

The Demise of Walk Zones in Boston: Priorities vs. Precedence in School Choice

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History of Student Assignment in Boston

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“The Soiling of Old Glory” by Stanley J. Forman
1977 Pulitzer Prize for Spot Photography

History of Student Assignment in Boston

- **September 1987:** The U. S. Court of Appeals rules that BPS has attained **unitary** status in school assignments, meaning schools are as desegregated as they can be given city demographics.
 - ✓ The BPS is free to design a new assignment plan, with no restrictions, as long as it does not take any action that might intentionally resegregate the schools.
- **December 1988:** New plan put forth where elementary and middle schools are organized into three zones: East, North, West.
 - ✓ Racial/ethnic “ideal racial percentages” (IRPs) are established in each zone reflecting the zone’s student population.
Assignment geared to be within 10% of the zone IRP whereas 35% of the seats are set aside for minorities at exam schools.
 - ✓ The mechanism, now known as the **Boston mechanism**, is adopted.
 - ✓ Sibling and walk zone priorities are introduced.

History of Student Assignment in Boston

- **July 1999:** Following a series of lawsuits, the School Committee votes to eliminate the use of racial/ethnic classifications in all school assignments, effective in the 2000-01 school year.
- **November 1999:** As recommended by Supt. Payzant, the School Committee adopts the New Choice Plan which reduces walk zone priority from 100% to 50%.
 - ✓ Serves as a compromise between proponents of neighborhood assignment and open access.
 - ✓ **Actual language of the BPS memo:**
“Fifty percent walk zone preference means that half of the seats at a given school are subject to walk zone preference. The remaining seats are open to students outside the walk zone.”

History of Student Assignment in Boston

- **July 2005:** Following a two year community engagement process triggered by the critic of the Boston mechanism in Abdulkadiroğlu and Sönmez (2003), School Committee approves adoption of the **student-proposing deferred acceptance algorithm (DA)** (Gale and Shapley 1962).
 - ✓ Replacing “excessively” manipulable Boston mechanism with a **strategy-proof** counterpart was the primary motivation of this reform.

- Since Boston adopted this procedure, it has spread:
 - ✓ 2007: British government bans use of versions of the Boston mechanism mandating the DA (referred as **equal preference** mechanism) in Nationwide admissions code.
 - ✓ 2009: Chicago abandoned the Boston mechanism midstream for its assignment to elite high schools, adopting DA.
 - ✓ 2012: Student assignment reform at Denver public schools.
 - ✓ 2012: Economics Nobel Prize awarded for “Stable allocation and the practice of market design.”
- Moreover, implications of policy decisions on allocation of **“property rights”** on public school seats became more tractable and transparent by the adoption of the DA.

This is at the heart of the 2012-2013 student assignment reform at BPS.

2012-2013 Reform of Student Assignment in Boston

- **January 2012:** In his State of the City Address, Mayor Menino articulated support for the faction in favor of greater neighborhood assignment.

Mayor Menino: **Finishing the Job on School Assignment**

- ✓ “Pick any street in our city. A dozen children probably attend a dozen different schools. Parents might not know each other; children might not play together. They can’t carpool, or study for the same tests. We won’t have the schools our kids deserve until we build school communities that serve them well.”

“Boston will have a radically different school assignment process one that puts priority on assigning children to schools that are closer to their homes.”
- ✓ Mayor Menino and Supt. Johnson then announce the formation of an External Advisory Committee (EAC) to help BPS develop a new plan in partnership with the community.

An Unexpected Advocate for Neighborhood Assignment

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The Boston Globe

TED LANDMARK

It's time to end busing in Boston



The city's demographics have changed since busing began, says Ted Landmark, who was the target of this angry demonstrator brandishing an American flag during the school busing riots on April 5, 1976. (©Stanley Forman)

By [Ted Landmark](#)

