



Technische
Universität
Braunschweig

Institut für Betriebssysteme
und Rechnerverbund
Algorithmik



Netzwerkalgorithmen

Übung 5: Stabile Matchings und 3-dimensionale Matchings

Christian Rieck, 15. Juli 2021

WORST-CASE ANALYSIS OF A NEW HEURISTIC

FOR THE TRAVELLING SALESMAN PROBLEM

by

Nicos Christofides*

ABSTRACT

An $O(n^3)$ heuristic algorithm is described for solving n -city travelling salesman problems (TSP) whose cost matrix satisfies the triangularity condition. The algorithm involves as substeps the computation of a shortest spanning tree of the graph G defining the TSP, and the finding of a minimum cost perfect matching of a certain induced subgraph of G . A worst-case analysis of this heuristic shows that the ratio of the answer obtained to the optimum TSP solution is strictly less than $3/2$. This represents a 50% reduction over the value 2 which was the previously best known such ratio for the performance of other polynomial-growth algorithms for the TSP.

COLLEGE ADMISSIONS AND THE STABILITY OF MARRIAGE

D. GALE* AND L. S. SHAPLEY, Brown University and the RAND Corporation

1. Introduction. The problem with which we shall be concerned relates to the following typical situation: A college is considering a set of n applicants of which it can admit a quota of only q . Having evaluated their qualifications, the admissions office must decide which ones to admit. The procedure of offering admission only to the q best-qualified applicants will not generally be satisfactory, for it cannot be assumed that all who are offered admission will accept. Accordingly, in order for a college to receive q acceptances, it will generally have to offer to admit more than q applicants. The problem of determining how many and which ones to admit requires some rather involved guesswork. It may not be known (a) whether a given applicant has also applied elsewhere; if this is known it may not be known (b) how he ranks the colleges to which he has applied; even if this is known it will not be known (c) which of the other colleges will offer to admit him. A result of all this uncertainty is that colleges can expect only that the entering class will come reasonably close in numbers to the desired quota, and be reasonably close to the attainable optimum in quality.





Nobelpreis



Nobelpreis



Fields-Medaille



Nobelpreis

Physik,
Chemie,
Medizin,
Literatur,
Frieden.



Fields-Medaille



Nobelpreis

Physik,
Chemie,
Medizin,
Literatur,
Frieden.



Fields-Medaille

Mathematik!



Nobelpreis

Physik,
Chemie,
Medizin,
Literatur,
Frieden.
(+ Wirtschaft)



Fields-Medaille

Mathematik!



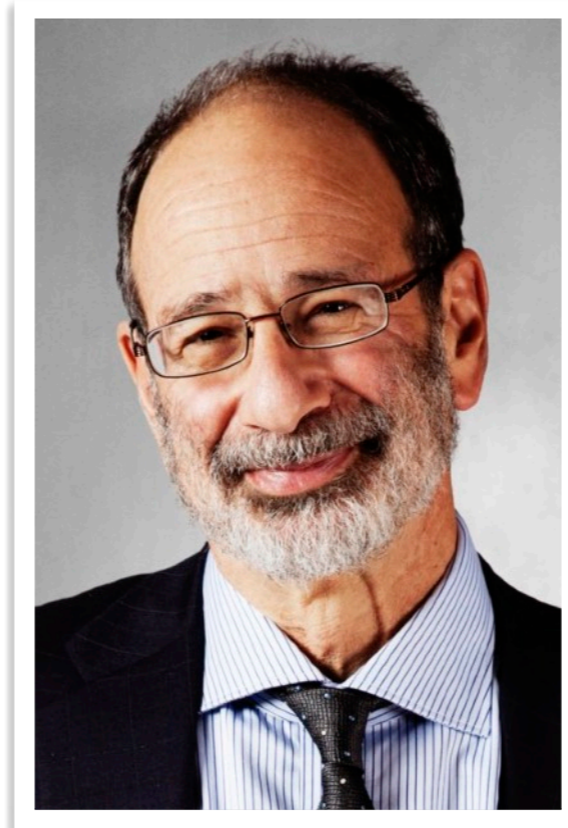
Nobelpreis

Wirtschaft



Nobelpreis

Wirtschaft





Nobelpreis

Wirtschaft



Alvin E. Roth



Lloyd S. Shapley

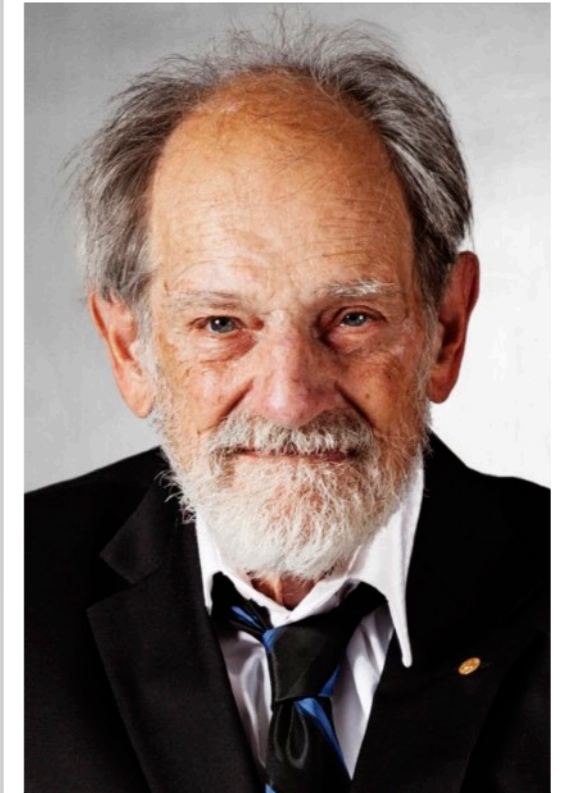


Nobelpreis

Wirtschaft



Alvin E. Roth



Lloyd S. Shapley

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2012 was awarded jointly to Alvin E. Roth and Lloyd S. Shapley „**for the theory of stable allocations and the practice of market design.**“

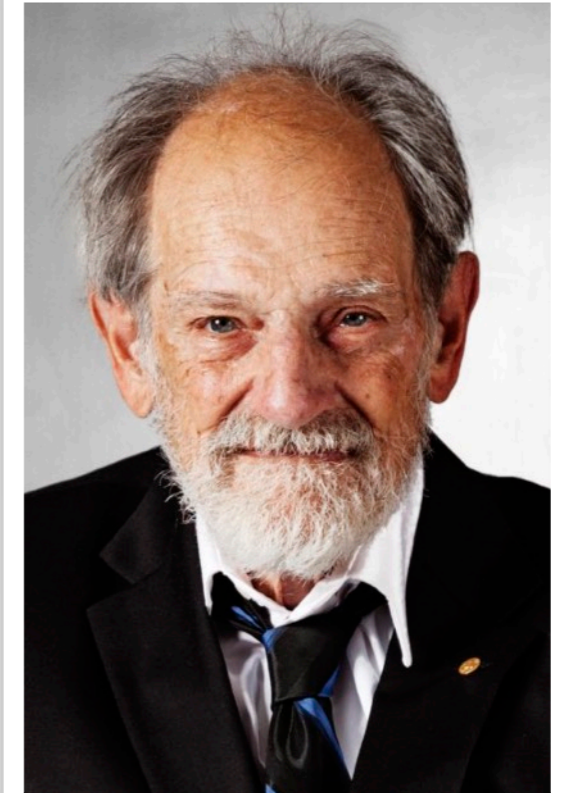


Nobelpreis

Wirtschaft



Alvin E. Roth



Lloyd S. Shapley

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<https://www.nobelprize.org/prizes/economic-sciences/2012/summary/>



