

Classes of 70 WSC questions

Class	Question Number
谓词间的直接关联 直接关联又分为一元谓词推倒二元谓词，二元谓词推倒一元谓词，二元谓词推倒二元谓词。	1.2.3.4.5.6.7.8.10.11.12.13.15.16.17.18.19.21.22.23.24.25.26.31.32.34.37.39.40.42.46.49.52.53.54.57.58.59.61.62.63.64.65.67.70
多谓词关联	9.33.35.44.45.48.50.55.56.66.68.69.
连接解析，连接包括 because, so, and, but, although, where, after	20.27.28.29.36.38.51
不需要 KB，基于文本直接推理。	14
无特定类型	30.41.43.47.60
总结：	<p>谓词间的直接关联类型句子基本可以由 z3 解决，多谓词关联的一部分可以解决，连词解析的暂时没想到如何添加 KB，直接推理的可以解决，无特定类型的也比较难添加 KB。</p> <p>今晚工作安排：</p> <ol style="list-style-type: none"> 1. 将谓词间直接关联的例子全部转化为 z3 可用的语言并验证 z3 的解决能力； 2. 构思关于连接解析类问题的添加 KB 方式； 3. 如还有时间则一个个解决多谓词关联问题。

附录：添加了背景知识的前 70 个例子。（高亮的例子暂时没想到如何添加 KB）

1. The city councilmen refused the demonstrators a permit because they [feared/advocated] violence. Who [feared/advocated] violence?

(Knowledge: If person A refuse person B a permit, person A might fear violence or person B might advocate violence.)

Answers: The city councilmen/the demonstrators.

Comment: This was the version published in (Winograd 1972). Winograd's earlier Ph.D. thesis (1970) has it in a slightly different form: "The city councilmen refused to give the women a permit for a demonstration because they [feared/advocated] violence". Winograd observes that finding the correct reference resolution would matter if one were translating the sentence into French, because of the gender of "they".

2. The trophy doesn't fit into the brown suitcase because it's too [small/large]. What is too [small/large]?

(Knowledge: If thing A doesn't fit into thing B, we know A is big and B is small.)

Answers:The suitcase/the trophy.

3. Joan made sure to thank Susan for all the help she had [given/received]. Who had [given/received] help?

(Knowledge: If person A thank person B, we know B gives help to A or A receive helps from B)

Answers: Susan/Joan.

4. Paul tried to call George on the phone, but he wasn't [successful/available]. Who was not [successful/available]?

(KB: If person A try to call person B, person A might be not successful and person B might be not available.)

Answers: Paul/George

5. The lawyer asked the witness a question, but he was reluctant to [answer/repeat] it . Who was reluctant to [answer/repeat] the question?

(KB: If person A asks person B a question, person A might not repeat the question again and person B might not answer the question.)

Answers: The witness/the lawyer.

6. The delivery truck zoomed by the school bus because it was going so [fast/slow]. What was going so [fast/slow]?

(KB:If car A zooms by car B, car A goes so fast or car B goes so slow.)

Answers: The truck/the bus

7. Frank felt [vindicated/crushed] when his longtime rival Bill revealed that he was the winner of the competition. Who was the winner of the competition?

(KB:If person B, who is person A' s rival, is the winner of the competition, person B will feel vindicated and person A will feel crushed.)

Answers: Frank/Bill

8. The man couldn't lift his son because he was so [weak/heavy]. Who was [weak/heavy]?

(KB: If person A couldn' t lift person B, person A is weak or person B is heavy.)

Answers: The man/the son.

9. The large ball crashed right through the table because it was made of [steel/styrofoam]. What was made of [steel/styrofoam]?

(KB: If thing A crashes right through thing B, thing A is solid or thing B is fragile. Steel is solid. Styrofoam is fragile. If thing A is made of thing B and thing B is solid, thing A is solid. If thing A is made of thing B and thing B is fragile, thing A is fragile.)

Answers: The ball/the table.

10. John couldn't see the stage with Billy in front of him because he is so [short/tall]. Who is so [short/tall]?

(KB: If person A couldn't see something with person B in front of him, person A is short or person B is tall.)

Answers: John/Billy.

11. Tom threw his schoolbag down to Ray after he reached the [top/bottom] of the stairs. Who reached the [top/bottom] of the stairs?

(**KB:** If person A throws something down to person B, person A is at the top and person B is at the bottom.)