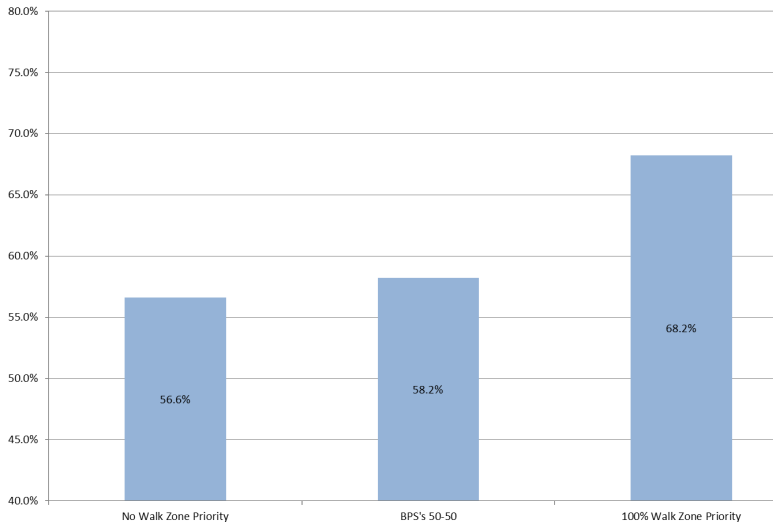
January 31, 2009

A Careful Look at the Role of Walk Zone Priority in Boston

- When BPS reduced the fraction of walk zone seats from 100% to 50% in 1999, Supt. Payzant emphasized that this reform serves as a compromise between proponents of neighborhood assignment and open access.
- Given the 2012 State of the City Address of Mayor Menino, shall we conclude that the reduction of the fraction of walk zone seats from 100 % to 50 % shifted the balance too much to the detriment of neighborhood assignment?
- Fortunately strategy-proofness of the DA allows us to consider various counterfactuals:
 - ✓ How would the outcome change if walk zone priority was maintained for all seats?
 - ✓ On the other extreme, how would the outcome change if walk zone priority was to be abandoned altogether?

A Puzzle

Grade K2, 2009-2012, Round 1
Fraction of Assigned Students Assigned to Walk Zone School



A Puzzle

- The outcome under BPS 50-50 “compromise” is surprisingly close to the outcome in the absence of any walk zone priority!

How can that be?

- In order to solve this puzzle, we shall of course understand how BPS implements the DA when half of the seats have walk zone priority while the other half does not.
 - ✓ In particular, a seat from which half is used up when a student has high enough priority for both types of seats?

Ex: Consider a walk zone student with a really favorable lottery number.

BPS Implementation of DA with 50/50 Slot Split

- BPS treats each school as two separate schools with half capacity each where the first half has walk zone priority and the second half does not.
- Since students provide a ranking of schools, rather than their halves, they need to decide how to “convert” student preferences over schools to student preferences over school-halves.
- At BPS this has been done by systematically ranking the walk-half before the open-half at each school but otherwise respecting the ranking between schools.

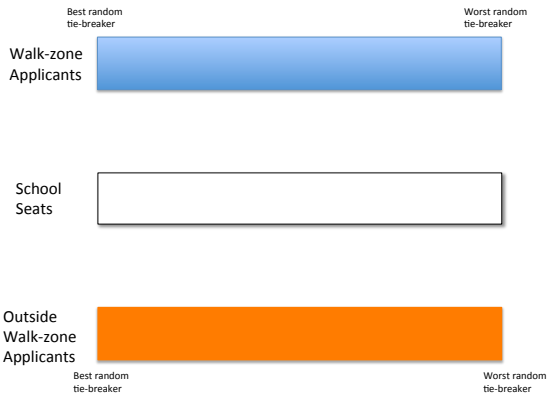
Interestingly, this decision was viewed as a detail and left to BPS software support.

- Let us walk through the implications of this “coding decision” for a simple example with:
 - ✓ One school with twice as many applicants as the # of seats, and
 - ✓ the same # of walk zone applicants as outside applicants.

An Example (From 03/07/2013 Testimony before the Boston School Committee)

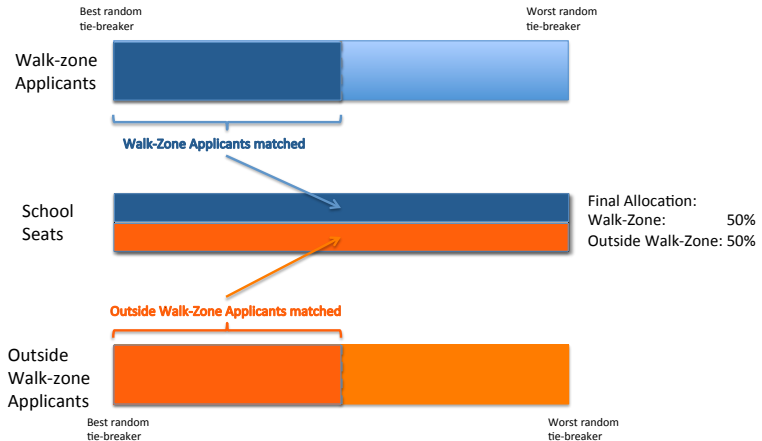
For simplicity, this example assumes same number of walk-zone applicants and outside walk-zone applicants.

