lund Corpus)
 - b. (i) A: Jill is John's, (laugh) long-term friend. (ii) A: She is John's long-term (laugh) friend.
 - c. (i) A: Jill is John's, (wink) long-term friend. (ii) A: She is John's long-term (wink) friend.

Where laughter is superior to a verbal utterance

- ▶ laugh better than simple acknowledgement :

(6) a. From BNC/JNV job interview (1,23):

Interviewer: ... [cough] Right, [cough][cough] you seem to be pretty well qualified. John: I hope so (laughs)yes (laughs)Interviewer: erm

b. (From the DUEL corpus):

A: c'est ça l'escalier? ..on va faire ça comme ça ...je met escaliers parce que j'ai mal dessiné B:(laughs)

Laughter and implicature

- ▶ (7) a. Smile reaction to joke → joke not very funny.
(quantity implicature)
- b. Child: And my sister's hamster died. Uncle:
(laughs/smiles) A (to herself): This guy cares about
nothing. (relevance implicature)

Laughter and Irony

- ▶ Irony/simulation can affect laughter, smiling, or crying: in all cases, there is a composition of a basic meaning of the NVSS with a meaning roughly paraphrasable as 'I don't really mean this'.
 - (8) a. A: And we were only give two macaroons each. B:
(Mock cries).
 - b. MR. WHITE: You talked to Nice Guy Eddie? Why the fuck didn't you say that in the first place?
MR. BLONDE: You didn't ask.
MR. WHITE: Hardy-fuckin-har. (Reservoir Dogs)

Laughter and Repair I

- ▶ Verbal utterances that are unclear in some way give rise to clarification interaction:

(9) a. A: What's Hamlet about?

B: Hamlet? [BNC, KPW, 945–946]

b. A: Why are you in?

B: What?

A: Why are you in? [BNC, KPT, 469–471]

c. Marjorie: Don't touch that cos she hasn't had it yet.

Dorothy: Does she eat anything? Marjorie: What do you mean? (British National Corpus (BNC))

- ▶ Laughter also gives rise to clarification interaction:

Laughter and Repair II

(10) *Extract from BNC, KBW*

Tim: I don't want chocolate. Dorothy: Shh. Shh. < unclear >
Andrew: Tim. If you don't want to finish it just put it down there and keep quiet. Dorothy: < laugh > Andrew: **What are you laughing at?** Dorothy: < laughing >
the way you said it .

(11) *Extract from BNC, KSS*

Angela: **What's funny?** < pause > What you doing?
Richard: I'm not doing a thing. You're doing it. Angela:
What you laughing at then?
Arthur: < unclear >. < laugh >
Angela: You're waiting for what? What you waiting for?

Interim Summary: basic semantic/pragmatic properties of laughter to capture

- ▶ antiphonal laughter: sharing incongruous judgement
- ▶ Jefferson's observation: accepting/rejecting laughter's subject matter
- ▶ Laughter repair . . . NVSS repair
- ▶ Assertion cancellation, disbelief
- ▶ Query cancellation
- ▶ Scare quotation

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KoS: extending a theory of dialogue with laughter and other NVSS
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KoS: extending a theory of dialogue with laughter and other NVSS

- ▶ We propose to analyse laughter as a kind of eventive/situational predicate whose argument is the laughable. We assume initially that the predicate in question is *incongruity*.
- ▶ We assume that the variety of inferences we have seen above to be associated with laughter arise from the combination of this meaning with contextually driven reasoning, which has a significant pragmatic component.
- ▶ What does a formal theory need to provide to a theory of laughter/NVSS?
- ▶ First pass (without emotion): laughables in context, incongruity, placement.

KoS: extending a theory of dialogue with laughter and other NVSS I

- ▶ For this purpose we will use the dialogue theory KoS (Ginzburg, 1994; Larsson, 2002; Purver, 2006; Ginzburg & Fernández, 2010; Ginzburg, 2012)) (Ginzburg, 2012 *The Interactive Stance*, OUP; Ginzburg, 2016 'The Semantics of Dialogue', Hbk of Formal Semantics, CUP)
- ▶ A dialogue theory needs to explicate **basic dialogical notions**
- ▶ In other words, to explain the dynamics the information states of participants in such interactions.
 1. Query/Answer: (a non-dependent topic is introduced by A and responded to by B)
(12) A: How much do four croissants cost? B: 4 euros.
 2. assertion/disagreement: (A says something, B disagrees)
(13) A: Obama's great. B: No/uh uh/ (head shake)

KoS: extending a theory of dialogue with laughter and other NVSS II

3. utterance/acknowledgement: A makes an utterance, B indicates that she understands

(14) a. A: How much do four croissants cost? B: OK, let me check.

b. A: Is Obama great? B: Right, well, good question.

4. utterance/Clarification request: A makes an utterance, B indicates that she cannot fully understand the utterance *and* pinpoints where.

