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ABSTRACT

        This paper presents the detailed propositional
analyses of the text employed in a study that compared the contents
of recall protocols of high knowledge (HK) and low knowledge (LK)
groups. The paper also includes the propositional analyses of the
recall protocols of the HK and LK individuals, as well as detailed
analyses of the results. (Author/FL)

TEXT PROCESSING OF DOMAIN-RELATED INFORMATION
FOR INDIVIDUALS WITH HIGH AND LOW DOMAIN KNOWLEDGE:
METHODOLOGICAL CONSIDERATIONS

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2

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The paper entitled "Text Processing of Domain-Related
Information for Individuals with High and Low Domain Knowledge"
(Spilich, Vesonder, Chiesi, & Voss, in press) presented the
results of an experimen'. which involved use of textual material.
A one-half inning account of a baseball game was presented to
individuals with either high (HK) or low (LK) baseball knowl-
edge, and subsequently the individuals were asked to recall
the contents of the account. The purpose of the study was, of
course, to compare the contents of the recall protocols of the
HK and LK groups by assessing both quantitative and qualita-
tive differences in recall. The results indicated that HK
recall was quantitatively and qualitatively superior to that
of LK recall, and the findings were considered in terms of
the superiority of HK individuals to relate game actions and
sequences of such actions to the goal structure of the game.
In order to provide a reasonable analysis of protocol differ-
ences, it was necessary to perform a number of detailed analy-
ses. However, because of length, the details of these analyses
were not contained in the aforementioned paper. It is there-
fore the purpose of this paper to present such analyses in
detail. More specifically, this paper presents the procedures
used to analyze the text employed in the aforementioned study
and also presents in detail the procedures used in the scoring
of the recall protocols.

3

## The Propositional Analysis of the Text

Table 1 presents the text that was used in the Spilich, Vesonder, Chiesi, and Voss (in press) paper. The text is a one-inning account of a fictitious baseball game.

Table 1

Baseball Text

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The Ridgeville Robins are playing the Center City Cougars. The Robins are leading 5-3 with the Cougars at bat in the last half of the fifth inning. The sky is getting darker, and the rain that has started is becoming heavier. The Cougars' first batter, Harvey Jones, is taking his time coming to plate. The umpire steps back from behind the plate and tells him to step into the batter's box.

Jones, the hitter, is left-handed, and has a batting average of .310. Claresen, the pitcher, has allowed only four hits, has walked one, and has struck out six. This performance is about average for Claresen since this left-hander has an earned-run average of 6.00 and typically strikes out quite a few batters.

Claresen now adjusts his cap, touches his knee, begins his wind-up, and delivers a high fast ball that the umpire calls "Ball One." The Robins's catcher, Don Postman, returns the ball, and Claresen takes the sign. The next pitch is swung on and hit to centerfield. Maloney comes in and catches it for the first out.

The next batter is the powerful hitter, Fred Johnson, who leads the league in home runs with 23. Claresen no doubt is glad to face him with no one on base. Claresen is now getting his sign from the catcher, begins his windup, and throws a curve ball breaking into the right-hand batter at the knees. The umpire calls it for a strike. Claresen is now getting ready again, winds up and throws, and Johnson hits it off to right and into the stands, a foul ball. The count is now 0 and 2. Claresen rubs up the new ball, takes his sign, and throws a fast ball which just misses the bill of Johnson's cap. Johnson took one step toward the mound, but then came back. Johnson stepped out of the batter's box and put some resin on his hands; the bat is no doubt slippery from the rain. Claresen is ready again, winds up and throws a slider which breaks inside, making the count 2-2. Once more Johnson steps out of the batter's box and gets some resin on his hands. He steps back in and Claresen starts his motion and throws. Johnson swings and has a line drive down the left field line. Ferraro runs over to get the ball as Johnson rounds first and goes toward second. Ferraro's throw is late and Johnson is safe on second with a double.

2

4

Beck, the left-handed relief pitcher, is warming up in the bull-
pen. The next hitter for the Cougars is the right-hand hitting Carl
Churniak, a .260 hitter who is known to hit well in the clutch.
Claresen takes his sign, delivers, and Churniak takes the pitch for
a ball. Claresen again is ready and pitches, and Churniak swings
and hits a slow bouncing ball toward the shortstop. Haley comes in,
fields it, and throws to first, but too late. Churniak is on first
with a single; Johnson stayed on second.

The next batter is Whitcomb, the Cougars' left-fielder. He is a
left-hander hitting .255. Claresen wipes his forehead with his sleeve
and takes his sign. Claresen looks toward first, where Manfred is
holding the runner. He stretches, looks at second, and throws a high
fast ball for a strike. The catcher returns the ball and Claresen
once more gets ready. Claresen throws a low curve ball. It bounces
into the dirt and past the catcher. Johnson moves to third and Chur-
niak to second before the catcher can retrieve the ball. The ball is
returned to Claresen. He gets the sign and winds up, and throws a
slider that Whitcomb hits between Manfred and Roberts for a hit.
Dulaney comes in and picks up the ball. Johnson has scored, and
Churniak is heading for the plate. Here comes the throw, and Chur-
niak is out. Churniak argues, but to no avail. The batter reached
second on the throw to the plate.

The next batter is Rob Williams, the Cougar's catcher. He is
hitting .230. Claresen is rubbing up the ball and now is ready to
pitch. The rain is coming down in sheets. Claresen delivers and
Williams takes a curve over the inside corner for a strike. Working
rapidly, Claresen again delivers and Williams takes a ball, low and
outside. Claresen again gets the sign, stretches, and throws a fast
ball, which Williams swings at and misses. The catcher returns the
ball and Claresen is ready. The pitch is a curve ball which Williams
swings at and misses for his third strike.

The umpires now are meeting and they signal that the game is being
called.

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Table 2a presents the propositional analysis that was per-
formed on the text. The method of analysis was essentially that
developed by Kintsch (1974) and Turner and Greene (in press).
The traditional propositional notation was not employed, how-
ever, although each proposition could readily be expressed in
terms of its predicate and argument(s). Table 2b presents the
propositions in the more traditional notation.

3

Table 2a

Propositional Structure of Baseball Passage and Classification of
Propositions According to Baseball Knowledge Structure

|     |     |     |
|-----|-----|-----|
|     | 0.  | There exists a baseball game |
| SG  | 1.  | Team - Ridgeville Robins |
| SG  | 2.  | Team - Center City Cougars |
| G2  | 3.  | Score - 5-3 |
| G2  | 4.  | Team ahead - Robins |
| SG  | 5.  | Team batting - Cougars |
| SG  | 6.  | Inning - fifth |
| SG  | 7.  | Half Inning - last (of the fifth) |
| SG  | 8.  | Weather - sky dark, rain, heavy rain (not "sheets," that is later) |
| E   | 9.  | (First) batter comes up to bat |
| SSI | 10. | First batter - name is Jones |
| NAI | 11. | Batter is slow to come to plate |
| NAI | 12. | Cause - 11, stalling (to try to get game called, Score, Rain, etc.) |
| NAI | 13. | Umpire - tells batter to get in batter's box |
| SSR | 14. | Batter = left-hand hitter |
| SSR | 15. | Batter - average is .310 |
| SSR | 16. | Batter - a good hitter |
| E   | 17. | Pitcher acknowledged (assume for team in field) |
| SSI | 18. | Pitcher's name is Claresen |
| SSR | 19. | Pitcher is left-handed |
| SSR | 20. | Pitcher's record in game - given up 4 hits |
| SSR | 21. | Pitcher's record in game - given up 1 walk |
| SSR | 22. | Pitcher's record in game - 6 strikeouts |
| SSR | 23. | Pitcher's record - quite a few strikeouts |
| SSR | 24. | Pitcher's record in game - typical |
| SSR | 25. | Pitcher's E.R.A. - 6.00 |
| SSR | 26. | Pitcher's E.R.A. is high |
| SSR | 27. | Because 26, pitcher is not good |

4

| | | |
|---|---|---|
| NAI | 28. | Pitcher adjusts cap |
| NAI | 29. | Pitcher touches knee |
| A4A | 30. | Pitcher winds up and pitches |
| A4A | 31. | Pitch is fast ball |
| A4 | 32. | Umpire calls "Ball" (pitch is ball) |
| G4 | 33. | Ball 1 |
| SSI | 34. | Robins' catcher is Postman |
| NAI | 35. | Postman returns ball to pitcher (after pitch) |
| NAR | 36. | Claresen gets sign |
| A4A | 37. | Claresen pitches |
| A3A | 38. | Batter (Jones) hits ball |
| A3A | 39. | Ball goes to center field |
| A3A | 40. | Ball is caught |
| SSI | 41. | Caught by Maloney |
| SSI | 42. | Maloney is Robins' centerfielder |
| A3 | 43. | First batter (Jones) is out |
| G3 | 44. | 1 out |
| E | 45. | Next batter is up |
| SSI | 46. | Batter's name is Johnson |
| SSI | 47. | Batter is second batter |
| SSR | 48. | Batter has hit 23 home runs |
| SSR | 49. | Batter leads league in home runs |
| SSR | 50. | Batter is power hitter |
| SSR | 51. | Batter's ave. (not in text) |
| SSI | 52. | Pitcher is glad no one is on base when Johnson (this batter) is batting |
| NAR | 53. | Pitcher (Claresen) gets sign |
| A4A | 54. | Pitcher throws pitch |
| A4A | 55. | Pitch is curve ball |
| A4A | 56. | Pitch breaks into batter at knees |
| SSR | 57. | Batter is right-handed (inference) |
| A4 | 58. | Pitch is strike |
| G4 | 59. | Strike 1 |
| A4A | 60. | Clarensen pitches |
| A4A | 61. | Batter hits ball |
| A4A | 62. | Batter (Johnson) hits foul |

5

7

| | | |
|---|---|---|
| NAI | 63. | Foul is to right |
| G4 | 64. | Strike 2 |
| NAI | 65. | Claresen rubs ball |
| NAR | 66. | Claresen gets sign |
| A4A | 67. | Claresen (pitcher) throws |
| A4A | 68. | Pitch is fast ball |
| A4A | 69. | Pitch is high |
| A4A | 70. | Pitch just misses batter |
| SSI | 71. | Pitch just misses bill of batter's cap |
| A4A | 72. | Pitch is brushback pitch |
| A4 | 73. | Pitch is Ball |
| G4 | 74. | Ball 1 |
| G4 | 75. | Count is Ball 1 - Strike 2 |
| NAI | 76. | Batter (Johnson) steps toward mound |
| NAI | 77. | Cause 76, 72 |
| NAI | 78. | Batter (Johnson) comes back |
| NAI | 79. | Batter steps out of batter's box |
| NAI | 80. | Batter gets resin bag |
| NAI | 81. | Batter puts resin on hands |
| NAI | 82. | Cause 81, bat slippery due to rain |
| SSI | 83. | Pitcher (Claresen) is ready |
| NAI | 84. | Pitcher winds up |
| A4A | 85. | Pitcher delivers pitch |
| A4A | 86. | Pitch is slider |
| A4A | 87. | Slider breaks inside |
| A4 | 88. | Pitch is "Ball" |
| G4 | 89. | Ball 2 |
| G4 | 90. | Count is 2-2 |
| NAI | 91. | Batter (Johnson) again steps out of batter's box |
| NAI | 92. | Batter again gets resin bag |
| NAI | 93. | Batter again puts resin on hands |
| NAI | 94. | Pitcher (Claresen) starts motion |
| A4A | 95. | Pitcher throws |
| A3A | 96. | Batter (Johnson) hits ball |
| A3A | 97. | Hit ball is line drive |

6

| A3A | 98. | Ball goes to left field |
|---|---|---|
| A3A | 99. | Ball goes down line of left field |
| A3A | 100. | Left fielder runs to get ball |
| SSI | 101. | Ferraro is Robins' left fielder |
| A3 | 102. | Batter (Johnson) is safe at second |
| A3A | 103. | Batter gets double (Credit given for 102) |
| G3 | 104. | Runner at second base (Cougars) |
| A3A | 105. | Left fielder's (Ferraro) throw late |
| NAR | 106. | Pitcher in bullpen (Assume Robins) |
| NAI | 107. | Warming up in bullpen |
| SSI | 108. | Pitcher's name is Beck |
| SSR | 109. | Pitcher is left-handed |
| SSR | 110. | Pitcher is relief pitcher |
| SSR | 111. | Current pitcher (Claresen) is in trouble |
| SSR | 112. | Cause 111, 104 |
| E | 113. | Next batter comes up |
| SSI | 114. | Next batter is third batter |
| SSI | 115. | Next batter's name is Churniak |
| SSR | 116. | Batter is right-handed |
| SSR | 117. | Batter's batting average is .260 |
| SSR | 118. | Batter is fair hitter |
| SSR | 119. | Batter known as clutch hitter |
| NAR | 120. | Pitcher (Claresen) takes sign |
| A4A | 121. | Pitcher pitches |
| A4A | 122. | Batter (Churniak) takes pitch |
| A4 | 123. | Pitch is a ball |
| G4 | 124. | Ball 1 |
| SSI | 125. | Pitcher (Claresen) is ready |
| A4A | 126. | Pitcher pitches |
| A3A | 127. | Batter (Churniak) hits ball (Omitted batter swings) |
| A3A | 128. | Ball hit is slow ground ball |
| A3A | 129. | Ground ball goes toward shortstop |
| A3A | 130. | Shortstop comes in (for ball) |
| A3A | 131. | Shortstop fields ball |
| A3A | 132. | Shortstop throws to first base |