Scenario 1: All Slots are open (0% Walk-Zone Priority)



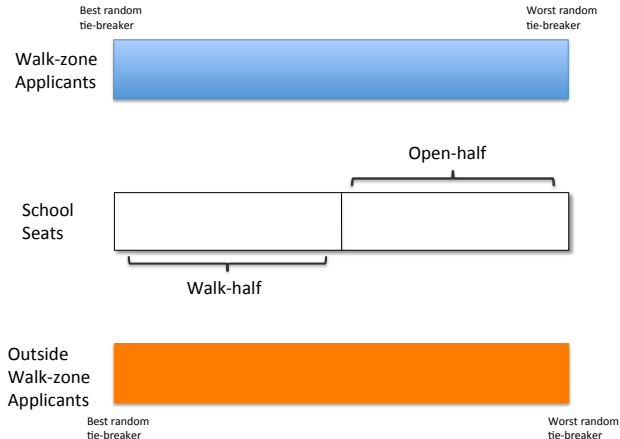
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Scenario 1: All Slots are open (0% Walk-Zone Priority)



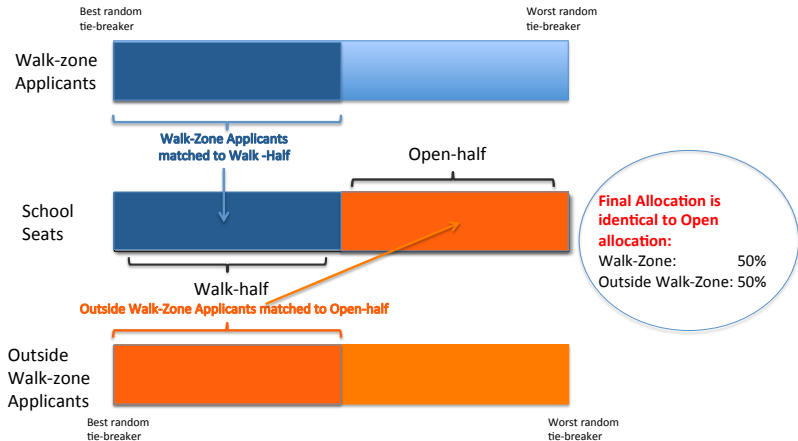
For simplicity, this example assumes same number of walk-zone applicants and outside walk-zone applicants.

Scenario 2: 50-50 slot split (50% Walk-Zone Priority – 50% Open Priority),
Walk-half first – Open-half next, Same tie-breaker for both halves (**Current BPS**)



For simplicity, this example assumes same number of walk-zone applicants and outside walk-zone applicants.

Scenario 2: 50-50 slot split (50% Walk-Zone Priority – 50% Open Priority),
Walk-half first – Open-half next, Same tie-breaker for both halves (**Current BPS**)



Why does the BPS treatment of the two halves eliminate the potential “second-bite” role of the open-half?

There are two reasons:

1. PROCESSING ORDER BIAS: The earlier the walk-zone slots are processed, the fewer the number of Walk-zone applicants are to compete for open slots.

Walk-zone applicants
competing for open slots



Outside walk-zone applicants
competing for open slots



When the walk-half is processed before the open-half, twice as many outside applicants as walk-zone applicants compete for the open slots.

Had all applicants been given an **even** shot for open slots, a third of open slots would be assigned to walk-zone applicants and two-thirds to outside-walk zone applicants.



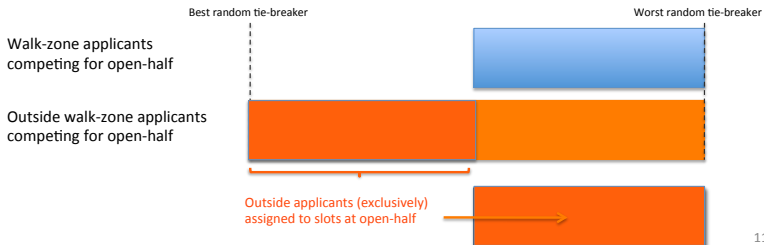
Elimination of the potential “second-bite” role of the Open-half

This is, however, not what happens under current BPS policy and the EAC recommendation. **Despite the intended “second-bite” at a school, none of the open slots are assigned to walk zone students!**

The more troublesome problem is the following:

2. RANDOMIZATION BIAS: There is an important unintended implication of using the **same** random tie-breaker for both halves. Since BPS first processes slots in the walk-half, **those who remain all have unfavorable lottery numbers.**

In this example, walk-zone students have no shot for the open half!