Sally



Peppermint



Lucy



Marcie



Sally



Charlie



Peppermint



Schroeder



Lucy



Franklin



Marcie



Linus



Sally



Charlie



Peppermint



Schroeder



Lucy

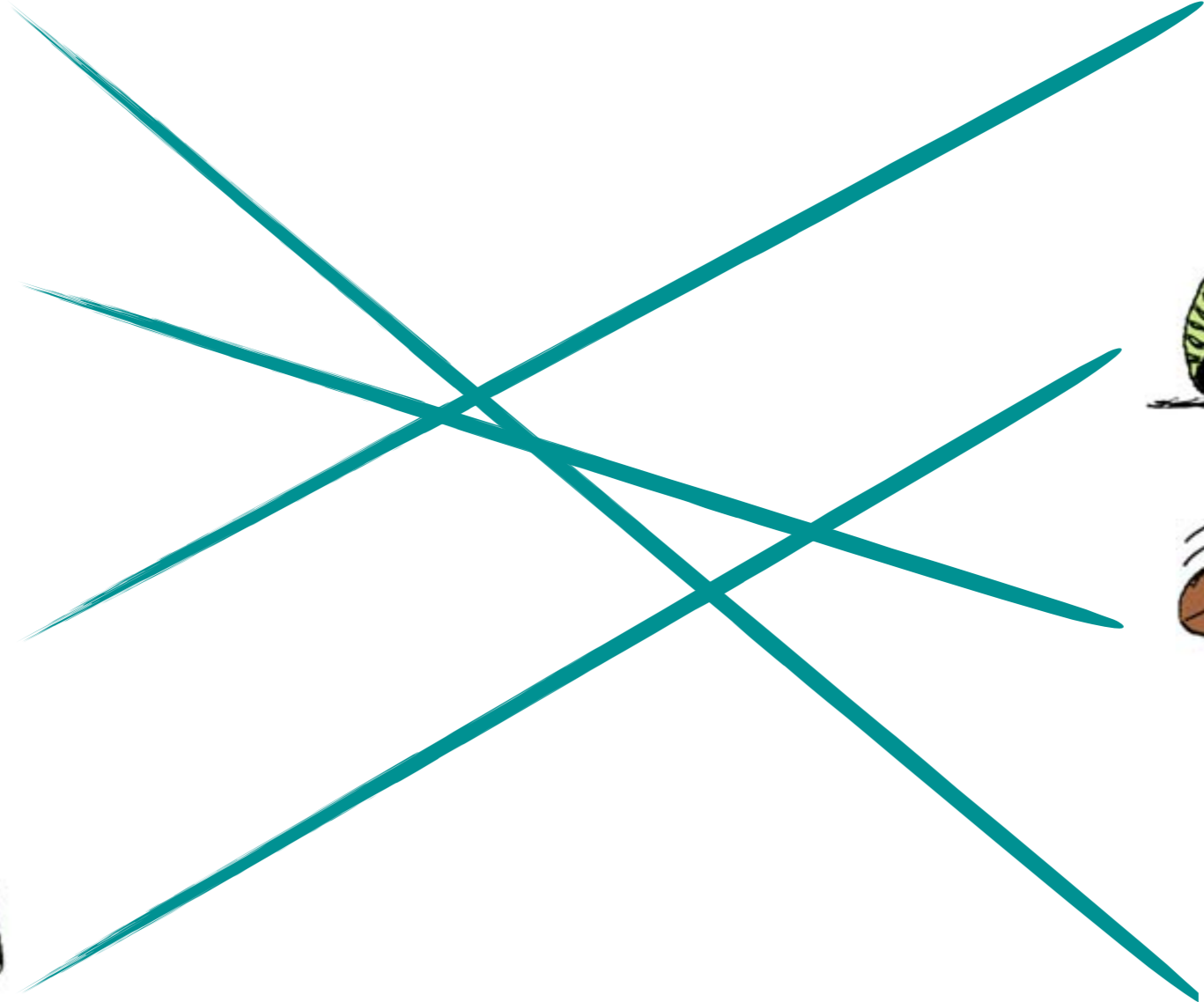


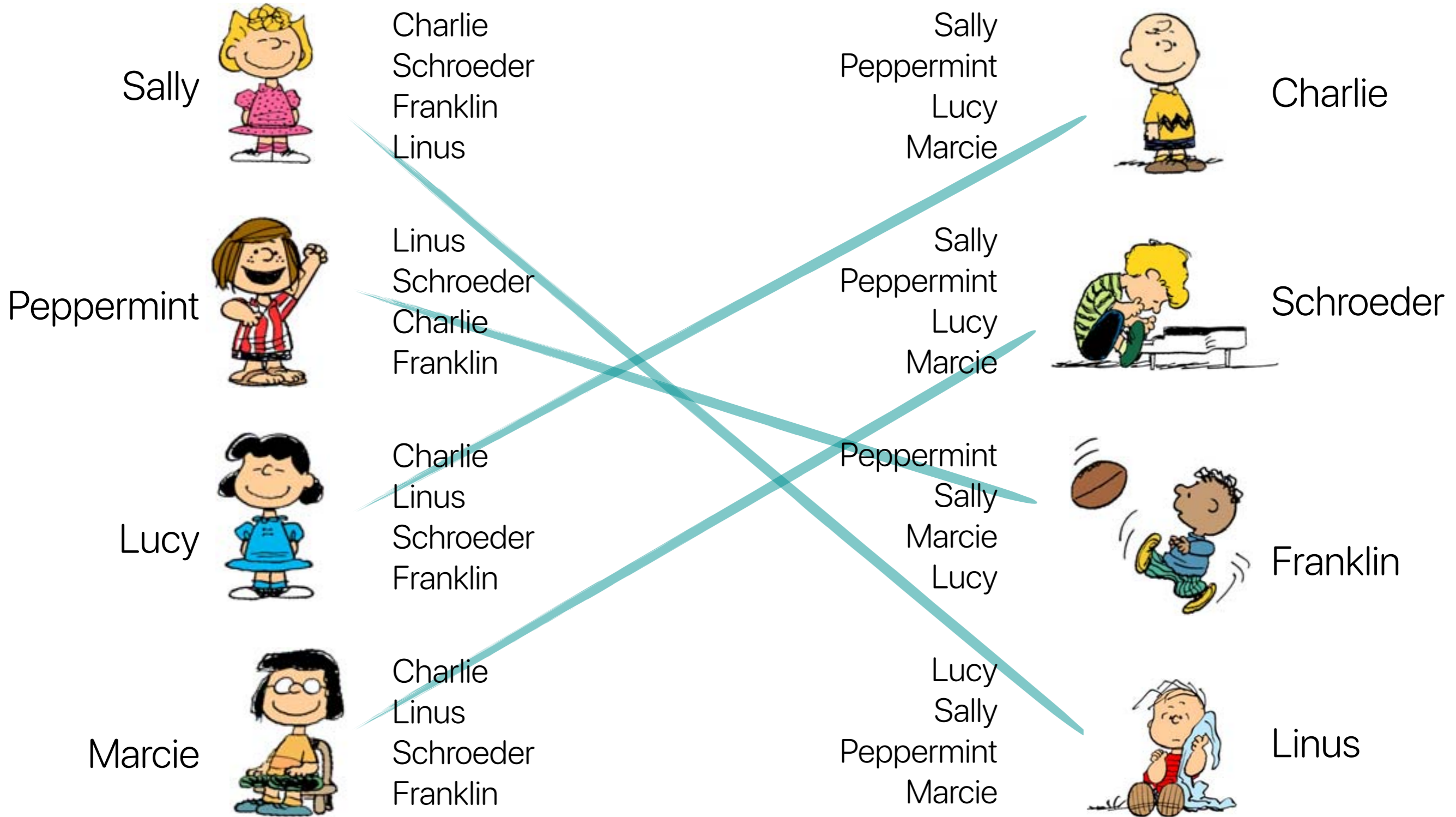
Franklin

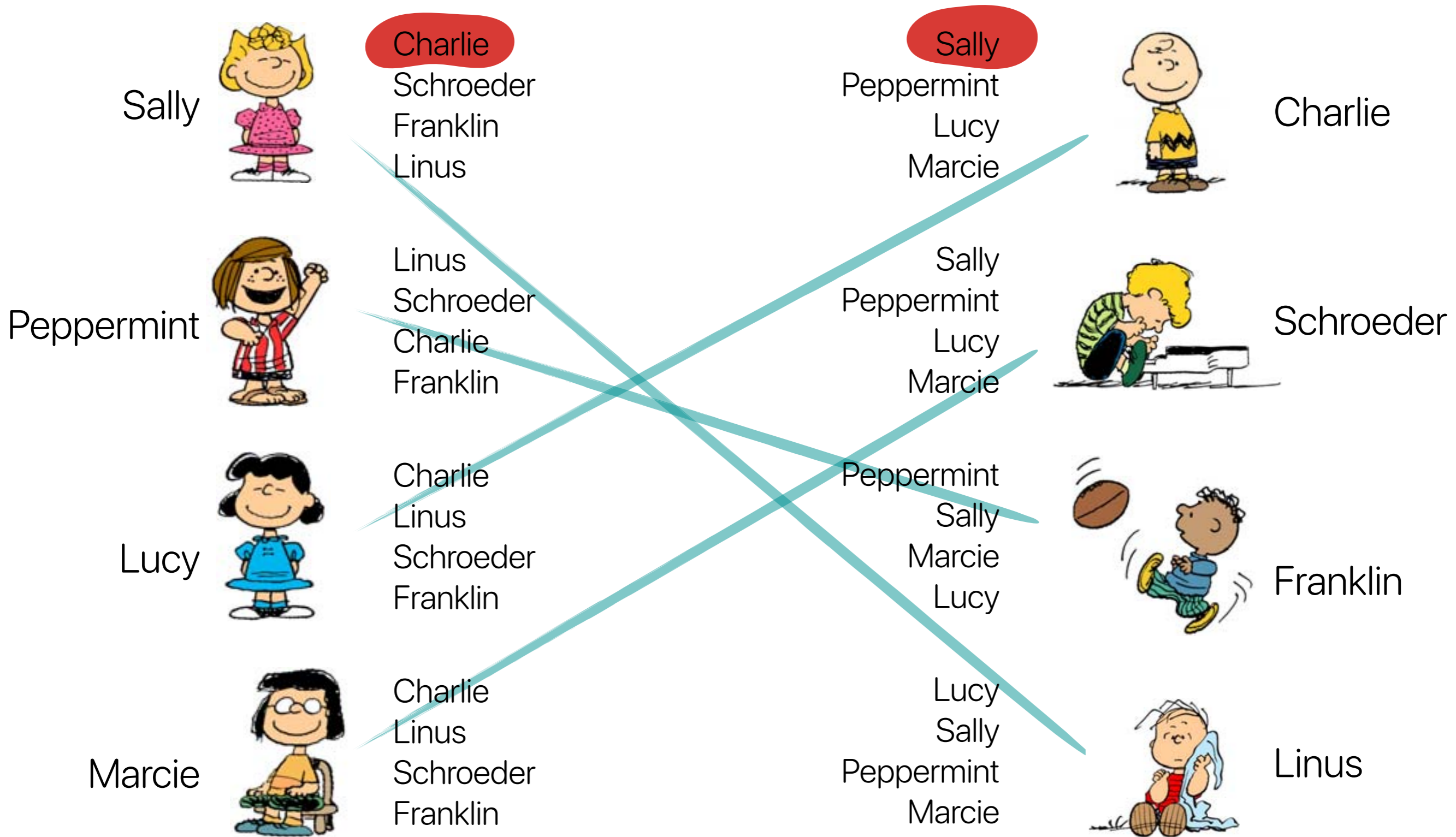
Marcie

