



Two school systems, one district: What to do when a unified admissions process is impossible [☆]



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ABSTRACT

When groups of schools within a single district run their admission processes independently of one another, the resulting match is often inefficient: many children are left unmatched and seats are left unfilled.

We study the problem of re-matching students to take advantage of these empty seats in a context where there are priorities to respect. We propose an iterative way in which each group may independently match and re-match students to its schools.

The advantages of this process are that every iteration leads to a Pareto improvement and a reduction in waste while maintaining respect of the priorities. Furthermore, it reaches a non-wasteful match within a finite number of iterations.

While iterating may be costly, as it involves asking for inputs from the children, there are significant gains from the first few iterations. We show this analytically for certain stylized problems and computationally for a few others.

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1. Introduction

Across the United States there are many instances where schools are broken into groups which are antagonistic towards one another. The fault lines are often between public schools and charter or voucher systems.

The earliest voucher systems date back to the 19th century when Maine and Vermont funded students from sparsely populated areas, far from public schools, to be educated at private schools. Currently twelve states and Washington D.C. offer voucher programs. Typically, a voucher covers a low income child's expenses should he or she attend a private rather than a public school.

Charter schools are publicly funded but independently administered schools. Since the 1970s, they have become increasingly common. In New Orleans, LA the majority of children are educated at charter schools (Mullins, 2014). All but eight states currently have laws permitting charter schools.

While the specifics regarding eligibility and implementation of these programs vary between school districts, there is one important feature that is typical: The processes of matching students to different groups of schools are independent of one another. The parents of children who are matched to schools by both processes make a choice at the very end. It is not hard to see that this leads to inefficiencies: seats in one school system are "wasted" on children who end up choosing to go

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to the other system. Consequently, at the end, many children are left unmatched or matched to schools that they find worse than others with empty seats. In Milwaukee, WI, which has a voucher system, many students are left to participate in what is called “open enrollment” at this stage. This is an uncoordinated and chaotic process where parents apply to individual schools in search of a seat for their child. This haphazard way of matching children to schools is inefficient and leads to violations of priorities that children have at schools. In New Orleans many of these children simply do not show up on the first day of classes (Dreilinger, 2013b).

From the sizable literature on school choice, starting with Abdulkadiroğlu and Sönmez (2003), it is clear that the “right” solution for this problem is a unified process of matching children to schools using the “child-optimal fair rule.”¹

Such a unified process, however, is not always possible. In Milwaukee, each public school is funded proportionally to the number of students it enrolls. The public school system (Milwaukee Public Schools or MPS) loses money for every student that is enrolled at a private school. Similarly, private schools (Milwaukee Parental Choice Program or MPCP) lose money for every student that is enrolled at a public school. The amount at stake per student was \$6,442 for the 2013–14 school year (Wisconsin Statute 119.23).

Below we quote a Milwaukee based journalist who focuses on the local education system.²

“I do not foresee MPS working with MPCP because they are both competing for the same crop of school-aged, Milwaukee resident children. And each has a vested interest in getting as many kids as possible to attend their respective schools because each kid gives them state money.”

—Erin Richards of the Milwaukee Journal Sentinel.³

This adversarial relationship between MPS and MPCP makes it politically infeasible to impose a unified matching process. It is possible, however, to control the separate processes that the two groups use to match children to their schools. Currently, both are required to match children in a way that takes certain priorities into account.⁴ Neither group uses a well designed matching process. Private school admissions are entirely decentralized. Public schools use a variant of the “Boston rule” (Abdulkadiroğlu and Sönmez, 2003) where each child only ranks three alternatives.

In New Orleans, though most schools are chartered they are administered by two different bodies: the Orleans Parish School Board and the Recovery School Board. Attempts to unify the admissions processes have failed (Dreilinger, 2013b).⁵ The issue of wasted seats has turned out to be severe, resulting in enrolled children failing to show up on the first day of classes (Dreilinger, 2013a).

While a unified admissions process is typically not possible, that the two groups can be required to follow certain rules (such as using priorities to break ties) suggests that it may be reasonable to expect that, in many cases, the authorities could require each group of schools to use the child-optimal fair rule restricted to that group.

This is still not enough. Once the various⁶ groups of schools separately match students using the child-optimal fair rule, the problem of wasted seats persists. In fact, as long as there are priorities that are to be respected, we show that it persists no matter what separate matching rules the groups of schools use (Theorem 1).

We are interested in finding a good way to deal with these vacant seats. The authorities may be able to dictate how the children are “re-matched” to schools to take advantage of vacant seats after the first match. We offer an iterated process where the groups of schools separately match and re-match students to schools until there are no wasted seats.⁷ We are unaware of other work on the topic of solving parts of a single matching problem in parallel.⁸

The process that we prescribe can be thought of as being “slightly decentralized.” Admission to each group of schools is done in a centralized way specific to that group.⁹ These various groups, however, are granted a measure of autonomy as they may run admissions algorithms for their schools independently.

Our process is as follows. Each child submits to each group of schools his preferences over those schools. Each group of schools separately applies the child-optimal fair rule restricted to that group of schools. A child who is matched to a school

¹ This rule, often called the “Deferred Acceptance” rule, has repeatedly turned out to be attractive from both efficiency and strategic points of view when there are fairness constraints in terms of school priorities over children (Abdulkadiroğlu et al., 2005a; Abdulkadiroğlu et al., 2005b; Kojima and Manea, 2010; Ehlers and Klaus, 2013; Abdulkadiroğlu et al., 2009; Kesten and Kurino, 2013; Alva and Manjunath, 2015).

² Neither MPS nor MPCP have responded to requests for comments.

³ This quote is from an email correspondence.

⁴ These are orderings over the children that dictate precedence of the children at various schools. They are usually based on coarse criteria with random tie-breaking. Even private schools are required to respect lottery based priorities when there are more applicants than available seats.

⁵ Ekmekci and Yenmez (2014) offer an explanation of why such attempts have failed in New Orleans and other cities. They also explore ways to provide incentives for charter schools to join a centralized clearinghouse.

⁶ The analysis in the paper applies even to the case of more than two groups of schools.

⁷ Dur and Kesten (2013) study a model of “sequential assignment” where two assignment problems are solved one after the other. The solution of the second problem takes as an input the allocation chosen for the first one. Their concern is with the strategic implications of matching in two steps rather than one. They provide conditions on sequential solutions to guarantee that the subgame perfect Nash equilibrium outcomes of the preference revelation game are fair.

⁸ Anno and Kurino (2014) study the parallel solution of separate problems involving the same people.

⁹ A “decentralized” method might involve “wait lists.” Such a process would be fraught with the kinds of coordination problems described above. Our goal is to depart from a fully centralized process in a way that the groups of schools have a sense of autonomy yet achieve a non-wasteful match.

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