Answers: Tom/Ray.

12. Although they ran at about the same speed, Sue beat Sally because she had such a [good/bad] start. Who had a [good/bad] start?

(**KB:** If person A beats person B at a run with the same speed, person A has a good start or person B has bad start.)

Answers: Sue/Sally.

13. The sculpture rolled off the shelf because it wasn't [anchored/level]. What wasn't [anchored/level]?

(**KB:** If thing A rolls off thing B, thing A isn't anchored or thing B isn't level)

Answers: The sculpture/the shelf.

14. Sam's drawing was hung just above Tina's and it did look much better with another one [below/above] it. Which looked better?

(**KB:** don't need KB)

Answers: Sam's drawing/Tina's drawing.

15. Anna did a lot [better/worse] than her good friend Lucy on the test because she had studied so hard. Who studied hard?

(**KB:** If person A does better than person B, person A studies hard. If person A does worse than person B, person B studies hard.)

Answers: Anna/Lucy

16. The firemen arrived [after/before] the police because they were coming from so far away. Who came from far away?

(**KB:** If person A arrives after person B, person A comes from far away. If person A arrives before person B, person B comes from far away.)

Answers: The firemen/the police.

17. Frank was upset with Tom because the toaster he had [bought from/sold to] him didn't work. Who had [bought/sold] the toaster?

(**KB:** If person A is upset with person B, something person A bought from person B doesn't work or something person B sold to person A doesn't work.)

Answers: Frank/Tom.

18. Jim [yelled at/comforted] Kevin because he was so upset. Who was upset?

(If person A is upset, person A might yell at somebody or somebody might comfort person A.)

Answers: Jim/Kevin.

19. The sack of potatoes had been placed [above/below] the bag of flour, so it had to be moved first. What had to be moved first?

(If thing A is placed above thing B, thing A has to be moved first. If thing A is placed below thing B, thing B has to be moved first.)

Answers: The sack of potatoes/the bag of flour.

20. Pete envies Martin [because/although] he is very successful. Who is very successful?

(KB:)

Answers: Martin/Pete.

21. I was trying to balance the bottle upside down on the table, but I couldn't do it because it was so [top-heavy/uneven]. What was [top-heavy/uneven]?

(KB: If somebody couldn't balance thing A on thing B, thing A is top-heavy or thing B is uneven.)

Answers: the bottle/the table.

22. I spread the cloth on the table in order to [protect/display] it. To [protect/display] what?

(KB: If somebody spread thing A on thing B, he wants to protect thing B or display thing A.)

Answers: the table/the cloth.

23. The older students were bullying the younger ones, so we [rescued/punished] them. Whom did we [rescue/punish]?

(KB: If person A bully person B, there will be somebody to rescue person B or to punish person A)

Answers: The younger students/the older students.

24. I poured water from the bottle into the cup until it was [full/empty]. What was [full/empty]?

(KB: If somebody pours something from thing A into thing B, thing A will be empty or thing B will be full.)

Answers: The cup/the bottle.

25. Susan knows all about Ann's personal problems because she is [nosy/indiscreet]. Who is [nosy/indiscreet]?

(KB: If person A is nosy, person A will know about somebody's personal problems. If person A is indiscreet, somebody will know about person A's personal problems.)

Answers: Susan/Anne.

26. Sid explained his theory to Mark but he couldn't [convince/understand] him. Who did not [convince/understand] whom?

(KB: If person A explains something to person B, person A might not convince person B or person B might not understand person A.)

Answer Pair A: Sid did not convince Mark/Mark did not convince Sid.

Answer Pair B: Sid did not understand Mark/Mark did not understand Sid.

Comment: Winograd schema in the broad sense, since the question asks about two pronouns.

27. Susan knew that Ann's son had been in a car accident, [so/because] she told her about it. Who told the other about the accident?

(KB: how to add KB for so and because.)

Answers: Susan/Ann.

Comment: There is a large literature on "implicit causality" and "implicit consequentiality" biases (see, for example, (Hartshorne, 2013), (Kehler et al. 2008)), in which a comprehender obtains a preference for the antecedent of a pronoun in a second clause based on the content of the first clause and the connective, before seeing the content of the second clause. These are often associated with "so" and "because". For example seeing:

"Sally frightened Mary because she ..." people interpret "she" as Sally.

"Sally loves Mary because she ..." people interpret "she" as Mary.

