Computational Intelligence
696i
Language
Homework 1 Answers
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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:
• 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

• **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

• **Answers**: (based at Trace Theory)
  - (1) a. John is too stubborn to talk to [94] 
  - b. John is too stubborn to talk to Bill [33]
Question 2

• **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)?

• **Discussion:**
  • (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)?
Question 2

Discussion:

- 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)

  \[
  [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2 ]1 [VP[Vt]2
  [AP[AP[ADV too][A stubborn]][C2[C][I2[NP]3 [I1[I]3 [VP[VP[V talk]4
  [I]3 ][PP[P to][NP]]]]]]]]]]
  \]

  - this one is like the correct parse except there is no empty operator (Op) position in Spec-CP

- Exit Parse S-Structure: (2)

  \[
  [C2[C][I2[NP john]1 [I1[I(AGR)[I(AGR)]1 [V is]2 ]1 [VP[Vt]2
  [AP[AP[ADV too][A stubborn]][C2[NP][C1[C][I2[NP]3 [I1[I]3 [VP[VP[V talk]4
  [I]3 ][PP[P to][NP]]]]]]]]]
  \]

  - this one generates the correct parse, [NP] in [C2[NP].. gets resolved as an empty operator (Op)
Question 2

• **Discussion:**
  – PAPPI emits 4 different basic structures out of parser operation *Parse S-structure*
    • Exit Parse S-Structure: (3)
      • [C2[NP john][C1[C][I2[NP][I1[I(AGR)][I(AGR)]1 [V is]2 ]1 [VP[Vt]2 [AP[AP[ADV
too][A stubborn]][C2[C][I2[NP][I1[I3]3 [VP[VP[V talk2 [I3 ]3 ]3 [PP[P to][NP]])]]]]]]]]]]]
    • Exit Parse S-Structure: (4)
      • [C2[NP john][C1[C][I2[NP][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[I3]3 [VP[VP[V talk4 [I3 ]3 ]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
Question 2

- Answer: 17 out of 94 structures match

<table>
<thead>
<tr>
<th>Trace Theory Structure #</th>
<th>Inherent Case Assignment</th>
<th>Theta Criterion</th>
<th>D-structure Theta Condition</th>
<th>Case Filter</th>
<th>Case Condition on ECs</th>
<th>Condition B</th>
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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
Question 2

• 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
Question 2

• Discussion:
  – 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[I1 [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[I1 [VP[VP[V talk]3 [I]1 ][PP[P to] [NP]1 ]]][[NP]]]]]]]]]]]]]
      – 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[I1 [VP[VP[V talk]3 [I]1 ][PP[P to] [NP]4 ]]][[NP]]]]]]]]]]]]]
      – not the structure we want
Question 2

• the 12 matching examples after Trace Theory are:
Question 2

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Question 2

- the 12 matching examples after Trace Theory are:
Question 2

- the 5 other matching examples are: