

APPENDIX E

SAMPLE CLINICAL INTERVIEWS

Task I: Fun House Puzzle (combinatorial reasoning).

Interview with NDP: sex - male, age 13 years; 11 months.

After establishing rapport with the interviewee, a card containing the plan of a house having three rooms is given to the interviewee.

Interviewer: This is a plan of a house with three rooms A, B and C (pointing at the plan of the house). The rooms are connected by doors. Suppose you are standing here (pointing at the figure on the card), and you want to pass through the three rooms. To enter the first room there are two doors i.e., a red door and a green door. You can pass through any one of them. To enter the second room from the first, there are three doors. They are; door marked A, door marked B and the door marked C. You can pass through any one of them (pointing at the plan). To enter the third room from the second there are four doors. Door marked 1, door marked 2, door marked 3 and door marked 4. You can pass through any one of them. And, finally, to go out of room C there are two doors, a blue door, and a yellow door. You can pass through any one of them. To pass from here to here (pointing at the card) you have to pass through four doors and let us call it a four door path. Now, you explain to me what this four door path is.

NDP: I can pass through Red, X, 1 and blue. This is a path.

Interviewer: Now, can you tell me how many such four door paths are there? I mean, you have shown me one path. Are there other paths also?

NDP: Yes, there are (pointing at the card). I can pass through Green, 2, 4 and yellow.

Interviewer: Can you tell me how many such four door paths are there totally?

NDP: (looks around, no response).

Interviewer: If you want to write anything you can use this paper and pencil (pointing at them kept on the table).

NDP: No. (after a long pause takes the paper and starts writing).

Int: (after the interviewee has stopped writing) Have you completed?

NDP: Yes. There are four paths (pointing at what he has written).

Int: Please explain the four paths.

NDP: Red, X, 1, & blue; Red, Y, 2 & yellow; Green, Z, 3 & blue; and Green, Z, 4 and yellow.

Int: Can you pass through Green, X, 4 & yellow?

NDP: (after a pause) No.

Int: Why?

NDP: I have already passed through X.

Int: You have already passed through Z twice (pointing at what the interviewee has written).

NDP: Then, there are only two ways.

Int: But, you have written four?

NDP: Idont know, I think there are four.

Int: Are you sure?

NDP: Yes.

Int: Can you explain?

NDP: Red, X, 1 & blue; Red, Y, 2 & yellow; Green, Z, 3 & blue; and Green, Z, 4 & yellow.

Int: Are there any more paths?

NDP: I think, there are four ways only.

Int: Are you sure?

NDP: Yes.

Int: Thank you.

Task II: Coloured Chemicals (combinatorial reasoning)

Interview with AMP: sex - female, age 13;7.

Interviewer: Here I have got four bottles containing colourless liquids. They are numbered 1, 2, 3, & 4 (pointing at the four bottles). Here I have got another bottle containing a colourless liquid. It is marked 'G'. The liquids in these five bottles are different. Can you repeat what I said.

AMP: There are five different liquids in five bottles.

Int: How do you know they are different?

AMP: They are marked differently (pointing at the bottles).

Int: Here, I have got a test tube containing a colourless liquid. This liquid I have taken from these four bottles. It may be from one of these four bottles or it may be a mixture from two bottles, or from three of them or from all the four put together. Now, I am going to add a few drops of 'G' to it. Let us watch what happens (adds a few drops of liquid G). What happened?

AMP: It turned yellow.

Int: Here, I have got test tubes. I want you to produce the yellow colour by adding liquids from bottles 1, 2, 3, 4 and then adding 'G'. You may do as many experiments as possible.

AMP: But, there are only four tubes.

Int: Dont you worry. I will wash them and give it to you as you proceed.

AMP starts doing the experiments by adding liquids from the bottles to the test tube. Interviewer records the combinations.

AMP: I'm not getting the colour.

Int: Why?

AMP: (no response).

Int: Have you tried all possible ways?

AMP: Yes. (pause) It may be some magic.

Int: Thank you.

Task III: Photosynthesis (controlling of variables)

Interview with RGA (sex - female, age - 13;5)

Interviewer: Have you seen Tulasi and Balsam plants?

RGA: I have seen Tulasi but not Balsam.

Int: Hav'nt you noticed small little plants with pink and white flowers in the school garden i.e., as you enter the school garden on the right hand side there is a row of small flowering plants.

RGA: Yes. They have red, purple and white flowers.

Int: Fine. Those plants are called Balsam. I did a few experiments with different parts of these two plants. The details of these experiments are given in these cards. (shows the card given in Appendix B, Task III). I took five glass jars of equal size and filled them with 250 units of carbon dioxide. Do you know what a glass jar is?

RGA: Yes.

Int: In the first jar I kept Tulasi leaves, in the second stem of balsam plant, in the third roots of tulasi, in the fourth stem of balsam plant and in the last jar leaves of tulasi. I numbered these jars 1, 2, 3, 4 and 5. I kept the jars under different coloured lights (pointing at the card explains each condition). Also, the temperature at which these jars were kept were different.

Interviewer checks in whether RGA has understood the different conditions by asking probing questions at each point.

Int: All the jars were kept under these conditions for two days. At the end of the second day I measured the amount of CO₂ left in the jars and I found them to be different in different jars. (Explains the quantity of CO₂ in the jars pointing at the table). Now, see whether you can answer this question. If you want to know the amount of carbon dioxide absorbed per day at two different temperatures, which jars would you compare? That is, if you want to know whether at lower temperature or higher temperature the gas is absorbed more which jars would you compare?

RGA: (After a long pause) Jars 1 and 5.

Int: Why?

RGA: Because they are kept at two different temperatures.

Int: Then why not jars 1 and 2. They are also kept at different temperatures.

RGA: They are different plants, also, the conditions are not the same.

Int: Then why not jars 3 and 5. The plants are the same.

RGA: (After examining the card again). No all the conditions are not same. Only by comparing 1 and 5 you can compare.

Int: Thank you.

Task IV: Pendulum Problem (controlling of variables).

Interview with AKM sex - female, age - 14;0

Interviewer: Here, I have got threads of three different length (pointing at the threads). And, here, I have bobs of different sizes and shapes (pointing at a dish containing the bobs). Here, I have a stand to which you can fix these threads. Using these threads and the bobs I can make different swings (Choolas). Now, I want you to make all possible combinations of choolas and tell which among the choolas take more time to go up and down like this (demonstrates using one of the combinations). I have kept a stop-clock here, if you wish to note the time.

AKM: (removes her wrist watch) She starts doing the experiments. The interviewer makes a detailed note of the procedure adopted by her.

AKM: I think it is the weight.

Int: Why do you think so?

AKM: Heavier the bob, it (the pendulum) moves slower and the lighter one it moves faster.

Int: Has the length anything to do?

AKM: It is all the same.

Int: You want to try again.

AKM: (tries out a few more experiments. In one of the experiments she accidentally hits the heavier bob) The heavier one can also move faster.

Int: Do you wish to try again?

This time AKM approaches the problem by controlling two variables viz., the height of the dropping point and mass of the bob.

AKM: I think length of the thread affect the movement.

Int: Can you show it to me?

AKM: (does a few more trials) I think it is the weight.

Int: Are you sure?

AKM: It is the weight and the length which affects.

Int: Thank you.

Task V: Hockey Player Puzzle (combinatorial reasoning)

Interview with KST: sex - male, age - 13;8.

Interviewer: (after explaining the task as given in Appendix B) How many ways can you wear the gear supplied to you? Try all possible ways.

KST: (after several trials) There are 24 ways.

Int: Can you explain?

KST: Can I write? (interviewer supplies him with a paper and pencil).

Int: What are these?

KST: I'm using letters for colours. (he writes all the 24 ways, using letters for each colour).

Int: Is there any other way?

KST: No, I have written all.

Int: Can you explain them?

KST: With black boots if you change other pieces of the gear, there are twelve ways. So, with white another twelve, making a total of twenty four.

Int: Which are the twelve ways?

KST: I've written them all.

Int: Thank you.

Task VI: Electrical Switching System (Combinatorial reasoning)

Interview with SKK: sex - male, age 13;7

Interviewer: Here, I have got a system of switches connected to a cell. The switches are marked 1, 2, 3, 4 and M.

