

# Portfolio assignment 10: Principal Component Analysis and Factor analysis

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*28 April 2020*

## Real World Immitating Task

You are working in a head-hunting agency. Your job is to filter candidates for a top position in a large corporation. During the interviews, the 105 candidates have been subjected to an empathy questionnaire.

- 1) People at your agency disagree on how many interesting components/factors are present in the test, so they ask you, the factor analysis expert, to determine this. Please add your argument for the number you end on.
- 2) In order to short-list candidates for the position, your job is to find the highest and lowest scoring candidate on each factor.
- 3) Your boss asks you what you think of his new empathy test (The physical empathy test). Does it really measure anything that the old scales cannot capture?
- 4) You also want to impress your boss with a couple of illustrative plots.

## Deadline

May 13 2020.

## Details about the questionnaire:

Participants were given 73 questions in pseudorandom order.

### Three questionnaires were used:

#### The Balanced Emotional Empathy Scale (BEES)

30 questions were from the “Balanced Emotional Empathy Scale” (BEES)

Ref. Mehrabian, A. (1997). Relations among personality scales of aggression, violence, and empathy: Validation evidence bearing on the risk of eruptive violence scale. *Aggressive Behavior*, 23(6).

Here are the questions: 1. I very much enjoy and feel uplifted by happy endings.

2. I cannot feel much sorrow for those who are responsible for their own misery.
3. I am moved deeply when I observe strangers who are struggling to survive.
4. I hardly ever cry when watching a very sad movie.
5. I can almost feel the pain of elderly people who are weak and must struggle to move about.
6. I cannot relate to the crying and sniffing at weddings.
7. It would be extremely painful for me to have to convey very bad news to another.

8. I cannot easily empathize with the hopes and aspirations of strangers.
9. I don't get caught up easily in the emotions generated by a crowd.
10. Unhappy movie endings haunt me for hours afterward.
11. It pains me to see young people in wheelchairs.
12. It is very exciting for me to watch children open presents.
13. Helpless old people don't have much of an emotional effect on me.
14. The sadness of a close one easily rubs off on me.
15. I don't get overly involved with friends' problems.
16. It is difficult for me to experience strongly the feelings of characters in a book or movie.
17. It upsets me to see someone being mistreated.
18. I easily get carried away by the lyrics of love songs.
19. I am not affected easily by the strong emotions of people around me.
20. I have difficulty knowing what babies and children feel.
21. It really hurts me to watch someone who is suffering from a terminal illness.
22. A crying child does not necessarily get my attention.
23. Another's happiness can be very uplifting for me.
24. I have difficulty feeling and reacting to the emotional expressions of foreigners.
25. I get a strong urge to help when I see someone in distress.
26. I am rarely moved to tears while reading a book or watching a movie.
27. I have little sympathy for people who cause their own serious illnesses (e.g., heart disease, diabetes, lung cancer).
28. I would not watch an execution.
29. I easily get excited when those around me are lively and happy.
30. The unhappiness or distress of a stranger are not especially moving for me.

####The Interpersonal Reactivity Index (IRI) 28 questions were from the "Interpersonal Reactivity Index" (IRI)

Reference: Davis, M. (1980). A multidimensional approach to individual differences in empathy. JSAS Catalog of Selected Documents in Psychology, 10(4), 85.

The test supposedly taps into four factors underlying empathy, each tested with 7 questions:

- A) "Fantasy" taps respondents' tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, movies, and plays
- B) "Empathic Concern" assesses "other-oriented" feelings of sympathy and concern for unfortunate others
- C) "Perspective Taking" the tendency to spontaneously adopt the psychological point of view of others
- D) "Personal Distress" measures "self-oriented" feelings of personal anxiety and unease in tense interpersonal settings

The questions can be found here: <http://fetzer.org/sites/default/files/images/stories/pdf/selfmeasures/EMPATHY-InterpersonalReactivityIndex.pdf>

## The Physical Empathy Test. (PEST)

15 questions were from a home-made test constructed to tap into less abstract and more immediate “affective empathy” using no references to mental life or psychological conflict.

The questions were in Danish, but were of the sort:

- 1e) I can feel it in my body if I think of a bicycle crash where the head hits a sign post.
- 2e) I am NOT affected by the thought of somebody reaching into a crack where a venomous snake is hidden.
- 3e) The thought of a broken leg where the bone is sticking out does not affect me???

For Danish readers:

- 1) Jeg kan mærke det i kroppen, hvis jeg tænker på et cykelstyrt, hvor hovedet rammer et skilt.
- 2) Jeg påvirkes IKKE af tanken om en person, der stikker hånden ned i en sprække, hvor en giftslange har gemt sig.
- 3) Tanken om et brækket ben, hvor knoglen stikker ud af k??det, påvirker mig ikke.
- 4) Tanken om en person, der falder og hamrer tænderne ned i kantstenen kan nærmest mærkes i mine egne tænder.
- 5) Ideen om at se et stort betaendt sår på maven af et barn giver mig ingen særlige følelser.
- 6) Jeg får et sug i maven ved tanken om at være i et passagerfly, der styrter ned.
- 7) Tanken om at overvære en dreng blive sparket, mens han ligger ned, giver mig ingen fysisk ubehag.
- 8) Det er fysisk ubehageligt at tænke på en kvinde, der kommer til at stikke hånden ned i en grenkvaern.
- 9) Jeg får ikke nogen særlige kropslige fornemmelser af at tænke på et menneske, der kaster blod op.
- 10) Jeg kan føle den panik, som en søn, der ser en stor haj nærme sig, må føle.
- 11) Tanken om at se en person styrte ned fra et højhus har ingen fysisk effekt på mig.
- 12) Tanken om at se en person få en taanegl revet af med en tang får mig nærmest til at krumme tæer selv.
- 13) Jeg har ingen fysisk reaktion på tanken om at se et menneske få sprøjtet syre i øjnene.
- 14) Det giver mig fysisk ubehag at tænke på en amputation af et sårben med koldbrand.
- 15) Det giver mig myrekryb at forestille mig en person spærret inde i et brændende hus.

## Responses

For all questions, participants responded on a scale from -4 (very strongly disagree) to 4 (very strongly agree).

Some of the questions were negatively phrased, e.g. “I hardly ever cry when I see a sad film.” However, for these questions “Very strongly disagree” is given the score 4. I.e. more empathic is always rated higher.

## Data

Data can be found at Blackboard. Filename: ‘emp\_all\_all.csv’

## **Data order**

In the data file, the data is ordered as follows: 1-30 BEES, 31-37: IRI-Fantasy, 38-44: IRI-Concern, 45-51: IRI-Perspective taking, 52-58: IRI-distress, 59-73: PEST.

rows= participants columns=questions

## **Reporting**

Submit report as a single file (pdf or html). Include commented code and figures all the way from data import.

Submit report to Blackboard.