Policy Recommendation for BPS

Is there a fully transparent procedure which eliminates both types of biases in allocation of open slots?

Yes. The following **unbiased** treatment removes both sources of bias.

1. Rather than processing all slots in the walk-half before all slots in the open half, **rotate** between the two types of slots.

School Slots



2. To avoid the major disadvantage to walk-zone applicants at open slots, use a **second lottery number** for these slots. This will give walk-zone applicants a **fair** shot for open slots.

While removing both biases is ideal, correction of the second one is key to have a **transparent** system.

Otherwise, the 50-50 slot split appears **cosmetic** and may unintentionally mislead the community.

A School Choice Model with Slot-Specific Priorities

Notation:

I	Finite set of students
A	Finite set of schools
P^i	Preferences of student $i \in I$ over the set of schools A
S^a	Finite set of slots at school $a \in A$
$S \equiv \bigcup_{a \in A} S^a$	Set of all slots
π^s	Linear priority order of slot $s \in S$ over students in I
\triangleright^a	Order of precedence of slots at school $a \in A$

A School Choice Model with Slot-Specific Priorities

- Two features of our model differ it from earlier school choice models:
 - ① The **slot-specific priority** feature is unusual although not completely novel (eg. various school choice models with racial quotas, etc.).
 - ② The **order of precedence** regulates the processing of school slots in a linear way where $s \triangleright^a s'$ means that slot s is to be filled before slot s' at school a whenever possible for two slots $s, s' \in S^a$.

This feature is novel in matching problems.

- Special case of the model in Kominers and Sönmez (2012) which introduces slot-specific priorities to the matching with contracts (Hatfield and Milgrom 2005) framework.
- Generalizes the school choice model of Abdulkadiroğlu and Sönmez (2003) by allowing heterogenous slot priorities.
 - ✓ Nevertheless, DA easily extends to this model once the **choice function** of each school is constructed for given slot priorities and order of precedence.

Induced Choice Functions

- Given a school $a \in A$ with a set of slots S^a , a list of slot priorities $(\pi^s)_{s \in S^a}$, an order of precedence \triangleright^a with

$$s_a^1 \triangleright^a s_a^2 \triangleright^a \dots \triangleright^a s_a^{|S^a|},$$

and a set of students $J \subseteq I$, the **choice of school a from the set of students J** is denoted by $C^a(J)$, and is obtained as follows:

Slots at school a are filled one at a time following the order of precedence \triangleright^a . The highest priority student in J under $\pi^{s_a^1}$, say student j_1 , is chosen for slot s_a^1 of school a ; the highest priority student in $J \setminus \{j_1\}$ under $\pi^{s_a^2}$ is chosen for slot s_a^2 of school a , and so on.

DA under Slot-Specific Priorities

For a given list of slot priorities $(\pi^s)_{s \in S}$ and an order of precedence \triangleright^a at each school $a \in A$, the outcome of DA can be obtained as follows:

Step 1: Each student i applies to her top choice under P^i .

Each school a with a set of Step 1 applicants J_1^a tentatively holds the applicants in $C^a(J_1^a)$, and rejects the rest.

In general at Step ℓ ,

Step ℓ : Each student who is rejected at Step $(\ell - 1)$ applies to her next choice school.

Each school a considers its new applicants together with those on hold from Step $(\ell - 1)$, and uses its choice function C^a to determine which students are tentatively held and which students are rejected.

The algorithm terminates when no additional student is rejected.

Mix of Neighborhood-Based and Open Priority Structures

We are particularly interested in the slot priority structure used at BPS.

- There is a master priority order π^o that is **uniform** across all schools.
 - ✓ This master priority order is obtained via an even lottery and is often referred to as the **random-tiebreaker**.
- At each school in Boston, slot priorities depend on students' **walk-zone** and **sibling** statuses and the **random-tiebreaker** π^o .
 - ✓ For our theoretical analysis, we will consider a simplified version which only depends on walk-zone status and the random-tiebreaker.

We show in our empirical analysis that this is a good approximation for Boston Public Schools.

We are particularly interested in the slot priority structure used at BPS.