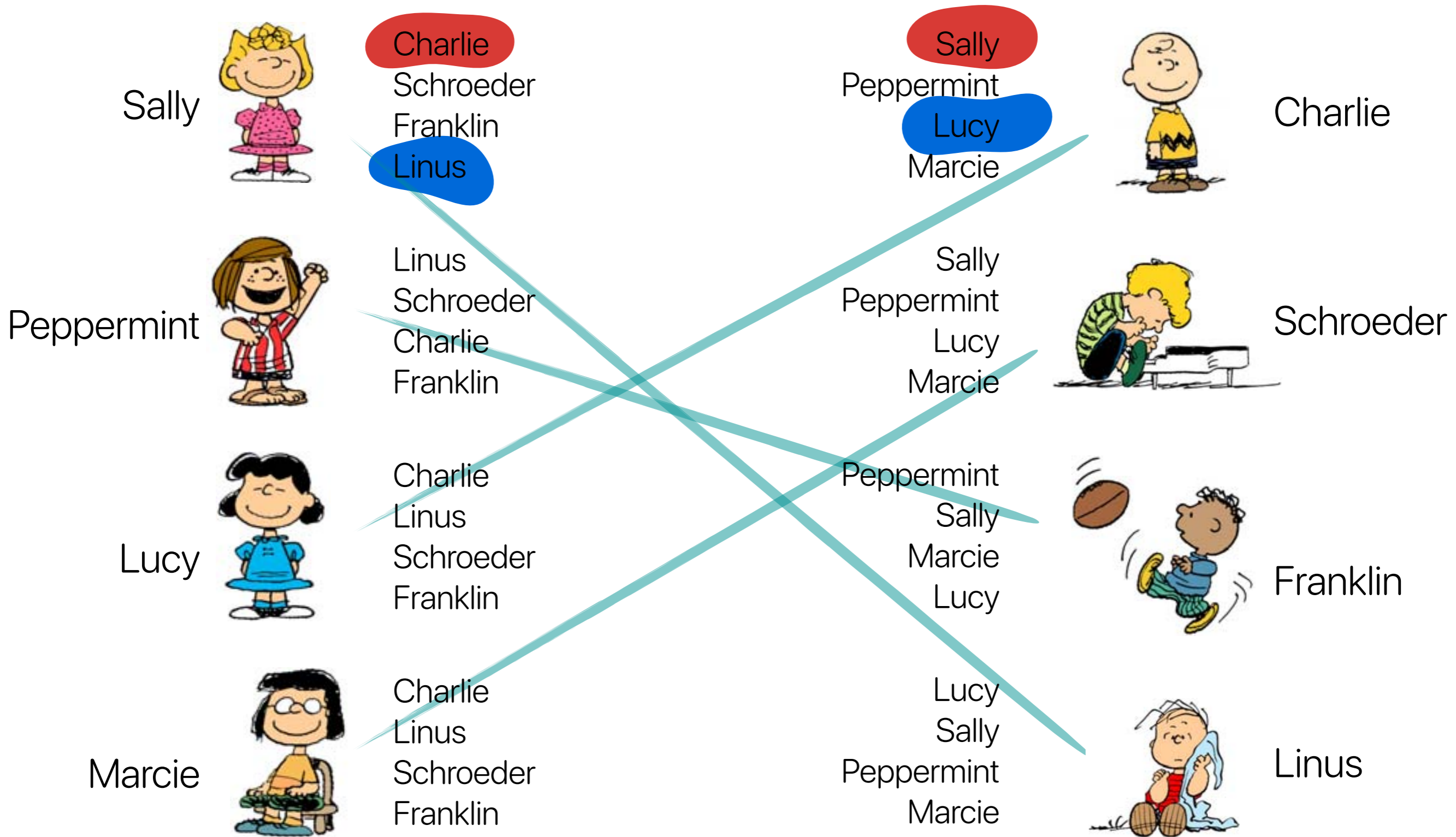


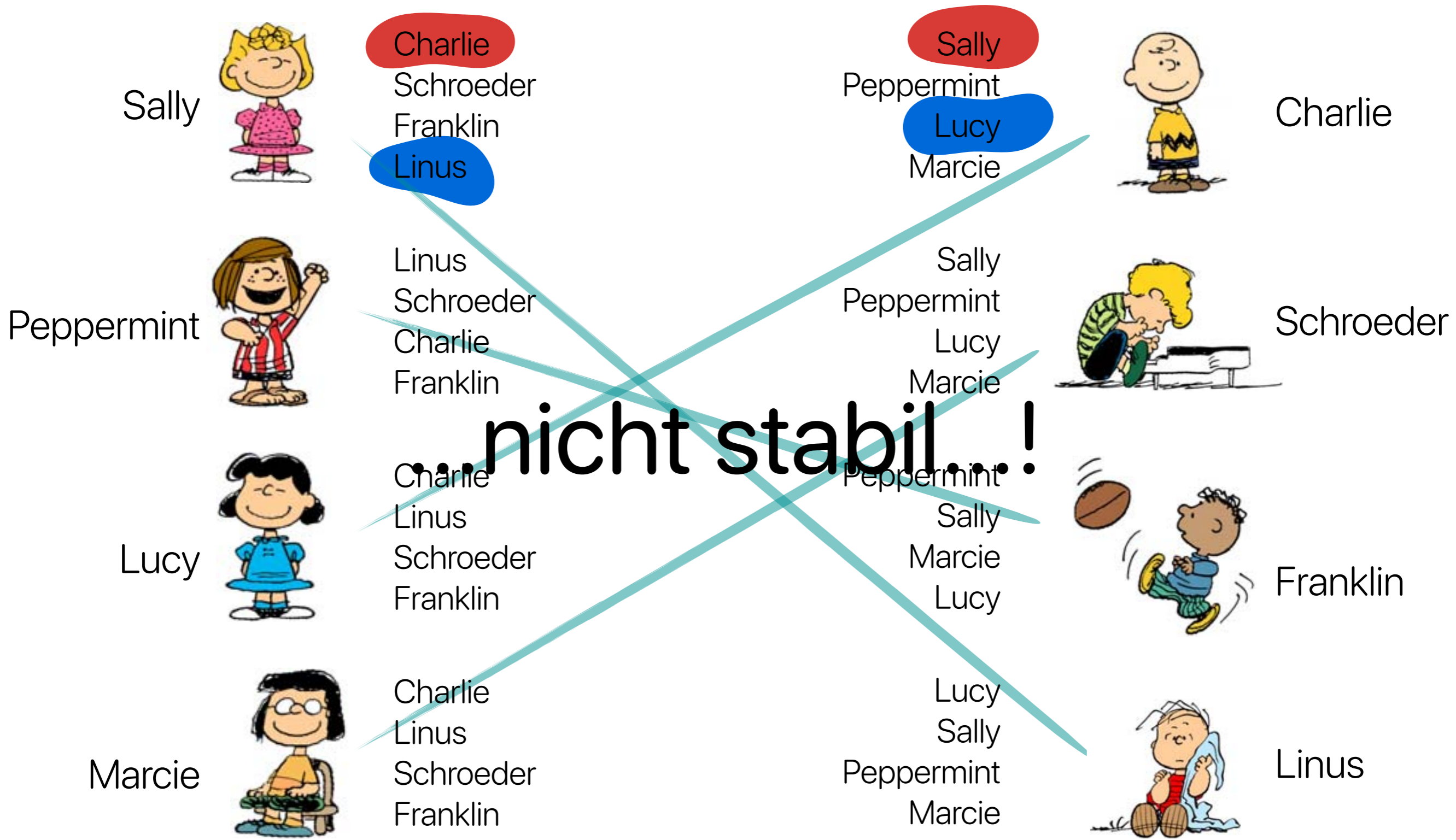
Linus











Sally



Charlie
Schroeder
Franklin
Linus

Sally
Peppermint
Lucy
Marcie



Charlie

Peppermint



Linus
Schroeder
Charlie
Franklin

Sally
Peppermint
Lucy
Marcie



Schroeder

Lucy



Charlie
Linus
Schroeder
Franklin

Peppermint
Sally
Marcie
Lucy



Franklin

Marcie



Charlie
Linus
Schroeder
Franklin

Lucy
Sally
Peppermint
Marcie



Linus

Sally



Charlie
Schroeder
Franklin
Linus

Sally
Peppermint
Lucy
Marcie



Charlie

Peppermint



Linus
Schroeder
Charlie
Franklin

Sally
Peppermint
Lucy
Marcie



Schroeder

Lucy



Charlie
Linus
Schroeder
Franklin

Peppermint
Sally
Marcie
Lucy



Franklin

Marcie



Charlie
Linus
Schroeder
Franklin

Lucy
Sally
Peppermint
Marcie



Linus



Sally



Charlie
Schroeder
Franklin
Linus

Sally
Peppermint
Lucy
Marcie



Charlie

Peppermint



Linus
Schroeder
Charlie
Franklin

Sally
Peppermint
Lucy
Marcie



Schroeder

stabil... yay!

Lucy



Charlie
Linus
Schroeder
Franklin

Peppermint
Sally
Marcie
Lucy



Franklin

Marcie



Charlie
Linus
Schroeder
Franklin

Lucy
Sally
Peppermint
Marcie



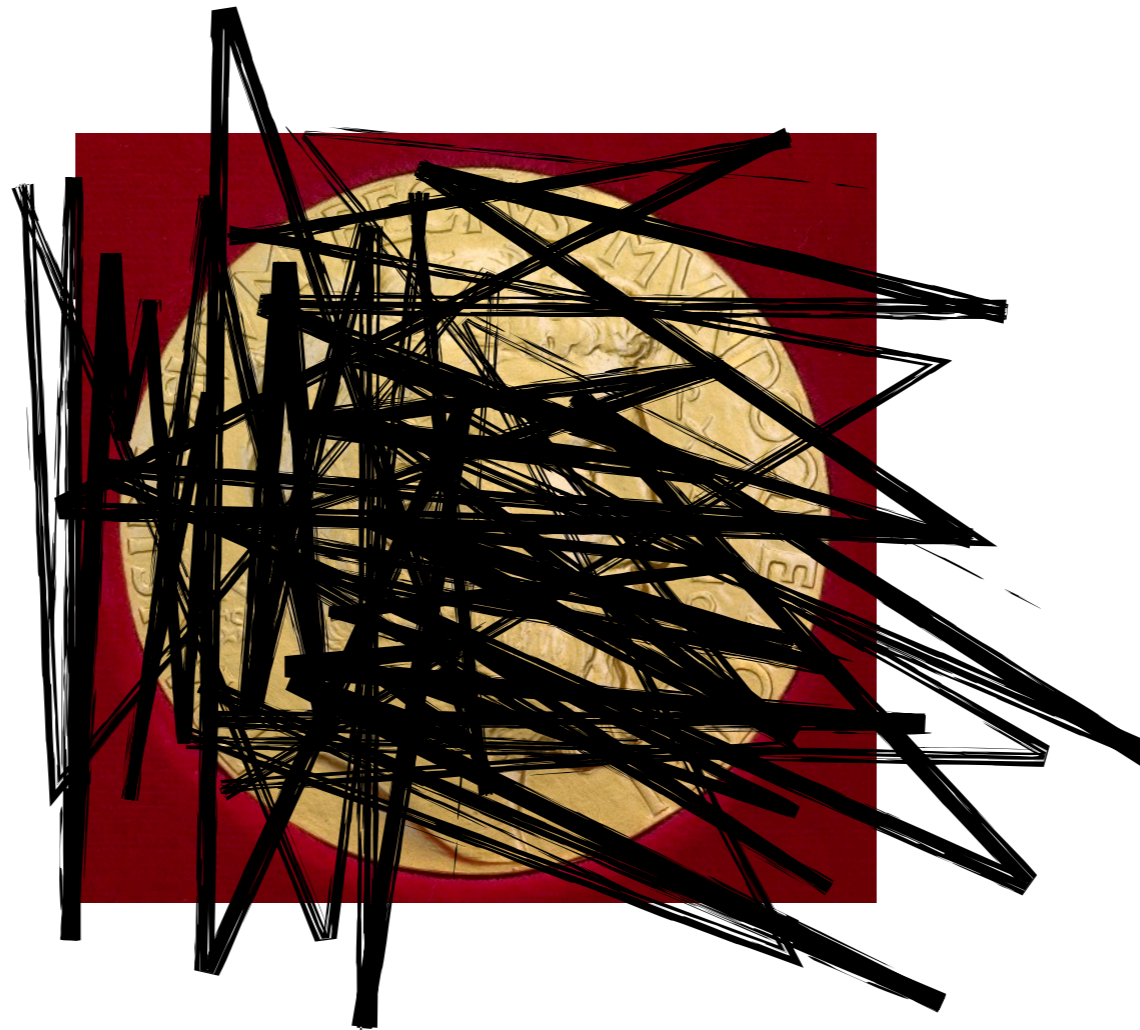
Linus



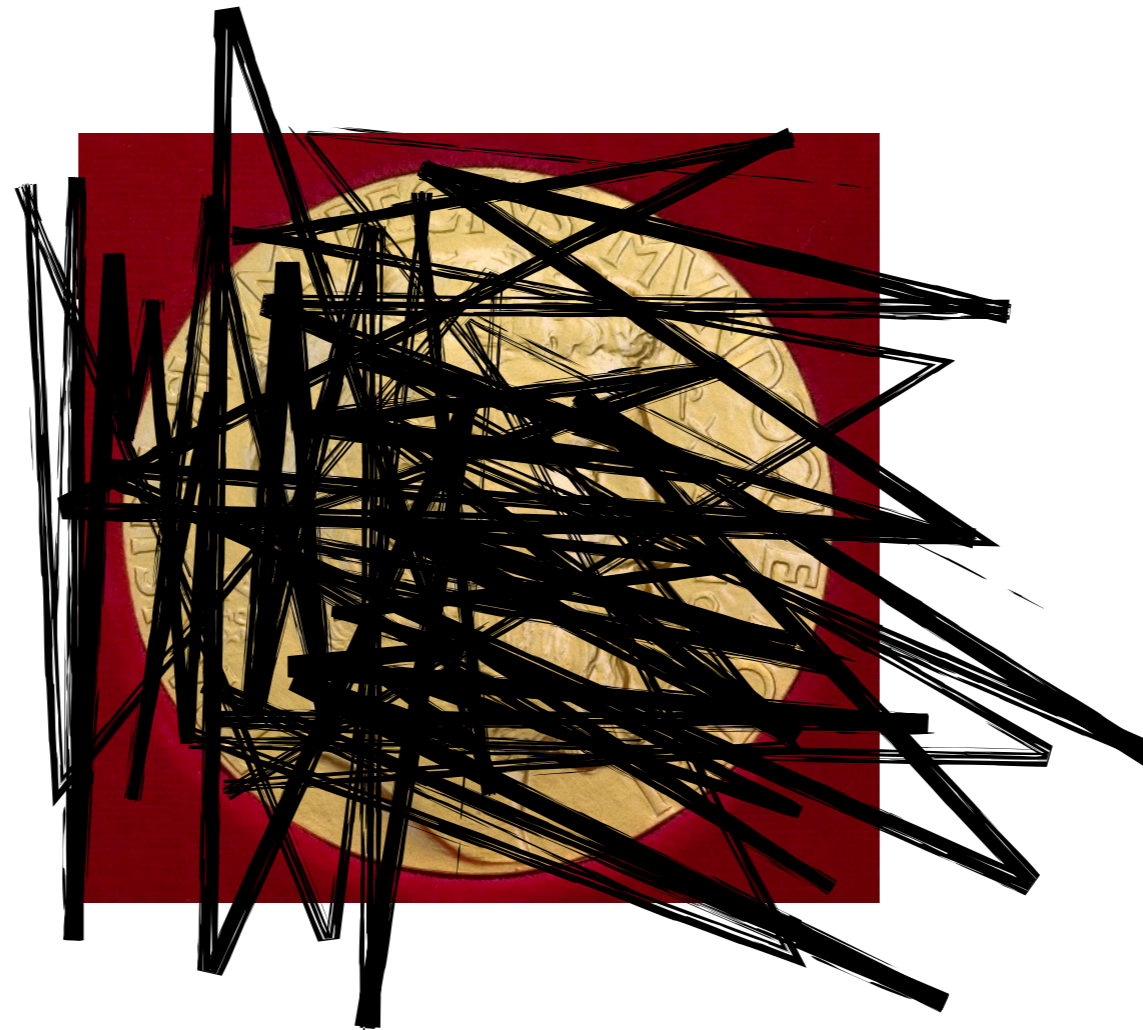
3/2-Approximation für das metrische TSP?



3/2-Approximation für das metrische TSP?



3/2-Approximation für das metrische TSP?



(...there is not even a wikipedia article on Nicos Christofides...)

A (Slightly) Improved Approximation Algorithm for Metric TSP

Anna R. Karlin,^{*} Nathan Klein,[†] and Shayan Oveis Gharan[‡]

University of Washington

September 1, 2020

Abstract

For some $\epsilon > 10^{-36}$ we give a $3/2 - \epsilon$ approximation algorithm for metric TSP.

<https://arxiv.org/pdf/2007.01409.pdf>

