

Order of Chapters in *Mathematics, Substance and Surmise*

The order of chapters in *Mathematics, Substance and Surmise* was determined as follows. First, it was decided that the chapter “Hardy, Littlewood, and polymath” by Ursula Martin and Alison Pease would make a particularly inviting starting point. Starting from there, the order of the subsequent chapters was chosen so as to maximize the mean similarity between consecutive chapters.

Specifically, the following procedure was followed:

1. Each chapter was characterized in terms of a six-dimensional feature vector, described below.
2. The distance between two chapters was defined to be the L^1 metric (Manhattan distance):

$$D(\vec{u}, \vec{v}) = \sum_{i=1}^6 |\vec{v}_i - \vec{u}_i|.$$
3. The shortest path, in terms of that distance measure, that starts at the Martin and Pease chapter and traverses all the chapters, was computed approximately. This is known as the “non-cyclic traveling salesman problem” (non-cyclic, because the salesman is not required to return to his starting point). The Matlab code used is at <http://www.cs.nyu.edu/faculty/davise/MathOntology/order.m>.

Feature vector

The six features used were as follows:

History: Premodern = 4; 16th - 18th centuries = 3; 19th century = 2; 20th century = 1; Ahistorical = 0.

Language: Central = 4; Discussed = 2; absent = 0.

New developments: Yes = 4; No = 0.

Psychology: Controlled experiments = 4; systematic observational studies = 3; anecdotal discussion = 2; absent 0.

Philosophy: Technical philosophy = 4; philosophy in the broad sense = 2; absent = 0.

Mathematical depth: Elementary = 1; High school = 2; undergraduate = 3; advanced = 4.

The values assigned were:

	Hist	Lang	New	Psych	Phil	Math
Avigad	2	4	0	0	2	3
Azzouni	0	2	0	0	4	2
Bailey & Borwein	1	0	4	0	0	4
Berlinski	0	0	0	0	2	3
E. Davis	0	0	0	0	0	3
P. Davis	2	0	0	0	2	3
Gillies	4	0	0	0	4	3
Gray	3	0	0	0	0	3
Lützen	4	0	0	0	2	3
Martin & Pease	2	0	4	2	0	4
O’Halloran	3	4	0	2	4	2
Piantadosi	1	4	0	3	2	2
Rips	0	4	0	4	0	1
Ross	4	4	0	2	2	1
Sinclair	4	2	4	4	0	1
Stillwell	4	0	0	0	0	4
Verran	0	2	4	2	2	1