7

9

| | | |
|---|---|---|
| A3A | 133. | Throw is late |
| A3 | 134. | Batter (Churniak) is safe at first base (Credit given for getting hit) |
| A3A | 135. | Batter (Churniak) has single |
| G3 | 136. | Runners on first and second base (Cougars) |
| G3 | 137. | Runner on second stayed at second base |
| SSI | 138. | Runner on second was Johnson |
| A3A | 139. | Cause 136, ball hit to left side of infield |
| SSI | 140. | Shortstop's name is Haley |
| E | 141. | Next batter comes up |
| SSI | 142. | Batter is fourth batter |
| SSI | 143. | Batter's name is Whitcomb |
| SSI | 144. | Batter is Cougars' left fielder |
| SSR | 145. | Batter bats left-handed |
| SSR | 146. | Batter's average is .255 |
| SSR | 147. | Batter is fair hitter (or poor) |
| NAI | 148. | Pitcher (Claresen) wipes forehead with sleeve |
| NAR | 149. | Pitcher (Claresen) takes sign |
| NAR | 150. | Pitcher (Claresen) looks toward first base |
| NAR | 151. | First baseman is holding runner (keeping him close to first) |
| SSI | 152. | First baseman's name is Manfred |
| NAI | 153. | Pitcher (Claresen) stretches |
| A4A | 154. | Pitcher (Claresen) looks at second base |
| A4A | 155. | Pitcher (Claresen) pitches |
| A4A | 156. | Batter takes pitch |
| A4A | 157. | Pitch is high |
| A4A | 158. | Pitch is fast ball |
| A4 | 159. | Pitch is strike |
| G4 | 160. | Strike 1 |
| NAI | 161. | Catcher returns ball to Claresen (pitcher) |
| NAI | 162. | Pitcher (Claresen) gets ready |
| A4A | 163. | Pitcher Claresen) pitches |
| A4A | 164. | Pitch is curve ball |
| A4A | 165. | Pitch is low (pitch is ball) |
| A4A | 166. | Pitch bounces in dirt |

| | | |
|---|---|---|
| A4A | 167. | Ball bounces past catcher |
| A3 | 168. | Runner from second goes to third |
| SSI | 169. | Runner is Johnson |
| A3 | 170. | Runner from first goes to second |
| SSI | 171. | Runner is Churniak |
| A4A | 172. | Pitch was wild pitch (defined by 164, 166, 168) |
| NAR | 173. | 166, 168 before catcher could get ball |
| G3 | 174. | Runners on second and third |
| G4 | 175. | Pitch was ball |
| G4 | 176. | Ball 1 |
| G4 | 177. | Ball 1 - Strike 1 |
| NAI | 178. | Catcher returns ball to pitcher |
| NAR | 179. | Pitcher (Claresen) gets sign |
| NAI | 180. | Pitcher (Claresen) winds up |
| A4A | 181. | Pitcher pitches |
| A4A | 182. | Pitch is slider |
| A2A | 183. | Batter hits pitch |
| A2A | 184. | Ball goes between two players |
| A2A | 185. | Ball goes between first and second |
| A3 | 186. | Batter (Whitcomb) gets a hit (single) - safe at first base |
| A2A | 187. | Ball is hit to outfield (right field) |
| SSI | 188. | Two players (183) are Manfred and Roberts |
| SSI | 189. | Name of second baseman is Roberts (Inference since 150) |
| A2A | 190. | Right fielder comes in to field ball |
| SSI | 191. | Name of right fielder is Delaney |
| A2A | 192. | Right fielder picks up ball |
| A2 | 193. | Runner on third scores |
| SSI | 194. | Runner is Johnson |
| G2 | 195. | Score - 5-4 |
| A3A | 196. | Runner from second goes toward home plate |
| SSI | 197. | Runner is Churniak |
| A3A | 198. | Throw comes (from Delaney) |
| A3 | 199. | Runner is out at home plate |
| G3 | 200. | Second out of half-inning |
| NAI | 201. | Runner out at home argues |

9

| | | |
|---|---|---|
| NAI | 202. | Runner loses argument (to no avail) |
| SSI | 203. | Runner arguing is Churniak |
| A3 | 204. | Batter advances to second base |
| SSI | 205. | Batter is Whitcomb |
| A3A | 206. | Cause of 202 - throw to home plate (196) |
| G3 | 207. | Runner on second base |
| E | 208. | Next batter comes up |
| SSI | 209. | Name of next batter is Williams |
| SSI | 210. | Batter is fifth batter |
| SSI | 211. | Batter is Cougars' catcher |
| SSR | 212. | Batter is hitting .230 |
| SSR | 213. | Batter is poor hitter |
| NAI | 214. | Pitcher (Claresen) rubs ball |
| NAI | 215. | Pitcher is ready |
| SG | 216. | It is raining hard (sheets) |
| A4A | 217. | Pitcher pitches |
| A4A | 218. | Batter takes pitch |
| A4A | 219. | Pitch is curve |
| A4A | 220. | Pitch is over inside corner (of plate) |
| A4 | 221. | Pitch is strike |
| G4 | 222. | Strike 1 |
| NAI | 223. | Pitcher works rapidly |
| NAI | 224. | Inference - 223 (because it is raining hard, etc.) |
| A4A | 225. | Pitcher pitches |
| A4A | 226. | Batter takes pitch |
| A4 | 227. | Pitch is a ball |
| G4 | 228. | Ball 1 |
| G4 | 229. | Count - Ball 1 - Strike 1 |
| A4A | 230. | Pitcher pitches (Inference) |
| A4A | 231. | Pitch is low |
| A4A | 232. | Pitch is outside |
| A4 | 233. | Pitch is ball |
| G4 | 234. | Ball 2 |
| G4 | 235. | Count - Ball 2 - Strike 1 |
| NAR | 236. | Pitcher gets sign |

| | | |
|---|---|---|
| NAI | 237. | Pitcher stretches |
| A4A | 238. | Pitcher throws |
| A4A | 239. | Pitch is fast ball |
| A4A | 240. | Batter swings |
| A4A | 241. | Batter misses |
| A4 | 242. | Pitch is strike |
| G4 | 243 | Strike 1 |
| G4 | 244. | Ball 2 - Strike 2 |
| NAI | 245. | Catcher returns ball to pitcher |
| NAR | 246. | Pitcher is ready |
| A3A | 247. | Pitcher pitches |
| A3A | 248. | Pitch is curve |
| A3A | 249. | Batter swings |
| A3A | 250. | Batter misses |
| A3 | 251. | Batter strikes out |
| G4 | 252. | Ball 2 - Strike 3 |
| G3 | 253. | Out 3 |
| SG | 254. | Half-inning over (side retired) |
| SG | 255. | Inning 6 |
| NAR | 256. | Umpires meet |
| SG | 257. | Umpires signal game is called (terminated) |
| SG | 258. | Cause, 257 - rain (inferred) |
| G2 | 259. | Team ahead when game is called |
| G2 | 260. | Score when game is called |
| G1 | 261. | Robins win |
| G1 | 262. | Cougars lose |
| G1 | 263. | Game official (5 innings) |
| SSR | 264. | Claresen was winning pitcher |

11

*13*

Table 2b

Propositional Structure (Traditional Notation)