"Sally frightened Mary, so she ..." people interpret "she" as Mary.

"Sally loves Mary, so she ..." people interpret "she" as Sally.

If there are biases that favor the correct disambiguation in our example here, and if the direction of the biases can be determined purely from linguistic characteristics of the first clause e.g. from the use of the verb "knew", then this is not a valid Winograd schema, because an automated understander could do better than chance on this without employing world knowledge. However, I currently have no reason to think that this is the case.

28. Joe's uncle can still beat him at tennis, even though he is 30 years [older/younger]. Who is [older/younger]?

(KB: how to add KB for even though)

Answers: Joe's uncle/Joe.

Comment: Note the following results of Google search (1/9/11).

"uncle older" 14,500,000

"uncle younger" 9,630,000

"older" 357,000,000

"younger" 93,000,000

Thus "uncle" is not particularly associated with "older".

29. The police left the house and went into the garage, [where/after] they found the murder weapon. Where did they find the murder weapon?

(KB: how to add KB for conjunction)

Answers: In the garage/in the house.

Comment: "after" is perhaps slightly awkward here. Winograd schema in the broad sense, since there is no ambiguous pronoun.

30. The painting in Mark's living room shows an oak tree. It is to the right of [the bookcase/a house]. What is to the right of [the bookcase/a house]?

(KB: I don't know)

Answers: The painting/the tree.

31. There is a gap in the wall. You can see the garden [through/behind] it. You can see the garden [through/behind] what?

(KB: see sth through the gap, see sth behind the wall)

Answers: The gap/the wall.

Comment. The syntax of the question is strictly incorrect, but "[Behind/through] what can you see the garden?" is almost incomprehensible.

32. The drain is clogged with hair. It has to be [cleaned/removed]. What has to be [cleaned/removed]?

(KB: If thing A is clogged with thing B, thing A must be cleaned or thing B must be removed.)

Answers: The drain/the hair.

33. My meeting started at 4:00 and I needed to catch the train at 4:30, so there wasn't much time. Luckily, it was [short/delayed], so it worked out. What was [short/delayed]?

(KB:)

Answers: The meeting/the train.

34. There is a pillar between me and the stage, and I can't [see/see around] it. What can't I [see/see around]?

(If thing A is between somebody and thing B, he can't see thing B or he can't see around thing A)

Answers: The stage/the pillar.

35. They broadcast an announcement, but a subway came into the station and I couldn't [hear/hear over] it. What couldn't I [hear/hear over]?

(**KB:** If somebody broadcast sth, another might not hear it. If there exists a loud, another one might not hear over it. If a subway comes, there exists a loud.)

Answers: The announcement/the subway.

36. In the middle of the outdoor concert, the rain started falling, [and/but] it continued until 10. What continued until 10?

(**KB:** and but??)

Answers: The rain/the concert.

37. I used an old rag to clean the knife, and then I put it in the [drawer/trash]. What did I put in the [drawer/trash]?

(**KB:** If somebody uses thing A to clean thing B, he will put thing B in the drawer or he will put thing A in the trash.)

Answers: The knife/the rag.

38. Ann asked Mary what time the library closes, [but/because] she had forgotten. Who had forgotten?

(**KB:** ????)

Answers: Mary/Ann.

39. I took the water bottle out of the backpack so that it would be [lighter/handy]. What would be [lighter/handy]?

(**KB:** If somebody takes thing A out of thing B, thing B will be lighter or thing A will be handy.)

Answers: The backpack/the bottle.

40. I couldn't put the pot on the shelf because it was too [high/tall]. What was too [high/tall]?

(**KB:** If somebody couldn't put thing A on the thing B, thing A is tall or thing B is high.)

Answers: The shelf/the pot.

Comment: The Google query ``high pot" gives about 10 times as many pages as ``tall pot" (search 9/8/11) for reasons unconnected with the meanings in this sentence.

41. I'm sure that my map will show this building; it is very [famous/good]. What is [famous/good]?

(KB: Building is famous? Map is good?)

Answers: The building/the map.

Comment: ``Detailed" would of course be a better word to describe the map, but it would certainly be Googable, and probably solvable by selectional restriction. One might suppose that "famous building" would be a more frequent combination than "famous map" but Google search (5/11/2012) suggests the reverse:

"building": 2.2 billion

"famous building": 250 million

"map": 1.4 billion

"famous map": 500 million

42. Bob paid for Charlie's college education. He is very [generous/grateful]. Who is [generous/grateful]?

(KB: If person A pays for person B, person A is generous or person B is grateful.)