- For any school $a \in A$, there is a subset $I_a \subset I$ of **walk-zone students** that is determined with a concrete formula.
- There are two types of slots:
 - ① **Walk-zone** slots: For each walk-zone slot at a school a , any walk-zone student $i \in I_a$ has priority over any non-walk-zone student $j \in I \setminus I_a$, and the priority order within these two groups is determined with the random tie-breaker π^o .
 - ② **Open** slots: $\pi^s = \pi^o$ for each open slot s .
- BPS currently uses a DA where half of the slots at each school are walk-zone slots, while the remaining half are open slots.
 - ✓ This structure has been historically interpreted as a compromise between the proponents of neighborhood assignment and the proponents of open enrollment.

Comparative Statics: Replacing an Open Slot with a Walk-zone Slot

One might expect such a change to weakly increase the number of neighborhood assignments. Surprisingly, this may fail to be the case.

Example 2:

- **Schools:** $A = \{k, l, m, n\}$. Each school has two slots.
- **Students:** $I = \{i_1, i_2, i_3, i_4, i_5, i_6, i_7, i_8\}$.
- **Walk-zone Status:** There are two walk-zone students at each school:
 $I_k = \{i_1, i_2\}$, $I_l = \{i_3, i_4\}$, $I_m = \{i_5, i_6\}$ and $I_n = \{i_7, i_8\}$.
- **The random tie-breaker π^o :** $i_1 \succ i_8 \succ i_3 \succ i_4 \succ i_5 \succ i_6 \succ i_7 \succ i_2$
- **Student preferences:**

P^{i_2}	P^{i_8}	P^{i_3}	P^{i_4}	P^{i_5}	P^{i_6}	P^{i_7}	P^{i_8}
k	k	l	l	m	m	n	k
l	l	k	k	k	k	k	l
m	m	m	m	l	l	l	m
n	n	n	n	n	n	m	n

Comparative Statics: Replacing an Open Slot with a Walk-zone Slot

Scenario 1:

- ① Each school has one walk-zone slot and one open slot.
- ② The walk-zone slot has higher precedence than the open slot at each school.
- The outcome of DA for this case is:

$$\mu = \begin{pmatrix} i_1 & i_8 & i_3 & i_4 & i_5 & i_6 & i_7 & i_2 \\ k_w & k_o & l_w & l_o & m_w & m_o & n_w & n_o \end{pmatrix}$$

- Six students (blue matches above) are assigned to their walk-zone schools under Scenario 1.

Comparative Statics: Replacing an Open Slot with a Walk-zone Slot

Scenario 2: Same as Scenario 1 except replace the open slot at school k with a walk-zone slot, so that both slots at school k are walk-zone slots.

- The outcome of DA for Scenario 2 is:

$$\mu' = \begin{pmatrix} i_1 & i_2 & i_3 & i_8 & i_5 & i_4 & i_7 & i_6 \\ k_w & k_w & l_w & l_o & m_w & m_o & n_w & n_o \end{pmatrix}$$

- Five students (blue matches above) are assigned to their walk-zone schools in the second case.
- That is, the total number of walk-zone assignments decreased when the open slot at school k is replaced with a walk-zone slot.

Comparative Statics: Replacing an Open Slot with a Walk-zone Slot

Nevertheless, a less ambitious positive results holds.

Proposition 1: For any given order of precedence of slots, replacing an open slot with a walk-zone slot at a given school a weakly increases the number of walk-zone students who are assigned slots of school a under DA.

- The main policy motive behind increasing the share of walk-zone slots is to increase the share of neighborhood assignment.

As we have shown in Proposition 1, replacing an open slot with a walk-zone slot serves this goal through its “first-order effect” in the school directly affected by the change, although the overall effect across all schools might in theory be in the opposite direction.

- Nevertheless, our empirical analysis using data from BPS suggests that the first-order effect dominates – the overall effect is in the expected direction.

Comparative Statics: Decreasing the Precedence of a Walk-zone Slot

- While the role of the number of walk-zone slots as a policy tool is quite clear, the role of the order of precedence is much more subtle. Indeed, the choice of the order of precedence is often considered a minor technical detail, and until now it has not entered policy discussions.
- Qualitatively the effect of decreasing the order of precedence of a walk-zone slot is similar to the effect of replacing an open slot with a walk-zone slot.

While this may appear counter-intuitive at first, the reason is simple: By decreasing the order of precedence of a walk-zone slot, one increases the odds that a walk-zone student who has high enough priority for both types of slots is assigned to an open slot rather than a walk-zone slot. This in turn increases the competition for the open slots and decreases the competition for the walk-zone slots.