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| | |
|---|---|
| 0. | (EXIST, BASEBALL GAME) |
| 1. | (ISA, TEAM PLAYING, RIDGEVILLE ROBINS) |
| 2. | (ISA, TEAM PLAYING, CENTER CITY COUGARS) |
| 3. | (QUALITY, SCORE, 5-3) |
| 4. | (QUALIFY, 3, TEAM AHEAD, ROBINS) |
| 5. | (QUALITY, TEAM AT BAT, COUGARS) |
| 6. | (QUALITY, INNING, 5TH) |
| 7. | (QUALIFY, 6, LAST HALF) |
| 8. | (QUALITY, WEATHER, DARK, RAINY) |
| 9. | (COME, FIRST BATTER, TO BAT) |
| 10. | (QUALIFY, 9, JONES) |
| 11. | (QUALIFY, 9, SLOWLY) |
| 12. | (CAUSE, 11, STALL) |
| 13. | (TELL, UMPIRE, BATTER, 9) |
| 14. | (QUALITY, 10, LEFT-HAND BATTER) |
| 15. | (QUALITY, 10, AVERAGE OF .310) |
| 16. | (IMPLY, 15, BATTER GOOD) |
| 17. | (EXIST, PITCHER) |
| 18. | (QUALIFY, 17, CLARESEN) |
| 19. | (QUALIFY, 17, LEFT-HANDED) |
| 20. | (QUALIFY, 17, 4 HITS IN GAME) |
| 21. | (QUALIFY, 17, 1 WALK IN GAME) |
| 22. | (QUALIFY, 17, 6 STRIKEOUTS IN GAME) |
| 23. | (IMPLY, 22, MANY STRIKEOUTS) |
| 24. | (QUALIFY, 20, 21, 22, TYPICAL) |
| 25. | (QUALIFY, 17, E.R.A. IS 6.00) |
| 26. | (IMPLY, 25, HIGH) |
| 27. | (IMPLY, 26, PITCHER NOT GOOD) |
| 28. | (ADJUST, 17, CAP) |
| 29. | (TOUCH, 17, KNEE) |
| 30. | (WINDS AND PITCHES, 17) |

12

*14*

31. (QUALITY, PITCH, FAST BALL)
32. (CALL, UMPIRE, "BALL")
33. (QUALITY, "BALL," 1)
34. (NAME, CATCHER, POSTMAN)
35. (RETURN, BALL, CATCHER, PITCHER)
36. (OBTAIN, PITCHER, SIGN)
37. (PITCHES, PITCHER)
38. (HITS, BATTER, BALL)
39. (MOVE, BALL, CENTER FIELD)
40. (CATCH, BALL)
41. (QUALIFY, 40, MALONEY)
42. (QUALIFY, MALONEY, CENTER FIELDER)
43. (QUALITY, BATTER, OUT)
44. (QUALITY, "OUT," 1)
45. (COME, NEXT BATTER, TO BAT)
46. (QUALIFY, 45, JOHNSON)
47. (QUALIFY, 45, SECOND BATTER)
48. (QUALIFY, 45, 23 HOME RUNS)
49. (CAUSE, 48, LEADS LEAGUE)
50. (IMPLY, 48, POWER HITTER)
51. (QUALIFY, 46, AVERAGE)
52. (QUALITY, PITCHER, GLAD, NO ONE ON BASE)
53. (GEYS, PITCHER, SIGN)
54. (THROW, PITCHER, PITCH)
55. (QUALITY, PITCH, CURVE)
56. (BREAK, PITCH, BATTER'S KNEES)
57. (QUALITY, BATTER, RIGHT-HANDED)
58. (QUALITY, PITCH, STRIKE)
59. (QUALITY, "STRIKE," 1)
60. (PITCHES, PITCHER)
61. (HIT, BATTER, BALL)
62. (HIT, BALL FOUL)
63. (LOC., FOUL, RIGHT)
64. (QUALITY, "STRIKE," 2)
65. (RUB, PITCHER, BALL)

13

15

66. (GET, PITCHER, SIGN)
67. (THROW, PITCHER, BALL)
68. (QUALITY, PITCH, FAST BALL)
69. (QUALITY, PITCH, HIGH)
70. (MISS, PITCH, BATTER, BARELY)
71. (QUALIFY, 70, BILL OF CAP)
72. (IMPLY, 70, BRUSHBACK PITCH)
73. (QUALITY, PITCH, "BALL")
74. (QUALITY, BALL, 1)
75. (QUALITY, COUNT, BALL 1, STRIKE 2)
76. (STEP, BATTER, PITCHER)
77. (CAUSE, 76, 72)
78. (COME, BATTER, BACK)
79. (STEP, BATTER, OUT OF BOX)
80. (GET, BATTER, RESIN BAG)
81. (PLACE, 80, HANDS)
82. (CAUSE, 80, RAIN)
83. (QUALITY, PITCHER, READY)
84. (WIND, PITCHER)
85. (DELIVER, PITCHER, PITCH)
86. (QUALITY, PITCH, SLIDER)
87. (BREAK, SLIDER, INSIDE)
88. (QUALITY, PITCH, "BALL")
89. QUALITY, "BALL," 2)
90. (QUALITY, COUNT, BALL 2, STRIKE 2)
91. (STEP, BATTER, OUT OF BOX, AGAIN)
92. (GET, BATTER, RESIN BAG, AGAIN)
93. (PLACE, 92, AGAIN)
94. (START, PITCHER, MOTION)
95. (THROW, PITCHER, BALL)
96. (HIT, BATTER, BALL)
97. (QUALITY, HIT, LINE DRIVE)
98. (MOVE, BALL, LEFT FIELD)
99. (MOVE, BALL, LEFT FIELD LINE)
100. (RUN, LEFT FIELDER, BALL)

14

101. (QUALIFY, LEFT FIELDER, FERRARO)
102. (QUALITY, BATTER, SAFE, SECOND BASE)
103. (GET, BATTER, DOUBLE)
104. (QUALITY, RUNNER, SECOND BASE)
105. (THROW, LEFT FIELDER, LATE)
106. (EXIST, PITCHER, BULLPEN)
107. (QUALIFY, 106, WARMING UP)
108. (QUALIFY, 106, BECK)
109. (QUALIFY, 106, LEFT-HANDED)
110. (QUALIFY, 106, RELIEF PITCHER)
111. (QUALITY, PITCHER, TROUBLE)
112. (CAUSE, 111, 104)
113. (COME, NEXT BATTER, TO BAT)
114. (QUALIFY 113, THIRD BATTER)
115. (QUALIFY, 113, CHURNIAK)
116. (QUALIFY, 113, RIGHT-HANDED)
117. (QUALIFY, 113, AVERAGE .260)
118. (IMPLY, 117, FAIR HITTER)
119. (QUALITY, BATTER, CLUTCH HITTER)
120. (GET, PITCHER, SIGN)
121. (PITCH, PITCHER)
122. (TAKE, BATTER, PITCH)
123. (QUALITY, PITCH, "BALL")
124. (QUALITY, BALL, 1)
125. (QUALITY, PITCHER, READY)
126. (PITCH, PITCHER)
127. (HIT, BATTER, BALL)
128. (QUALITY, 127, SLOW GROUND BALL)
129. (MOVE, BALL, SHORTSTOP)
130. (MOVE, SHORTSTOP, BALL)
131. (FIELD, SHORTSTOP, BALL)
132. (THROW, SHORTSTOP, BALL, FIRST BASE)
133. (QUALITY, THROW, LATE)
134. (QUALITY, BATTER, SAFE, FIRST BASE)
135. (GET, BATTER, SINGLE)
136. (QUALITY, RUNNERS, FIRST AND SECOND BASES)

