

Chapter 4

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Exercises

```
import numpy as np
```

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1. The function `oap.GWLPmixed()` calculates word counts of length $0, \dots, n$, where n is the number of factors. Its input is an orthogonal array and its output is the sequence of word counts. The file `OA16mixed.oa` includes three $OA(16; 4 \times 2^8; 2)$.
 - Calculate (A_3, A_4) for the three designs.
 - What design is best regarding estimation of a main-effects only model?
 - Suppose that there is no interaction between the four-level factor and the two-level factors. What design is best in that case?
2. The function `projB3` calculates the A_3 values for all three-factor subsets of the input array. It returns a matrix with two columns. The first one contains the different A_3 values and the second one the frequencies of the respective values. In this exercise, you are to evaluate four different $OA(18; 3^6; 2)$ contained within `OA18pure.m`.
 - Calculate (A_3, A_4) for the four designs.
 - Calculate the projection A_3 frequency vectors with the new function.
 - Suppose that you are required to choose one of these designs for a real-life experiment in six three-level factors. Suppose further that experimenters assure you that at most three out of the six factors can be active. Which of the four designs is best?
 - Suppose that at most two factors can be active. Which of the four designs is best?

3. There are 27 different $OA(16; 2^6; 2)$. You can find them in the file `result-16.2-2-2-2-2-2.oa`. The designs might be used to estimate all main effects and a subset of a few two-factor interactions. Not all the designs perform equally well here. One possible criterion to express their performance is the estimation capacity, which is a scalar discussed in Section 4.5. A related criterion is the estimation capacity sequence. This is the fraction of estimable models with all main effects and j, \dots, k interactions, denoted (EC_j, \dots, EC_k) . The function `oaf.ECIC` calculates this vector for pure-level arrays. The required input is a tuple of `arraylink` objects, as created by the `oap.readarrayfile` function. By default, $j = 1$ and $k = 3$.
- Load the designs and calculate (EC_1, \dots, EC_3) . Which design do you prefer?

References