(15) a. Marie: Would you like a brioche? Peasant: A brioche?

b. Marie: How much does it cost? Peasant: Cost?

KoS: extending a theory of dialogue with laughter and other NVSS III

- ▶ It also needs to serve as a theory of context for non-sentential utterances, (30-40% of all utterances in dialogue)—e.g., how does a context bring about resolutions of utterances such as the following:

(16) a. B: Four croissants.

b. (Context: A: What did you buy in the bakery?)

Content: I bought four croissants in the bakery.

c. (Context: A: (smiles at B, who has become the next customer to be served at the bakery.)) Content: I would like to buy four croissants.

d. (Context: A: Dad bought four crescents.) Content: You mean that Dad bought four croissants.

- ▶ KoS is underpinned by the logical framework TTR (Cooper, 2005, 2012; Cooper & Ginzburg, 2015), which has been used in various semantic and logical tasks:

KoS: extending a theory of dialogue with laughter and other NVSS IV

- ▶ the modelling of intentionality and mental attitudes (Cooper, 2005),
- ▶ generalised quantifiers (Cooper, 2013),
- ▶ co-predication and dot types in lexical innovation, frame semantics for temporal reasoning, reasoning in hypothetical contexts (Cooper, 2011),
- ▶ enthymematic reasoning (Breitholtz, 2014),
- ▶ negation (Cooper & Ginzburg, 2012),
- ▶ iconic gesture (Lücking, 2016)

Type Theory with Records as logical framework

- ▶ Use Type Theory with Records (TTR) (Cooper, 2005) to build the semantic ontology and to write conversational rules.

Fundamental notion

- ▶ The most fundamental notion of TTR is the typing *judgement* $a : T$ classifying an object a as being of type T .

(17) a. $s : \text{SIT}$

b. $b : \text{IND}$

c. $s : \text{run}(\text{arg1}_{\text{IND}} : b, \text{arg2}_{\text{TIME}} : t)$

d. $s : \text{run}(b,t)$

Records and Record Types

- ▶ A record is a set of fields assigning entities to labels, partially ordered by a notion of *dependence* between fields. Its general form is as in (18):

$$(18) \quad \left[\begin{array}{l} l_1 = val_1 \\ l_2 = val_2 \\ \dots \\ l_n = val_n \end{array} \right]$$

Records and Record Types

- ▶ Together with records come record *types*. A record type is simply a record where each field represents a judgement rather than an assignment, as in (19).

$$(19) \quad \left[\begin{array}{l} l_1 : T_1 \\ l_2 : T_2 \\ \dots \\ l_n : T_n \end{array} \right]$$

Records and Record Types

- ▶ Record types allow us to place constraints on records.
- ▶ The basic relationship between the two is that a record r is of type RT if each value in r assigned to a given label l_i satisfies the typing constraints imposed by RT on l_i .
- ▶ More precisely,

(20) The record:

$$\left[\begin{array}{l} l_1 = a_1 \\ l_2 = a_2 \\ \dots \\ l_n = a_n \end{array} \right] \text{ is of type:}$$

$$\left[\begin{array}{l} l_1 : T_1 \\ l_2 : T_2(l_1) \\ \dots \\ l_n : T_n(l_1, l_2, \dots, l_{n-1}) \end{array} \right]$$

$$\text{iff } a_1 : T_1, a_2 : T_2(a_1), \dots, a_n : T_n(a_1, a_2, \dots, a_{n-1})$$

Records and Record Types

- ▶ The record $\left[\begin{array}{l} \text{runner} = \text{bo} \\ \text{time} = \text{2pm, Dec 20} \\ \text{place} = \text{batumi} \end{array} \right]$ is of the type $\left[\begin{array}{l} \text{runner} : \text{Ind} \\ \text{time} : \text{Time} \\ \text{place} : \text{Loc} \end{array} \right]$
- ▶ and of the type $\left[\begin{array}{l} \text{runner} : \text{Ind} \\ \text{time} : \text{Time} \end{array} \right]$ and of the type $\left[\text{runner} : \text{Ind} \right]$
and of the type $\left[\right]$, the type that imposes no constraints.