Comparative Statics: Decreasing the Precedence of a Walk-zone Slot

Proposition 2: Fix the set of walk-zone slots and the set of open slots at each school. Then, switching the order of precedence position of a walk-zone slot at a given school a with that of a subsequent open slot weakly increases the number of walk-zone students who are assigned to school a under DA.

- Given Example 2, it is not surprising to see that the aggregate effect of such a change across all schools may contradict its “first order” effect.

The next example is a small modification of Example 2 making this point.

Comparative Statics: Decreasing the Precedence of a Walk-zone Slot

Example 3:

- **Schools:** $A = \{k, l, m, n\}$. Each school has two slots.
- **Students:** $I = \{i_1, i_2, i_3, i_4, i_5, i_6, i_7, i_8\}$.
- **Walk-zone Status:** There are two walk-zone students at each school:
 $I_k = \{i_1, i_2\}$, $I_l = \{i_3, i_4\}$, $I_m = \{i_5, i_6\}$ and $I_n = \{i_7, i_8\}$.
- **The random tie-breaker π^o :** $i_1 \succ i_8 \succ i_3 \succ i_4 \succ i_5 \succ i_6 \succ i_7 \succ i_2$
- **Student preferences:**

P^{i_1}	P^{i_2}	P^{i_3}	P^{i_4}	P^{i_5}	P^{i_6}	P^{i_7}	P^{i_8}
k	k	l	l	m	m	n	k
l	l	k	k	k	k	k	l
m	m	m	m	l	l	l	m
n	n	n	n	n	n	m	n

Comparative Statics: Decreasing the Precedence of a Walk-zone Slot

Scenario 1:

- ① Each school has one walk-zone slot and one open slot.
- ② The walk-zone slot has higher precedence than the open slot at each school.
- The outcome of DA for this case is:

$$\mu = \begin{pmatrix} i_1 & i_8 & i_3 & i_4 & i_5 & i_6 & i_7 & i_2 \\ k_w & k_o & l_w & l_o & m_w & m_o & n_w & n_o \end{pmatrix}$$

- Six students (blue matches above) are assigned to their walk-zone schools under Scenario 1.

Comparative Statics: Decreasing the Precedence of a Walk-zone Slot

Scenario 2: Same as Scenario 1 except change the order of precedence at school k so that its open slot has higher precedence than its walk-zone slot.

- The outcome of DA for Scenario 2 is:

$$\mu' = \begin{pmatrix} i_1 & i_2 & i_3 & i_8 & i_5 & i_4 & i_7 & i_6 \\ k_o & k_w & l_w & l_o & m_w & m_o & n_w & n_o \end{pmatrix}$$

- Five students (blue matches above) are assigned to their walk-zone schools in the second case.
- That is, the total number of walk-zone assignments decreased when the precedence of the walk zone slot is reduced at school k .

Additional Results for Two Schools

- We obtain sharper theoretical results by focusing on the case of two schools where each student belongs to one walk zone.
- This simplified model is motivated in part by the commonly discussed policy objective of giving students from poorer neighborhoods access to desirable schools in richer neighborhoods.

Proposition 3: Suppose there are two schools. For any school and any order of precedence of its slots, replacing an open slot with a walk-zone slot weakly increases the total number of walk-zone assignments under DA.

Additional Results for Two Schools

- An immediate implication of Proposition 3 is the following intuitive result justifying the ideal policies of the two polar factions in Boston.

Corollary: Suppose there are two schools and the number of slots is fixed at both schools. Under DA:

- ① The minimum number of walk-zone assignments across all priority and precedence policies is obtained when all slots have open priority, and
- ② the maximum number of walk-zone assignments across all priority and precedence policies is obtained when all slots have walk-zone priority.

Additional Results for Two Schools

- A stronger version of Proposition 2 also holds for the case of two schools.

Proposition 4: Suppose there are two schools. Fix the set of walk-zone slots and the set of open slots at each school. Then, switching the order of precedence position of a walk-zone slot at a given school with that of a subsequent open slot weakly increases the total number of walk-zone assignments under DA.

- While the precedence alone does not cover the entire spectrum of outcomes reached via priority adjustment, it may cover a significant part as we present in our empirical analysis.

For the case of Boston, this portion is about 70% of the full policy spectrum.

