

Extra Assignment for a- and b-students

Peter P. Wakker

Consider the file (3)_vdakker2013_annotated, which is an annotated copy of the paper

Van den Akker–van Marle, M. Elske, Mascha Kamphuis, Helma B. M. van Gameren–Oosterom, Frank H. Pierik, Job Kievit, & NST Expert Group (2013)

“Management of Undescended Testis: A Decision Analysis,” *Medical Decision Making* 33, 906–919.

c-students need not read this paper and need not do any homework for it.

b-students: read the highlighted and underlined texts and only glance through the rest diagonally.

a-students: read all the texts not crossed out.

a-students: answer all questions below with superscript a.

b-students: answer all questions below with superscript b.

For b-students the recommended maximal total length of the answer is 700 words (about 2 pages), and for a-students 1000 words (about 3 pages), but if you can do shorter then all the better. Feedback and corrections on your answers are not provided online, but it will be worthwhile to work on this paper still to get the gist of applied decision theory.

ELUCIDATION

This paper provides a good illustration of how decision theory and expected utility, as used in the naïve period of 1960-1970, is applied and still is valuable today. You will have to digest some medical details. Part of the real decision tree is provided in an added figure, but it is too large to print. The figure is on canvas where you can inspect it on your screen, with things legible if enlarged, and it gives you some idea about the complexity of real decision trees.

The authors consider undescended testis (UDT) with baby-boys, meaning that a testis is present but did not descend enough and did not make it to the scrotum; the prevalence is $\pm 1\%$. Question is whether to operate, and if so when (because there

often is spontaneous cure, being in about 80% of the cases within the first year). They find that operation is best, but is best done only after 9 months. P. 912 bottom of 1st column: Pro of operation is cosmetic (keeping scrotum symmetric), bigger fertility, and avoiding extra risks of testicular cancer of more than 1% over a lifetime. Cons are surgery inconvenience (such as scar) & risk of surgery complications (p. 912 end of 1st column), with small chance of death due to surgery/anesthesia.

The authors use the VAS (visual analog scale) utility measurement method. Here a scale from 0 to 100 is presented to the subject in the form of a line on a page. Then 0 designates the worst possible score, usually death, and 100 designates the best possible score, usually perfect health (with the longest possible life duration specified if life duration is relevant). Subjects can indicate on this line where their evaluation is. For example, if they indicate 60 on the line for an outcome, then the outcome has 60% of the value of the best outcome.

When reading, keep in mind, and let me repeat: If you do not want to get dirty hands, then you will never deliver useful applications.

QUESTION 1^{a,b}. Who is the decision maker here? And what is the decision to be taken?

QUESTION.2.^{a,b} How did the authors estimate utilities?

QUESTION.3.^b Is this analysis a case of decision under risk, with known (objective) probabilities, or of unknown (subjective) probabilities?

QUESTION.4.^a How do the authors deal with the fact that they are not sure about probability/utility estimates and other aspects?

QUESTION.5.^a What are the two most sensitive variables of the analysis?

QUESTION.6.^a What is the main conclusion of this study?

QUESTION 7.^b P. 916 para –3: Are monetary expenses relevant to this study? What is the suggested monetary value of a year of life?

QUESTION.8.^b P. 916 para –3: Assume that the discounted QALY gain for unilateral UDT with 3% discounting, the case of interest to us, is 0.25 QALYs. What is the maximum price that society would be willing to pay for orchidopexy (the name of the surgery)?

QUESTION.9.^{a,b} P. 917 last para: What was the practical impact of the main conclusion of this study, and can you read between the lines what the authors think about this?

QUESTION.10^{a,b}. Could this application of expected utility have been done in the naïve period of 1960-1980, say in early 1980, when expected utility had become known in the health domain? How could the analyses of the data have been improved with our modern behavioral insights and prospect theory? Compare your answer for this paper with the answer for the medical example of larynx-cancer discussed before.