An event

- ▶ A situation with a woman riding a bicycle would then be a

record $\left[\begin{array}{l} \dots \\ x = a \\ c1 = p1 \\ y = b \\ c2 = p2 \\ \text{time} = t0 \\ \text{loc} = l0 \\ c3 = p3 \\ \dots \end{array} \right]$ of type $\left[\begin{array}{l} x: \text{IND} \\ c1: \text{woman}(x) \\ y: \text{IND} \\ c2: \text{bicycle}(y) \\ \text{time} : \text{TIME} \\ \text{loc}: \text{LOC} \\ c3: \text{ride}(x,y,\text{time},\text{loc}) \end{array} \right]$

such that: $a: \text{IND}; c1: \text{woman}(a); b: \text{IND}; p2: \text{bicycle}(b); t0 : \text{TIME}; l0 : \text{LOC}; p3: \text{ride}(a,b,t0,l0);$

Frames in TTR

- ▶ (Cooper, 2012): use TTR to formalize Frame Semantics.
- ▶ Frame semantics was introduced in Fillmore's paper ((Fillmore, 1985)): building from real data detailed lexical descriptions.
- ▶ Details about the frame project
<http://framenet.icsi.berkeley.edu/>
- ▶ Ambient temperature defined in the Berkeley FrameNet2: *The Temperature in a certain environment, determined by Time and Place, is specified.*

A Frame

(21)

- a. The Temperature in a certain environment, determined by Time and Place, is specified.
- b. It's too hot to do anything today.
- c. Nome is pretty cold this time of year.

A Frame

- ▶ Core frame elements:
- ▶ **Attribute**: The temperature feature of the weather
- ▶ **Degree**: A modifier expressing the deviation of the Temperature from the norm
- ▶ **Place**: The Place where it is a certain Temperature
- ▶ **Temperature**: A quantity or other characterization of the Temperature of the environment.
- ▶ **Time**: The Time during which an ambient environment has a particular Temperature

A Frame

▶ AmbTemp =

$$\left[\begin{array}{l} x : \text{Ind} \\ e\text{-time} : \text{Time} \\ e\text{-loc} : \text{Loc} \\ c_{temp-at-in} : \text{temp_at_in}(e\text{-time}, e\text{-location}, x) \end{array} \right]$$

Information States

- ▶ Conversation as collection of coupled information states, each agent analyzed in terms of her own dialogue gameboard and an unpublicized component.

Dialogue Gameboard

<i>component</i>	<i>type</i>	<i>keeps track of</i>
	Spkr: Individual Addressee: Individual	Turn ownership
	Facts : Set(propositions)	Shared assumptions
	VisualSit : Situation	Visual scene
	Moves: List(Locutionary propositions)	Grounded utterances
	QUD: partially ordered set(<question, fec> pairs) fec=focus-establishing-constituent	Live issues
	Pending: List(Locutionary propositions)	Ungrounded utterances

The Dialogue GameBoard

- ▶ The spkr/hearer roles serve to keep track of turn ownership.
- ▶ **FACTS** represents the shared knowledge conversationalists utilize during a conversation. More operationally, information a conversationalist can use embedded under presuppositional operators.
- ▶ **MOVES**: useful to single out LatestMove, a distinguished fact that characterizes the most recent move made.
- ▶ The main motivation—to segregate from the entire repository of presuppositions information on the basis of which coherent reactions could be computed.
- ▶ Later on see that keeping track of more than just the latest move can be useful.

The Dialogue GameBoard

- ▶ **QUD**: (mnemonic for Questions Under Discussion)—questions that constitute a “live issue”. That is, questions that have been *introduced for discussion* at a given point in the conversation and not yet been *downdated*.
- ▶ There are additional, indirect ways for questions to get added into QUD, the most prominent of which is during metacommunicative interaction.
- ▶ Being maximal in QUD (max-qud) corresponds to being the current ‘discourse topic’ and is a key component in the theory.

Basics of Interaction

- ▶ The basic units of change are mappings between DGBs that specify how one DGB configuration can be modified into another. \therefore *conversational rule*.
- ▶ The types specifying its domain and its range respectively the *preconditions* and the *effects*.

Basics of Interaction

- ▶ Notationwise a conversational rule will be specified as in (22a). We will often notate such a mapping as in (22b):

$$(22) \text{ a. } r : \begin{bmatrix} \dots \\ \text{dgb1} : \text{DGB} \\ \dots \end{bmatrix} \mapsto \begin{bmatrix} \dots \\ \text{dgb2} : \text{DGB} \\ \dots \end{bmatrix}$$

$$\text{b. } \begin{bmatrix} \text{pre(conds)} : \text{RType} \\ \text{effects} : \text{RType} \end{bmatrix}$$

Greeting

- ▶ An initiating greeting typically occurs dialogue initially.
- ▶ The primary contextual effect of such a greeting is simply providing the addressee with the possibility of reciprocating with a counter-greeting.