Additional Results for Two Schools

- Based on 2009-2012 BPS data, the fraction of students who receive their first choices, second choices, etc. show virtually no response to changes in the fraction of walk-zone slots or the order of precedence. The next result provides a theoretical basis for this empirical observation.

Proposition 5: Suppose there are two schools. The number of students assigned to their top choice schools is independent of both the number of walk-zone slots and the choice of precedence order.

- An important policy implication of our last result is that the division of slots between walk-zone priority and open priority as well the order of precedence selection has little bearing on the aggregate number of students who receive their top choices; thus, the impact of these DA calibrations on student welfare is mostly distributional.

Main Empirical Results

Table 1. Difference between the Current Boston Mechanism and Alternative Walk Zone Splits

<u>Grade K1</u>				<u>Grade K2</u>			<u>Grade 6</u>		
<u>Difference relative to current BPS</u>				<u>Difference relative to current BPS</u>			<u>Difference relative to current BPS</u>		
# students	0% Walk	100% Walk		# students	0% Walk	100% Walk	# students	0% Walk	100% Walk
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)
2009	1770	46 3%	336 19%	1715	28 2%	343 20%	2348	54 2%	205 9%
2010	1977	68 3%	392 20%	1902	62 3%	269 14%	2308	41 2%	171 7%
2011	2071	50 2%	387 19%	1821	90 5%	293 16%	2073	4 0%	225 11%
2012	2515	88 3%	504 20%	2301	101 4%	403 18%	2057	24 1%	247 12%
All	8333	252 3%	1619 19%	7739	281 4%	1308 17%	8786	123 1%	848 10%

Main Empirical Results

Table 2. Number of Students Assigned to School in Walk Zone (2009-2012), Single Random Number

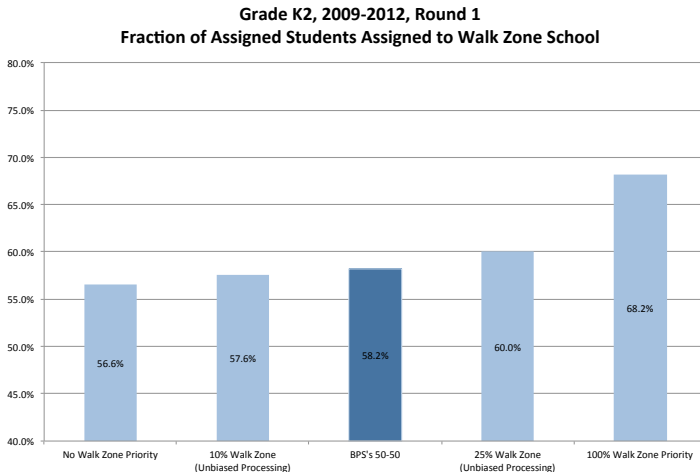
	Priorities = 0% Walk	Priorities = 50% Walk Changing Precedence					Priorities = 100% Walk
		Walk-Open	Actual BPS	Rotating	Compromise (W25-050-W25)	Open-Walk	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>I. Grade K1</u>							
Walk Zone	3849 46.2%	3879 46.6%	3930 47.2%	4080 49.0%	4227 50.7%	4570 54.8%	4787 57.4%
Outside Walk Zone	2430 29.2%	2399 28.8%	2353 28.2%	2187 26.2%	2044 24.5%	1695 20.3%	1468 17.6%
Unassigned	2054 24.6%	2055 24.7%	2050 24.6%	2066 24.8%	2062 24.7%	2068 24.8%	2078 24.9%
<u>II. Grade K2</u>							
Walk Zone	3651 47.2%	3685 47.6%	3753 48.5%	3842 49.6%	3900 50.4%	4214 54.5%	4374 56.5%
Outside Walk Zone	2799 36.2%	2764 35.7%	2694 34.8%	2601 33.6%	2538 32.8%	2214 28.6%	2036 26.3%
Unassigned	1289 16.7%	1290 16.7%	1292 16.7%	1296 16.7%	1301 16.8%	1311 16.9%	1329 17.2%
<u>III. Grade 06</u>							
Walk Zone	3439 39.1%	3476 39.6%	3484 39.7%	3542 40.3%	3657 41.6%	3797 43.2%	3907 44.5%
Outside Walk Zone	4782 54.4%	4750 54.1%	4743 54.0%	4686 53.3%	4561 51.9%	4419 50.3%	4309 49.0%
Unassigned	565 6.4%	560 6.4%	559 6.4%	558 6.4%	568 6.5%	570 6.5%	570 6.5%