15

*17*

137. (QUALITY, RUNNER, SECOND BASE)
138. (QUALIFY, 137, JOHNSON)
139. (CAUSE, 136, 129)
140. (QUALIFY, 129, HALEY)
141. (COME, NEXT BATTER, TO BAT)
142. (QUALIFY, BATTER, FOURTH BATTER)
143. (QUALIFY, BATTER, WHITCOMB)
144. (QUALIFY, BATTER, LEFT FIELDER)
145. (QUALIFY, BATTER, LEFT-HANDED)
146. (QUALIFY, BATTER, AVERAGE .255)
147. (IMPLY, 146, FAIR BATTER)
148. (WIPE, PITCHER, FOREHEAD, SLEEVE)
149. (TAKE, PITCHER, SIGN)
150. (LOOK, PITCHER, FIRST BASE)
151. (HOLD, PITCHER, RUNNER)
152. (QUALIFY, FIRST BASEMAN, MANFRED)
153. (STRETCH, PITCHER)
154. (LOOK, PITCHER, SECOND BASE)
155. (PITCH, PITCHER)
156. (TAKE, BATTER, PITCH)
157. (QUALITY, PITCH, HIGH)
158. (QUALITY, PITCH, FAST BALL)
159. (QUALITY, PITCH, STRIKE)
160. (QUALITY, STRIKE, 1)
161. (RETURN, CATCHER, BALL, PITCHER)
162. (GET, PITCHER, READY)
163. (PITCH, PITCHER)
164. (QUALITY, PITCH, CURVE)
165. (QUALITY, PITCH, LOW)
166. (BOUNCE, PITCH, DIRT)
167. (BOUNCE, BALL, CATCHER)
168. (GO, RUNNER, SECOND, THIRD)
169. (QUALIFY, RUNNER, JOHNSON)
170. (GO, RUNNER, FIRST, SECOND)
171. (QUALIFY, RUNNER, CHURNIAK)

16

18

172. (IMPLY, 164, 166, 168, WILD PITCH)
173. (MOVE, 166, 168, CATCHER, BALL)
174. (QUALITY, RUNNERS, SECOND, THIRD)
175. (QUALITY, PITCH, BALL)
176. (QUALITY, BALL, 1)
177. (QUALITY, COUNT, BALL 1, STRIKE 1)
178. (RETURN, CATCHER, BALL, PITCHER)
179. (GET, PITCHER, SIGN)
180. (WIND, PITCHER)
181. (PITCH, PITCHER)
182. (QUALITY, PITCH, SLIDER)
183. (HIT, BATTER, PITCH)
184. (MOVE, BALL, TWO PLAYERS)
185. (QUALIFY, 184, FIRST AND SECOND BASE)
186. (HIT, BATTER, SINGLE)
187. (HIT, BATTER, BALL, RIGHT FIELD)
188. (QUALIFY, 1, MANFRED, ROBERTS)
189. (IMPLY, 188, 150)
190. (MOVE, RIGHT FIELDER, BALL)
191. (QUALIFY, RIGHT FIELDER, DELANEY)
192. (PICKUP, RIGHT FIELDER, BALL)
193. (SCORE, RUNNER, THIRD BASE)
194. (QUALIFY, 193)
195. (QUALITY, SCORE, 5-4)
196. (GO, RUNNER, SECOND BASE, HOME PLATE)
197. (QUALIFY, 196, CHURNIAK)
198. (COME, THROW, RIGHT FIELDER)
199. (QUALITY, RUNNER, OUT, HOME PLATE)
200. (QUALITY, OUT, 2)
201. (ARGUE, RUNNER, HOME PLATE)
202. (LOSE, RUNNER, ARGUMENT)
203. (QUALIFY, 201, CHURNIAK)
204. (GO, BATTER, SECOND BASE)
205. (QUALIFY, RUNNER, WHITCOMB)
206. (CAUSE, 202, 196)
207. (QUALITY, RUNNER, SECOND BASE)

17

19

208. (COME, NEXT BATTER, TO BAT)
209. (QUALIFY, BATTER, WILLIAMS)
210. (QUALIFY, BATTER, FIFTH)
211. (QUALIFY, BATTER, CATCHER)
212. (QUALIFY, BATTER, AVERAGE .230)
213. (IMPLY, 212, POOR HITTER)
214. (RUB, PITCHER, BALL)
215. (QUALITY, PITCHER, READY)
216. (RAINING, SHEETS)
217. (PITCH, PITCHER)
218. (TAKE, BATTER, PITCH)
219. (QUALITY, PITCH, CURVE)
220. (QUALITY, PITCH, INSIDE CORNER)
221. (QUALITY, PITCH, STRIKE)
222. (QUALITY, STRIKE, 1)
223. (WORK, PITCHER, RAPIDLY)
224. (CAUSE, 223, 216)
225. (PITCH, PITCHER)
226. (TAKE, BATTER, PITCH)
227. (QUALITY, PITCH, BALL)
228. (QUALITY, BALL, 1)
229. (QUALITY, COUNT, BALL 1, STRIKE 1)
230. (PITCH, PITCHER)
231. (QUALIFY, PITCH, LOW)
232. (QUALIFY, PITCH, OUTSIDE)
233. (QUALITY, PITCH, BALL)
234. (QUALITY, BALL, 2)
235. (QUALITY, COUNT, BALL 2, STRIKE 1)
236. (GET, PITCHER, SIGN)
237. (STRETCH, PITCHER)
238. (THROW, PITCHER, BALL)
239. (QUALITY, PITCH, FAST BALL)
240. (SWING, BATTER)
241. (MISS, BATTER, BALL)
242. (QUALITY, PITCH, STRIKE)

18

243. (QUALITY, STRIKE, 1)
244. (QUALITY, COUNT, BALL 2, STRIKE 2)
245. (RETURN, CATCHER, BALL, PITCHER)
246. (QUALITY, PITCHER, READY)
247. (PITCH, PITCHER)
248. (QUALITY, PITCH, CURVE)
249. (SWING, BATTER)
250. (MISS, BATTER)
251. (STRIKE OUT, BATTER)
252. (QUALITY, COUNT, BALL 2, STRIKE 3)
253. (QUALITY, OUT, 3)
254. (QUALITY, INNING, OVER)
255. (IMPLY, INNING, SIXTH)
256. (MEET, UMPIRES)
257. (CALL OFF, UMPIRES, GAME)
258. (CAUSE, 257, 216)
259. (QUALITY, TEAM, ROBINS)
260. (QUALITY, 257, 195)
261. (QUALITY, WINNER, ROBINS)
262. (QUALITY, LOSER, COUGARS)
263. (QUALITY, GAME, OFFICIAL)
264. (QUALITY, WINNING PITCHER, CLARESEN)

One point about the propositional analysis is that some propositions could be derived from the text which are not included in the analysis of Table 2a. These primarily are not important to the account and in some cases are somewhat arbitrary. For example, Proposition 52, which is concerned with the assertion that the pitcher was glad that he was facing a particular batter when no runners were on base, could be divided into at least two propositions, but this was not done because the basic content of the assertion could be contained in a single proposition. A second point is that a few propositions were placed in the structure because the recall protocols necessitated their inclusion.