Answers: Bob/Charlie.

43. Bob paid for Charlie's college education, but now Charlie acts as though it never happened. He is very [hurt/ungrateful]. Who is [hurt/ungrateful]?

(KB: don't know)

Answers: Bob/Charlie

44. Bob was playing cards with Adam and was way ahead. If Adam hadn't had a sudden run of good luck, he would have [won/lost]. Who would have [won/lost]?

(KB: If person A is way head when playing games with person B, and person B)

Answers: Bob/Adam.

45. Adam can't leave work here until Bob arrives to replace him. If Bob had left home for work on time, he would be [here/gone] by this time. Who would be [here/gone]?

(KB:??)

Answers: Bob/Adam

46. If the con artist has succeeded in fooling Sam, he would have [gotten/lost] a lot of money. Who would have [gotten/lost] the money?

(KB: If person A succeed in fooling person B, person A will get money or person B will lose money.)

Answers: The con artist/Sam.

47. It was a summer afternoon, and the dog was sitting in the middle of the lawn. After a while, it got up and moved to a spot under the tree, because it was [hot/cooler]. What was [hot/cooler]?

(KB: If somewhere is exposed to the sun in the summer afternoon, it is hot, and if not exposed it is cool. If

Answers: The dog/The spot under the tree.

Comment: An earlier version of this page omitted "to a spot" in the second sentence, but that was problematic. Thanks to Peter Schueller for discussion.

48. The cat was lying by the mouse hole waiting for the mouse, but it was too [cautious/impatient]. What was too [cautious/impatient]?

(If thing A is waiting for its prey, thing A might be impatient or its prey might be cautious. Mouse is cat's prey.)

Answers: The mouse/the cat.

49. Anne gave birth to a daughter last month. She is a very charming [woman/baby]. Who is a very charming [woman/baby]?

(KB: If person A gives birth to person B, person A is a woman or person B is a baby.)

Answers: Anne/Anne's daughter.

50. Alice tried frantically to stop her daughter from [chatting/barking] at the party, leaving us to wonder why she was behaving so strangely. Who was behaving strangely?

(KB: ??)

Answers: Alice/Alice's daughter.

51. I saw Jim yelling at some guy in a military uniform with a huge red beard. I don't know [who/why] he was, but he looked very unhappy. Who looked very unhappy?

(KB: ??)

Answers: The guy in the uniform/Jim.

Comment: If you stop the second sentence at "I don't know [who/why] he was" you still have the same ambiguity, but it becomes very difficult to ask the question. "I don't know who who was?" is perhaps best. Of course, either way there is a reading in which the two "he" refer to different people, but it seems to me that that's considerably less preferred.

52. The fish ate the worm. It was [tasty/hungry]. What was [tasty/hungry]?

(KB: If thing A eats thing B, thing A is hungry or thing B is tasty.)

Answers: The worm/the fish.

53. I was trying to open the lock with the key, but someone had filled the keyhole with chewing gum, and I couldn't get it [in/out]. What couldn't I get [in/out]?

(KB: If somebody tries to open the lock with the thing A, he might not get the thing A in. If thing B fills the keyhole, somebody might not get thing B out.

Answers: The key/the chewing gum.

54. The dog chased the cat, which ran up a tree. It waited at the [top/bottom]. Which waited at the [top/bottom]?

(KB: If thing A chases thing B and thing B runs up, thing A might wait at the bottom or thing B might wait at the top.)

Answers: The cat/the dog.

55. In the storm, the tree fell down and crashed through the roof of my house. Now, I have to get it [removed/repaired]. What has to be [removed/repaired]?

(KB: If thing A crash through thing B, thing A might be removed and thing B is broken. If thing B is broken, thing B might be repaired.)

Answers: The tree/the roof.

56. The customer walked into the bank and stabbed one of the tellers. He was immediately taken to the [emergency room/police station]. Who was taken to the [emergency room/police station]?

(KB: If person A stabs person B, person B might be hurt and person A might commit a crime. If person A commits a crime, person A might be taken to the police station. If person A is hurt, person A might be taken to emergency.)

Answers: The teller/the customer.