SKK: (interrupting) Why M? and not 5.

Int: The switch M is called a master switch and so it is named as M. All the switches have two positions i.e., on and off (pointing at the switches). With one of these four switches in the on position; or with any two of them; or with three of them, any three; or with all the four switches in the on position; if you switch on the master switch this bulb would give out light. You try different possible ways to make the bulb glow. Try all possible ways.

SKK: Yes. (puts switch 1 in the on position and then M. Then he switches on 2).

Int: (interrupting) After making one trial put off all the switches before you try again.

SKK: I have to put off 1 and M also?

Int: Yes, switch off all after each trial.

SKK tries in a systematic manner. Interviewer makes a note of all the trials carried out.

SKK: Switches 1 & 3, and M is the combination.

Int: Do you want to try other ways?

SKK: Yes, I would like to.

Int: Try all possible ways (makes a note).

SKK: There are two ways: 1,3 and M; and 1,2,3 and M.

Int: What has switch 2 to do?

SKK: Switches on 1 and 3 and M; then switches on 2 and then puts it off. I think switch 2 has nothing to do.

Int: What about switch 4?

SKK: (tries with all four switches in the on position and then puts off switch 4) I think switch 4 is coming in the way of the current.

Int: Thank you.

Task VII: Rate of Growth of Plants (Controlling of variables)

Interview with SVC: sex - male , age - 16;3.

Interviewer: Have you seen bean seeds?

SVC: Yes.

Int: Have you noticed any time seeds growing into plants?

SVC: Yes, in my house there is a kitchen garden and I have seen seeds growing into plants.

Int: I did some experiments with bean seeds. I took five mud pots of equal size and numbered them 1, 2, 3, 4 and 5 (pointing at the card). I filled pot 1 with sandy soil, the second also with sandy soil. The third pot I filled with clayey soil. The fourth pot I took a mixture of sandy and clayey soil. The last pot again I filled with sandy soil. I planted five bean seeds each in these pots. I added one mug of water per day to the first pot, three mugs of water to the second and so on as given in this table. I added manure X to pot 1, manure Y to pot 2 and so on. I kept all the pots in these conditions for two weeks. What do you think would happen to these seeds in these two weeks?

SVC: They would grow into plants.

Int: I measured the length of the plants in all these five pots. In the first pot they have grown to 14 cms., in the second to ten cms., and so on as given. Now, try to answer this question: If you want to know the length to which the plants have grown, per week, under two light conditions viz., sun and shade, which two pots would you compare?

SVC: After a long pause. Pots 2 and 5.

Int: Why have you chosen 2 and 5? Can you give me a reason?

SVC: Both are kept in sun.

Int: If you want to compare the difference in growth of plants kept in sun and shade which pots would you compare?

SVC: 1 and 2.

Int: Why?

SVC: They are kept in sun and shade and water added is more in one and less in the other.

Int: If water added is more the plants in pot 2 should grow taller. But, they are shorter.

SVC: May be there is some other reason. I dont know.

Int: Thank you.

Task VIII: Falling Bodies on an Inclined Plane (controlling of variables)

Interview with SIP: sex - female, age - 13;11.

The interviewer describes the apparatus as given in Appendix B with intermittent questions to ensure the understanding of SIP.

Interviewer: Now, I want you to tell me, after doing experiments, what makes the bob go further; whether it is the height of the plane, distance from the bottom curve of the plane, the mass of the bob or the size of the bob?

SIP: (after making several observations with different bobs in an unsystematic manner). The balls will go in holes, further away, in order of size (pointing at the apparatus).

Int: What do you mean by order of size? Can you explain?

SIP: The smallest goes to the nearest hole and the biggest goes to the farthest. Those in the middle goes to the middle (she demonstrates it).

Int: So, they go according to size. Has the height of the plane anything to do?

SIP: According to where you put the slide (pointing at the inclined plane) they go in the holes. You put it up the ball falls nearer. It depends on the slide also.

Int: Are you sure?

SIP: I think the size has nothing to do. The weight and the plane affect it.

Int: Do you wish to try again?

SIP: No. I have already completed all the experiments.

Int: Thank you.
