Computational Intelligence 696i

Language Homework 1 Answers Sandiway Fong

Homework 1

 answers are provided here for Questions 1 and 2 only on Homework 1

Homework 1

- Minimal Pair:
 - (1) a. John is too stubborn to talk to
 - b. John is too stubborn to talk to Bill
- It's an interesting example:
 - just adding one word Bill provokes a big change in gap-filling
- PAPPI parses:
 - (2) a. John[1] is too stubborn Op[1] **PRO[2]** to talk to t[1]
 - b. John[1] is too stubborn PRO[1] to talk to Bill[2]
- Readings:
 - (3) a. John is too stubborn for some arbitrary person to talk to John
 - b. John is too stubborn **for John** to talk to Bill

Homework 1

- Question 1: 2pts (giveaway)
 - how many structures did it consider for each sentence?
- Question 2: (6pts)
 - Consider the sentence:
 - (4) John is too stubborn [for John] to talk to himself
 - PAPPI parses both versions of this sentence
 - why is this interpretation unavailable for (1a)?
 - what principle(s) rules it out?
 - your answer should report which parse numbers and the steps required to drill down to the answer

- **Question 1**: 2pts (*giveaway*)
 - how many structures did it consider for each sentence?
- Discussion:
 - depends on what you count as a (distinct) structure: an acceptable answer is the fan-out after chain formation, i.e. parser operation *Trace Theory*
 - a more complete answer would also include the extra fan-out generated by parser operations *Free Indexation* and *LF Movement*

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- **Answers**: (based at *Trace Theory*)
 - (1) a. John is too stubborn to talk to
 94
 - b. John is too stubborn to talk to Bill

Generators			Generators	
1 Parse PF	(12)	1 2	Parse PF	(41)
2 Parse S-Structure	(1a)	2 4	Parse S-Structure	(1b)
4 Assign Theta-Roles		33 33	Assign Theta-Roles	()
Horent Case Assignment		33 17	Inherent Case Assignment	
Assign Structural Case		33 33	Assign Structural Case	
4 Trace Theory		4 33	Trace Theory	
20 Eurotional Determination		10	Functional Determination	
4 Execting Indeparties		2	Free Indexation	
56 Fundation		17 17	Expletive Linking	
3 LE Mouement		1	LF Movement	
3 cr movement		_		

• Question 2: (6pts)

- Consider the sentence:
 - (4) John is too stubborn [for John] to talk to himself
 - PAPPI parses both versions of this sentence
 - why is this interpretation unavailable for (1a)?

- (1) a. John is too stubborn to talk to
- in the case of (1a), we are looking for structures generated by PAPPI matching the general template (5)
 - (5) John[1] is too stubborn NP[1] to talk to NP[1]
 - where NP denotes some empty noun phrase (NP)
- recall PAPPI tries all possible structures, so there may be multiple attempts at getting something matching (5) through the gauntlet of constraints
 - from the answer to Question 1, there are 94 structures generated by parser operation Trace Theory
 - first question to ask is: which of these match the general template in (5)?

- PAPPI emits 4 different basic structures out of parser operation Parse S-structure
 - Parsing: john is too stubborn to talk to
 - Exit Parse S-Structure: (1)
 - [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[C][I2[NP]3 [I1[It]3 [VP[VP[V talk]4 [I]3][PP[P to][NP]]]]]]]]
 - this one is like the correct parse except there is no empty operator (Op) position in Spec-CP
 - Exit Parse S-Structure: (2)
 - [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NP][C1[C][I2[NP]3 [I1[It]3 [VP[VP[V talk]4 [I]3][PP[P to][NP]]]]]]]]]
 - this one generates the correct parse, [NP] in [C2[NP].. gets resolved as an empty operator (Op)

- PAPPI emits 4 different basic structures out of parser operation Parse Sstructure
 - Exit Parse S-Structure: (3)
 - [C2[NP john][C1[C][I2[NP]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[C][I2[NP]3 [I1[It]3 [VP[VP[V talk]4 [I]3][PP[P to][NP]]]]]]]]]]
 - Exit Parse S-Structure: (4)
 - [C2[NP john][C1[C][I2[NP]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NP][C1[C][I2[NP]3 [I1[It]3 [VP[VP[V talk]4 [I]3][PP[P to][NP]]]]]]]]]
 - both (3) and (4) have the noun phrase (NP) subject John in the wrong place [C2[NP john]... not the subject position [i2[NP]1...
- these four structures partition the 94 structures emitted by parser operation Trace Theory as follows:
 - (1) 1–7, (2) 8–21, (3) 22–34, (4) 35–94
- there are 17 matching structures (direct and *indirect in a sense to be made clear*) partitioned as follows:
 - (1) 2 direct, 1 indirect, (2) 4 direct, 1 indirect, (3) none, (4) 6 direct, 3 indirect