19

While the propositional structure was by no means data driven, it was necessary to include those few propositions because of the contents of one or two protocols. For example, Proposition 27 states that the pitcher, based upon his record, was not a good pitcher. This is a conclusion that is implied by the text information. It should be reiterated, however, that there were only a few such propositions included in the text.

The most important aspect of the propositional structure involves the classification of the propositions that is presented in the left column of Table 2a. The text propositions are classified according to a baseball knowledge structure, and this structure is presented in Table 3. The structure pertains to the knowledge that is involved in the play of the game and not to all baseball knowledge. (Specific leagues, teams, and players, for example, are not considered.)

The uppermost part of the structure depicted in Table 3 is setting information. There is general setting information which refers to the teams playing, the inning (or half-inning) of the game, and any general information that could influence the play of the game. The specific setting information pertains to information that involves a particular team, player, or some other component of the game. There are two types of specific setting information, relevant and irrelevant. The first includes information that is of some relevance to the game but not involved in the game per se. For example, a player's batting average indicates the general success of that player in getting hits, and, while this statistic has no direct bearing on what a person does when at bat, it is relevant in the sense of providing an idea of how good a hitter the individual is. It also states the probability of that person getting a hit (other things being equal). Thus, the specific setting information that is relevant includes most of the statistics kept for particular

20

22

Table 3

Baseball Knowledge Structure

---

<u>Setting</u>

<u>General:</u> Teams Playing, Team at Bat, Team in Field, Inning, Miscellaneous Conditions

<u>Specific:</u> Relevant--Teams' Records as Related to Goal Structure, Players' Records as Related to Goal Structure

Irrelevant--Team Attributes, Player Attributes

<u>Enabling:</u> Batter at Bat and Pitcher Ready to Pitch

---

<u>Goal Structure</u>

| <u>Team at Bat</u> | <u>Level</u> | <u>Variables</u> | <u>Values</u> | <u>Team in Field</u> |
|---|---|---|---|---|
| Winning game | 1 | Game outcome | Win-lose | Winning game |
| Scoring runs | 2 | Score | Domain of game scores | Preventing runs from scoring |
| Getting runners on base and advancing runners | 3 | Pattern of base runners<br>Outs | Eight possible patterns<br>0, 1, 2, 3 | Preventing runners from getting on base or advancing by making outs |
| Having "balls," avoiding "strikes" | 4 | "Balls"<br>"Strikes" | 0, 1, 2, 3, 4<br>0, 1, 2, 3 | Getting "strikes," avoiding "balls" |

---

<u>Non-game Actions</u>

| | | | | |
|---|---|---|---|---|
| --- | | | | Relevant non-game actions |
| --- | | | | Irrelevant non-game actions |

21

teams and individual players. The irrelevant specific set-
ting category includes information that does not relate to
the play of the game. Examples of this type of information
include the color of the uniforms and the numbers worn by
the players. The enabling setting information category con-
sists of the information pertaining to game activity initia-
tion. Examples of this information include the members of
one team being in the field with the pitcher being ready to
pitch and the batter at bat.

In the list of propositions of Table 2a, general setting
propositions are denoted SG, and specific setting proposi-
tions are denoted SSR and SSI, depending upon whether they
are relevant or irrelevant, respectively. The enabling
propositions are denoted E.

The next category of the knowledge structure of Table 3
is that of the goal structure. It is assumed that baseball
has a hierarchical goal structure involving four levels.
The highest level consists of winning the game. The remain-
ing levels consist of subgoals which are related to winning
the game. The second-level goal is scoring runs (team at
bat) and preventing runs from being scored (team in field).
The third level is getting a batter on base and advancing
runners (team at bat) and making batters out and preventing
runners from advancing by making them out (team in field).
The fourth level involves events connected with a batter
getting on base; the batter (team at bat) tries to get
"Balls" called in order to get to first base, while the
pitcher (team in field) tries to get "Strikes" on the batter.

Related to each level of the goal structure is a set of
actions, each of which may take place during the play of a
baseball game. These actions are too numerous to consider
in any exhaustive sense, but Table 4 presents a list of typi-
cal actions. (Table 4 also presents information typical of

22

24

the other types of information of the baseball knowledge
structure presented in Table 3.)

Table 4

Classification System for Propositions of a
Baseball Knowledge Structure

---

I. Setting Information

    A.   General (SG)

          Propositions

              Team(s) playing
              Team at bat
              Team in field
              Inning
              Inning half
              Relevant setting information

    B.   Specific (SS)

        1.  Relevant (SSR)

           Propositions

              Batter information
              Batter's batting average
              Batter's number of at-bats
              Batter's number of hits
              Batter's number of doubles
              Batter's number of triples
              Batter's number of home runs
              Batter's speed
              Batter's runs batted in
              Batter's tendency to hit into double play
              Batter's general quality
              Batter's bunting ability
              Batter's left-right handedness
              Batter's clutch-hitting reputation
              Batter--pull hitter, straightaway hitter, oppo-
                    site field hitter
              Batter power hitter
              Batter "spray" hitter

              Pitcher information
              Pitcher's earned run average
              Pitcher's strike-out record
              Pitcher's walk record

23

Pitcher's left- or right-handedness
Pitcher's run record
Pitcher's inning record
Pitcher's hit record
Pitcher--type of best pitch (fast ball, curve
      ball, etc.)
Pitcher's ability to prevent stolen bases from
      occurring
Pitcher--type (starter, relief, long relief)
Pitcher's win-lost record
Pitcher's special characteristics
Pitcher's general quality

Fielder's information
Fielder's position
Fielder's quality at fielding position
Fielder--at specific position - error record
Fielder--at specific position - throwing arm
Fielder--at specific position - ability to field
      ground balls
Fielder--at specific position - ability to field
      fly balls
Quality of double-play combination
Fielder's place to play specific batter
Fielder--specific position - specific characteristics

Managerial and coaching information
Tendency to replace pitcher
Tendency to use pinch hitter
General quality and reputation
Tendency to use steal and hit-run
Change-of-state of potential relevance

Pinch hitter
New pitcher
New runner
New fielder
Manager (or coach) expelled

2.  Irrelevant (SSI)

    Propositions

        Baseball information in game context general non-
              relevant
        Information pert. to pitcher
        Information pert. to batter
        Information pert. to runner
        Information pert. to fielder
        Information pert. to manager or coach
        Information pert. to umpire
        Name of player
        Name of player at position

24

26

Name of player batting or in reference to batting
   ("on deck")
Name of player in reference to base he is on when
   a base runner
Commentary on game

C.   Enabling (E)

      Propositions

            Batter comes to bat
            Pitcher on mound
            Team takes field
            Umpires come on field

Listed below are auxiliary actions which would be classified according
to the outcome of the play.