Greeting

- ▶ The conversational rule associated with greeting:

$$\left[\begin{array}{l} \text{pre : } \left[\begin{array}{l} \text{spkr : Ind} \\ \text{addr : Ind} \\ \text{moves = elist : list(IllocProp)} \\ \text{qud = elist : list(Question)} \\ \text{facts = commonground1 : Prop} \end{array} \right] \\ \\ \text{effects : } \left[\begin{array}{l} \text{spkr = pre.spkr : Ind} \\ \text{addr = pre.addr : Ind} \\ \text{LatestMove = Greet(spkr,addr):IllocProp} \\ \text{qud = pre.qud : list(Question)} \\ \text{facts = pre.facts : Prop} \end{array} \right] \end{array} \right]$$

Greeting and Parting

- ▶ Henceforth adopt a more economical notation: the preconds can be written as a *merge* of two record types $DGB^- \wedge_{merge} PreCondSpec$, one of which DGB^- is a subtype of DGB and therefore represents predictable information common to all conversational rules;
- ▶ *PreCondSpec* represents information specific to the preconditions of this particular interaction type. Concretely for (22):

$$(23) \text{ a. } DGB^- = \left[\begin{array}{l} \text{spkr: Ind} \\ \text{addr: Ind} \\ \text{facts : Prop} \end{array} \right]$$

$$\text{b. } PreCondSpec = \left[\begin{array}{l} \text{moves = elist : list(IllocProp)} \\ \text{qud = eset : poset(Question)} \end{array} \right]$$

Greeting and Parting

- ▶ Similarly, the effects can be written as a merge of two record types $DGB^0 \wedge_{merge} ChangePrecondSpec$, where DGB^0 is a subtype of the preconditions and $ChangePrecondSpec$ represents those aspects of the preconditions that have changed. So for (22):

(24) a. $DGB^0 =$

$$\left[\begin{array}{l} spkr = pre.spkr : \text{Ind} \\ addr = pre.addr : \text{Ind} \\ qud = pre.qud : \text{list}(\text{Question}) \\ facts = pre.facts : \text{Prop} \end{array} \right]$$

b. $ChangePreCondSpec =$

$$\left[\text{LatestMove} = \text{Greet}(spkr, addr) : \text{IllocProp} \right]$$

Greeting and Parting

- ▶ So we can *abbreviate* conversational rules as in (25a), which for the rule for greeting yields (25b).

(25) a. $\left[\begin{array}{l} \text{pre: PreCondSpec} \\ \text{effects : ChangePrecondSpec} \end{array} \right]$

b. $\left[\begin{array}{l} \text{pre : } \left[\begin{array}{l} \text{moves = elist : list(IllocProp)} \\ \text{qud = elist : list(Question)} \end{array} \right] \\ \text{effects : } \left[\text{LatestMove = Greet(spkr,addr):IllocProp} \right] \end{array} \right]$

Turn Change and abbreviation

- ▶ It should be emphasized that this is merely notational abbreviation, as the labels in a record type need to be introduced before they can be the constituents of a complex type.
- ▶ This is particularly pertinent with respect to the labels associated with speaker and addressee. Note that there are three basic possibilities in 2-person interaction.
- ▶ Only *No turn change* gets abbreviated away in the notational convention just introduced.

Turn Change and abbreviation

- ▶ No-Turn-Change =
$$\left[\begin{array}{l} \text{pre : } \left[\begin{array}{l} \text{spkr : Ind} \\ \text{addr : Ind} \end{array} \right] \\ \text{effects : } \left[\begin{array}{l} \text{spkr = pre.spkr : Ind} \\ \text{addr = pre.addr : Ind} \end{array} \right] \end{array} \right]$$
- ▶ Turn-Change =
$$\left[\begin{array}{l} \text{pre : } \left[\begin{array}{l} \text{spkr : Ind} \\ \text{addr : Ind} \end{array} \right] \\ \text{effects : } \left[\begin{array}{l} \text{spkr = pre.addr : Ind} \\ \text{addr = pre.spkr : Ind} \end{array} \right] \end{array} \right]$$

Turn Change and abbreviation

- ▶ Turnholder-Underspecified =

$$\left[\begin{array}{l} \text{pre : } \left[\begin{array}{l} \text{spkr : Ind} \\ \text{addr : Ind} \end{array} \right] \\ \\ \text{effects : } \left[\begin{array}{l} \text{spkr : Ind} \\ \text{c1 : spkr = preconds.spkr } \vee \text{ preconds.addr} \\ \text{addr : Ind} \\ \text{c2 : member(addr, \{preconds.spkr, preconds.addr\})} \\ \wedge \text{ addr } \neq \text{ spkr} \end{array} \right] \end{array} \right]$$

The rest of the course

- ▶ **Tuesday, Aug 14:** the KoS dialogue framework (cont); A minimal semantic/pragmatic theory of laughter.
- ▶ **Wednesday, Aug 15:** Cognitive theories of emotion; Incorporating cognitive theories of emotion into KoS; classifying laughter in corpora using Praat.
- ▶ **Thursday, Aug 16:** A formal theory of non-verbal social signals in dialogue: laughter, smiling, frowning, sighing; A formal analysis of emojis.
- ▶ **Friday, Aug 16:** Analyzing emojis in social media; Incorporating non-verbal social signals into the grammar.

THANKS!!!

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