• Answer: 17 out of 94 structures match

Trace Theory Structure #	Inherent Case Assignment	Theta Criterion	D-structure Theta Condition	Case Filter	Case Condition on ECs	Condition B	ECP	ECP at LF
2		Х	Х		Х		Х	Х
4		Х	Х			Х	Х	Х
5	х	Х	Х				X	Х
11		X.	Х				X	Х
14		Х	Х		Х			
16		Х	Х		Х	Х		
17	х	Х	Х		Х			Х
20	х	Х	Х		Х		X	Х
39		Х	Х		Х	Х	Х	Х
42		Х	Х	Х	Х		X	Х
52		Х	Х		Х		X	Х
59		Х	Х			Х	Х	Х
62	х	Х	Х	Х	Х		X	Х
72	х	Х	Х				X	Х
85		X	Х	Х	X	Х	Х	Х
88	Х	X	Х	Х	Х		X	Х
93	X	X	X	х	X		X	Х

- Answer: 17 out of 94 structures match
- Discussion:
 - preceding table shows the principles that block each of the structures referenced by the Trace Theory parser operation exit numbers
 - all of the structures violate Theta Theory
 - Theta Criterion, D-structure Theta Condition
 - most of them also violate the Empty Category Principle (ECP)
 - either at S-structure or LF (or both)
 - some of them also violate elements of Case Theory
 - Inherent Case Assignment, Case Filter, Case Condition on Traces

- Answer: 17 out of 94 structures match
- Discussion:
 - to prevent interpretation (5) from being available,
 - PAPPI has to rule out every one of these 17 structures
 - recall the arrow/target analogy ⇒+
 - Theta Theory is the blocking module
 - out of the 17 structures
 - 12 already have the required indexing after parser operation *Trace Theory*
 - 5 more (indirect indicated by the yellow rows in the table) are partially indexed after Trace Theory, picking up a needed index only after parser operation Free Indexation
 - see Question 1 discussion of Free Indexation



- Example: (of partial indexing)
 - Exit Trace Theory: (16)
 - [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NP]]]]]]]]]]
 - NP (shown in bold) is not yet assigned an index
 - Exit Free Indexation: (1)
 - [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to] [NP]1]]]]]]]]]
 - NP (shown in bold) is now co-indexed with John
 - Exit Free Indexation: (2)
 - [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to] [NP]4]]]]]]]]]
 - not the structure we want

- the 12 matching examples after Trace Theory are:
 - (2) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]
 - (5) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]
 - (11) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]])
 - (14) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]])

- the 12 matching examples after Trace Theory are:
 - (17) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]])
 - (20) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]])
 - (42) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1
 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1
 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]])
 - (52) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]]]

- the 12 matching examples after Trace Theory are:
 - (62) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]]]
 - (72) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]]]
 - (88) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1
 - [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]]

- (93) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1

[I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NPt]1]]]]]]]]]]]]]]

[VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1

- the 5 other matching examples are:
 - (4) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NP]]]]]]]]
 - (16) [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1 [VP[Vt]2] [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1 [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NP]]]]]]]]]
 - (39) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)]I(AGR)]1 [V is]2]1 [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NP]3 [I1[It]3 [VP[VP[V talk]4 [I]3][PP[P to][NPt]1]]]]]]]]]

- (85) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1

[VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1

- (59) [C2[NP john]1 [C1[C][I2[NPt]1 [I1[I(AGR)[I(AGR)]1 [V is]2]1

[I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NP]]]]]]]]]]]

- [VP[Vt]2 [AP[AP[ADV too][A stubborn]][C2[NPt]1 [C1[C][I2[NPt]1

- [I1[It]1 [VP[VP[V talk]3 [I]1][PP[P to][NP]]]]]]]]]]]