            Pitcher's actions while pitching
            Pitcher throws curve ball
            Pitcher throws fast ball
            Pitcher throws change of pace
            Pitcher throws slider
            Pitcher throws knuckle ball
            Pitcher throws screw ball
            Pitcher throws pitchout
            Pitcher throws brushback (ducks)
            Pitcher throws to first base
            Pitcher throws to second base
            Pitcher throws to third base
            Pitch is low
            Pitch is high
            Pitch is outside
            Pitch is inside
            Pitch is in the dirt
            Pitch is wild
            Pitch breaks inside
            Pitch breaks outside
            Pitch breaks down
            Pitcher jams batter
            Pitcher commits balk

            Batter's action
            Batter swings
            Batter takes pitch
            Batter misses
            Batter hits ball
            Batter's batted ball direction
            Ball hit on ground
            Fly ball hit
            Line drive hit
            Ball hit bouncing
            Ball hit toward position X (PX is filled with
                TB, SS, SB, FB, P, RF, CF, LF).

25

27

Ball hit between positions PS filled with TS
    (3rd base - SS) SS (SS - 2B), (SF) 2B. 1B
LC (left-center) CR (center-right) Batter hits
    ball down line (X - Left or right)
Batter hits foul ball
Batter bunts
Batter drags bunt
Batter arrives at base safely on single, double,
    triple, or home run
Batter out at base (X - F, S, T, H)
Batter safe on error
Batter safe on walk
Batter safe on passed ball
Batter safe on fielder's choice
Batter reaches base on throw

Runner's information
Runner leads off base
Runner attempts steal
Runner starts running in hit-and-run play
Runner reaches base safely (X = F, S, T, H)
Runner out at base (F, S, T, H) on particular play
Runner goes toward base

Fielder's movements
Fielder's movement to field GB
X = position of fielder, filled in
Fielder catches fly ball (or line drive) success-
    fully
Fielder fields ground ball successfully (Substi-
    tute position for F when appropriate.)
Fielder throws ball (to first base, etc.)
Fielder misses fly ball
Fielder misses ground ball
Fielder misses thrown ball
Fielder's throw arrives late


II. Goal Structure and Related Action

    A.    Level 1

        1.    Goal Structure Level 1 (G1)
            Team won or lost

        2.    Action Information Level 1 (A1)
            Action of winning or losing

        3.    Auxiliary Action Information Level 1 (A1A)
            Action leading to play winning or losing


26

28

B.    Level 2

    1.    Goal Structure Level 2 (G2)
            Score
            Score differential
            Team ahead

    2.    Action Information Level 2 (A2)
            Action involving change in score

    3.    Auxiliary Action Information Level 2 (A2A)
            Action leading to scoring of a run

C.    Level 3

    1.    Goal Structure Level 3 (G3)
            Number of outs
            Location of (any) runners (X designates base,
                1, 2, 3)

    2.    Action Information Level 3 (A3)
            Action in which out is made
            Action in which batter gets on base safely or
                runner safely advances to another base

    3.    Auxiliary Action Information Level 3 (A3A)
            Actions leading to making an out
            Actions leading to batter reaching base safely
                and/or runner reaches base safely

D.    Level 4

    1.    Goal Structure Level 4 (G4)
            Number of balls on batter
            Number of strikes on batter
            Count (ball - strike)

    2.    Action Information Level 4 (A4)
            Pitch is ball
            Pitch is strike

    3.    Auxiliary Action Information Level 4 (A4A)*
            Pitcher delivers ball
            Pitch is curve
            Pitch is fast ball
            Pitch is slider
            Pitch is change of pace
            Pitch is screwball
            Pitch is knuckleball
            Pitch is spitter
            Pitch is pitchout
            Batter takes pitch

27

29

Batter swings
Batter hits ball
Etc.

*Some actions may be A3A, A2A, or A1A, depending upon outcome.

III. Non-Game Actions

A. Non-Game Actions - Relevant (NAR)
(Actions are related in some way to the game, but not changes in goal structure.)
Manager's actions
Coach's actions
Catcher's actions
Fielder's actions
Cause for NAR action
Miscelleanous actions
Pitcher's actions
Umpire's actions

B. Non-Game Actions - Irrelevant (NAI)
Irrelevant game actions
Pitcher's action
Batter's actions
Runner's actions
Umpire's actions
Miscellaneous actions
Catcher's actions
Cause for NAI action

C. Non-Game Actions - Irrelevant (Non-Baseball) (NANB)
Irrelevant non-baseball information
Fan action
Weather action
Action in stands
Miscellaneous action

---

Another aspect of the action classification is the inclu-
sion of a category at each level called auxiliary actions.
These are actions which are part of a play leading to a goal
action but not the action itself.  For example, the text may
state, "The batter hit a fly ball to left field.  The left
fielder took three steps to the right.  The left fielder
caught the ball and the batter was out."  The action that
involves the goal state is in the final sentence, but the

28

30

first sentences contain information that is part of the play. This type of action is termed auxiliary.

The propositions shown in Table 2a were classified in terms of goal states and game actions. The former are denoted by G, followed by a number indicating the level of goal state involved in that proposition. Game actions are denoted by A, followed by a number indicating the level. An A following the number denotes that the action is auxiliary, for example, A1A.

A note is inserted here to answer some potential questions. The goal state propositions are those which make explicit a change in the state of a particular component of the goal structure. If a runner reaches second base safely, that is a change in the state. How the runner reached second (i.e., by hitting a double, by "stealing" second base, by an error, etc.) is an action.

The final knowledge structure information shown in Table 3 is termed non-game actions. These are actions that are not part of the game per se, but actions that may occur during a particular game. An example is a batter wiping his/her hands with a resin bag.

Non-game actions are classified in three ways. First, relevant actions are in some way related to the game even though they are not related to the play of the game. The second category, irrelevant actions, consists of actions less related to the game. The third category, irrelevant (non-baseball) actions, consists of actions not at all related to baseball. Examples of these three types of actions are found in Table 4. In the propositional classification of Table 2a, the three types of non-game actions are denoted, respectively, as NAR, NAI, and NANB.

29

31

## The Scoring of Protocols

The protocol scoring method was quite straightforward.
Each protocol was read sentence by sentence and the information contained in each sentence was scored in terms of the
propositional analysis of Table 2a. Credit was thus given
for the particular propositions whose contents were contained
in the protocol. The reliability of this method, obtained
by two raters with blind scoring of 16 (of 46) protocols, was
81% and 78% for HK and LK, respectively.

Tables 5 and 6 present a protocol of a HK and LK subject,
respectively. Tables 7 and 8 present the propositions listed
in Table 2A as they were recalled in the protocols of Tables 5
and 6, respectively.

Table 5

A High-Knowledge Protocol

The Robins and the Cougars are playing in a 5-3 game, favor of the
Robins. It is in the last of the fifth and it is raining. The left-
handed pitcher (E.R.A. 6.0) is having a usual day, 4 hits, 6 strikeouts
(he usually gets a lot of strikeouts). The first batter flies out
bringing up Johnson, a .310 power hitter who leads the league with 23
homers. The first pitch is an inside curve ball for a strike. Johnson
then raps a long foul which is followed by a brushback pitch. Johnson
starts toward the mound, but then just goes to put resin on his slippery
bat. The next pitch is an inside slider to even the count 2-2. Again
Johnson puts resin on the bat. The next pitch is lined to left field
for a double. The next batter, a .260 hitter, beats out an infield
single to short, Johnson holding second. A .255 hitter follows, and
the first pitch to him sails by the catcher and the runners each move
up a base. He then shoots a single up the middle. Johnson scores
but the runner on second is out trying to score. The runner advances
to second on the throw. Beck, a relief pitcher, starts to warm up,
but the last batter strikes out to end the inning. The umpires then
confer, and the game is called.