57. John was doing research in the library when he heard a man humming and whistling. He was very [annoyed/annoying]. Who was [annoyed/annoying]?

(KB: When person A hear person B humming and whistling, person A might be annoyed or person B might be annoying.)

Answers: John/the hummer.

58. John was jogging through the park when he saw a man juggling watermelons. He was very [impressed/impressive]. Who was [impressed/impressive]?

(KB: If person A sees person B doing something, person A might be impressed or person B might be impressive.)

Answers: John/the juggler.

59. Bob collapsed on the sidewalk. Soon he saw Carl coming to help. He was very [ill/concerned]. Who was [ill/concerned]?

(KB: If person A collapses, person A is ill. If person B helps person A, person B is concerned. If person A sees person B coming to help, person B helps person A.)

Answers: Bob/Carl.

60. Sam and Amy are passionately in love, but Amy's parents are unhappy about it, because they are [snobs/fifteen]. Who are [snobs/fifteen]?

(KB: ??)

Answers: Amy's parents/Sam and Amy.

61. Mark told Pete many lies about himself, which Pete included in his book. He should have been more [truthful/skeptical]. Who should have been more [truthful/skeptical]?

(KB: If person A tells person B lies, person A should be truthful or person B should be skeptical.)

Answers: Mark/Pete.

62. Joe has sold his house and bought a new one a few miles away. He will be moving [out of/into] it on Thursday. Which house will he be moving [out of/into]?

(KB: If somebody sells his house A and buys a house B, he might move out of house A or move into house B.)

Answers: The old house/the new house.

63. Many people start to read Paul's books and can't put them down. They are [gripped/popular] because Paul writes so well. Who or what are [gripped/popular]?

(KB: If person A reads thing B, person A might be gripped or thing B might be popular.)

Answers: The readers/the books.

Comment: A lot of synonyms for ``gripped" (e.g. ``fascinated") can be resolved by selectional restrictions. ``Gripped" cannot because it is polysemic with physical grasping.

64. Mary took out her flute and played one of her favorite pieces. She has [loved/had] it since she was a child. What has Mary [loved/had] since she was a child?

(KB: If thing A is somebody's favorite, he loves thing A. If somebody takes out thing A, he has thing A.)

Answers: The piece/the flute.

65. Sam pulled up a chair to the piano, but it was broken, so he had to [stand/sing] instead. What was broken?

(KB: If somebody has to stand, his chair is broken. If somebody has to sing, his instrument is broken. Piano is an instrument.)

Answers: The chair/the piano.

66. Since it was raining, I carried the newspaper [over/in] my backpack to keep it dry. What was I trying to keep dry?

(**KB:** If somebody carries thing A over thing B, thing A is over thing B. If somebody carries thing A in thing B, thing B is over thing A. When it is rainy and thing A is over thing B, thing B is dry.)

Answers: The backpack/the newspaper.

Comment: The form of the question is quite far from the text, but there doesn't seem to be a better way to formulate this question.

67. Sara borrowed the book from the library because she needs it for an article she is working on. She [reads/writes] it when she gets home from work. What does Sara [read/write] when she gets home from work?

(**KB:** If somebody borrows thing A for thing B, he can reads thing A or can writes thing B.)

Answers: The book/the article.

68. This morning, Joey built a sand castle on the beach, and put a toy flag in the highest tower, but this afternoon [a breeze/the tide] knocked it down. What did the [breeze/tide] knock down?

(**KB:** If thing B is built by sand, tide will knock down thing B. Sand castle is built by sand. If thing A is on the high position, breeze will knock down thing A. High highest tower is a high position.)

Answers: The flag/the sand castle.

Comment: Perhaps a little overly delicate.

69. Jane knocked on Susan's door, but there was no answer. She was [out/disappointed]. Who was [out/disappointed]?

(**KB:** If person A knocks on person B's door and there is no answer, person B might be not at the house or person A might be disappointed. If person B might be not at the house, person B might be out.)

Answers: Susan/Jane.

Comment: Note that Jane is also "out" (of the house or room); The disambiguation in this case involves issues of textual coherence. A simplified version is given in #114.

70. Jane knocked on the door, and Susan answered it. She invited her to come [out/in]. Who invited whom?

(**KB:** If person A knock on the door and person B answers it, person B might invite person A to come in or person A might invite person B to come out.)

Answers: Jane invited Susan/Susan invited Jane.