Table 6

A Low-Knowledge Protocol

The score was 5-3. At the start of the inning, the sky started getting dark and as the inning went on it began raining and the game had to be called. The first batter of the inning had an average of .310, and the pitcher had allowed only 4 hits. The batter did not make it on base, and the pitcher was relieved because the next batter was very good. At one point, his count was 2 and 2. One of the batters had to use resin on his hands twice because the bat was slippery due to the rain. Someone's E.R.A. was 6.00. One of the batter's names was Churniak.

Table 7

Prepositions Correctly Recalled for HK Protocol
(By Numbers from Table 2a)

| | | |
|---|---|---|
| 1 | 76 | 141 |
| 2 | 78 | 146 |
| 3 | 80 | 163 |
| 4 | 81 | 167 |
| 6 | 82 | 168 |
| 7 | 85 | 170 |
| 8 | 86 | 183 |
| 9 | 87 | 193 |
| 17 | 88 | 194 |
| 19 | 89 | 196 |
| 20 | 90 | 199 |
| 22 | 92 | 208 |
| 23 | 93 | 251 |
| 24 | 95 | 253 |
| 25 | 96 | 254 |
| 38 | 97 | 257 |
| 40 | 98 | 263 |
| 43 | 102 | 264 |

31

33

| | |
|---|---|
| 45 | 103 |
| 46 | 106 |
| 48 | 108 |
| 49 | 110 |
| 54 | 113 |
| 55 | 117 |
| 58 | 127 |
| 61 | 129 |
| 62 | 134 |
| 67 | 135 |
| 72 | 137 |

Table 8

Propositions Correctly Recalled for LK Protocol
(By Numbers from Table 2a)

| |
|---|
| 3 |
| 8 |
| 9 |
| 15 |
| 17 |
| 20 |
| 25 |
| 43 |
| 52 |
| 80 |
| 81 |
| 82 |
| 90 |
| 92 |
| 93 |
| 115 |
| 257 |
| 258 |

32

## The Scoring of the Questionnaire

In the procedure used by Spilich et al. (in press), the subjects were given a series of 40 questions on the contents of the text after they had recalled the contents of the text. The purpose of the questionnaire was (a) to determine whether HK and LK differences would occur on this type of test, and (b) to determine whether HK and/or LK individuals were able to recall information (via question probe) that was not stated in the recall protocol. While HK individuals yielded better recall than LK individuals on the questionnaire performances, both groups recalled information in response to questions which they had not stated in their recall protocols. The questions employed in the questionnaire are presented in Table 9. (The order of questions generally follows the order of the text.).

Table 9

Questionnaire

---

1. What was the score of the game at the beginning of the account?
2. Which team was ahead?
3. Who were the teams that were playing?
4. Which team was at bat during the account?
5. Was the team at bat the home or visiting team?
6. What were the weather conditions?
7. Who was the pitcher for the team in the field?
8. Who was the first batter in the account?
9. What was his batting average?
10. Was he right- or left-handed?
11. What was the pitcher's earned run average?
12. Was he a good pitcher? Why or why not?
13. What parts of his own body or uniform did the pitcher touch before delivering the ball?
14. What happened when the first batter hit the ball?

33

35

15. What was the ball-strike count on him when he hit the ball?
16. Who was the second batter?
17. What was his batting average?
18. How many home runs did he hit?
19. Why did this batter take a step toward the pitcher?
20. What did this batter do? How?
21. What was the ball-strike count on this batter when he hit the ball?
22. Why did this batter use a resin bag?
23. Who was warming up in the bullpen? Why?
24. Who was the next batter?
25. What happened when he hit the ball?
26. What was the ball-strike count on the batter when he hit the ball?
27. Why did the runner on base not advance when this man hit the ball?
28. After this man batted, on which base(s) (was) (were) the (runner) (runners)?
29. Who was the next batter?
30. What was his batting average?
31. What happened that affected the (man) (men) on base?
32. What happened when this batter hit the ball?
33. What kind of pitch did he hit?
34. What happened to the runner(s) when this batter hit the ball?
35. Who was the next batter?
36. What was his batting average?
37. What happened to this batter?
38. Name as many players on the team in the field and state their positions.
39. Was the game official? How do you know?
40. What was the score at the end of the account?

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34

36

| Question | Number of Correct Responses (of 23) for HK | Question | Number of Correct Responses (of 23) for HK |
|----------|----------|----------|----------|
| 1 | 16 | 21 | 10 |
| 2 | 18 | 22 | 21 |
| 3 | 19 | 23 | 10 |
| 4 | 16 | 24 | 3 |
| 5 | 17 | 25 | 21 |
| 6 | 23 | 26 | 4 |
| 7 | 15 | 27 | 20 |
| 8 | 6 | 28 | 21 |
| 9 | 13 | 29 | 1 |
| 10 | 12 | 30 | 5 |
| 11 | 20 | 31 | 17 |
| 12 | 15 | 32 | 19 |
| 13 | 12 | 33 | 0 |
| 14 | 20 | 34 | * |
| 15 | 4 | 35 | 5 |
| 16 | 10 | 36 | 5 |
| 17 | 2 | 37 | 10 |
| 18 | 15 | 38 | 25** |
| 19 | 20 | 39 | 13 |
| 20 | 19 | 40 | 15 |

* Question #34 thrown out due to redundancy

** Eight correct responses per subject were possible

35

| Question | Number of Correct Responses (of 23) for LK | Question | Number of Correct Responses (of 23) for LK |
|---|---|---|---|
| 1 | 12 | 21 | 7 |
| 2 | 9 | 22 | 17 |
| 3 | 14 | 23 | 7 |
| 4 | 14 | 24 | 2 |
| 5 | 12 | 25 | 10 |
| 6 | 22 | 26 | 0 |
| 7 | 11 | 27 | 8 |
| 8 | 5 | 28 | 13 |
| 9 | 3 | 29 | 0 |
| 10 | 16 | 30 | 3 |
| 11 | 8 | 31 | 9 |
| 12 | 2 | 32 | 10 |
| 13 | 12 | 33 | 1 |
| 14 | 9 | 34 | * |
| 15 | 2 | 35 | 1 |
| 16 | 9 | 36 | 0 |
| 17 | 0 | 37 | 9 |
| 18 | 6 | 38 | 9** |
| 19 | 8 | 39 | 10 |
| 20 | 8 | 40 | 6 |

* Question #34 thrown out due to redundancy

** Eight correct responses per subject were possible

While the more important results of this phase of the experiment were discussed by Spilich et al. (in press), the results for each question were not presented. Table 9 therefore also indicates the number of correct answers given by the 23 high-knowledge and 23 low-knowledge subjects in the experiment.

## Final Comments

This paper presented in detail the procedures used for the text analysis and protocol analysis of the Spilich et al. paper. Also included is a summary of the results of the questionnaire given. While the methodology cannot be noted for its precision, it did involve procedures that were reliable and were apparently valid.

39

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