Main Empirical Results

Table 3. Number of Students Assigned to School in Walk Zone (2009-2012), Two Random Numbers

	Total of Number of Students Assigned to School in Walk Zone (2005-2024) - Two Random Numbers						
	<u>Priorities = 0% Walk</u>	<u>Priorities = 10% Walk</u>	<u>Priorities = 25% Walk</u>	<u>Priorities = 50% Walk Changing Precedence</u>			<u>Priorities = 100% Walk</u>
		Rotating: Two Random (W-O-O-O-O-O-O-O-O)	Rotating: Two Random (W-O-O-O)	Walk-Open: Two Random	Rotating: Two Random (O-W-O-W-...)	Open-Walk: Two Random	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
					<u>I. Grade K1</u>		
Walk Zone	3849 46.2%	3939 47.3%	4133 49.6%	4008 48.1%	4305 51.7%	4551 54.6%	4787 57.4%
Outside Walk Zone	2430 29.2%	2339 28.1%	2140 25.7%	2245 26.9%	1941 23.3%	1721 20.7%	1468 17.6%
Unassigned	2054 24.6%	2055 24.7%	2060 24.7%	2080 25.0%	2087 25.0%	2061 24.7%	2078 24.9%
					<u>II. Grade K2</u>		
Walk Zone	3651 47.2%	3711 48.0%	3872 50.0%	3831 49.5%	4037 52.2%	4202 54.3%	4374 56.5%
Outside Walk Zone	2799 36.2%	2736 35.4%	2562 33.1%	2579 33.3%	2383 30.8%	2211 28.6%	2036 26.3%
Unassigned	1289 16.7%	1292 16.7%	1305 16.9%	1329 17.2%	1319 17.0%	1326 17.1%	1329 17.2%
					<u>III. Grade 06</u>		
Walk Zone	3439 39.1%	3481 39.6%	3568 40.6%	3572 40.7%	3691 42.0%	3808 43.3%	3907 44.5%
Outside Walk Zone	4782 54.4%	4726 53.8%	4631 52.7%	4608 52.4%	4507 51.3%	4397 50.0%	4309 49.0%
Unassigned	565 6.4%	579 6.6%	587 6.7%	606 6.9%	588 6.7%	581 6.6%	570 6.5%

Main Empirical Results



2012-2013 Reform of Student Assignment in Boston

“Boston will have a radically different school assignment process one that puts priority on assigning children to schools that are closer to their homes.”

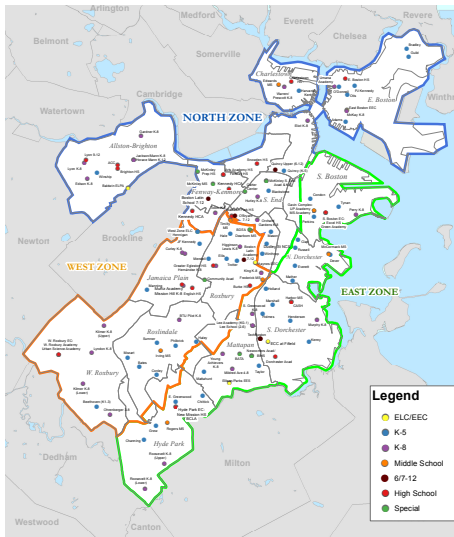
Mayor Menino, State of the City Address, January 2012

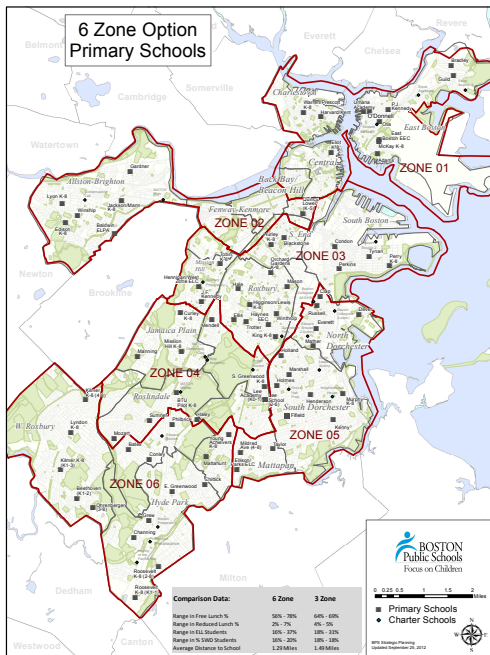
- An obvious way to increase neighborhood assignment is reducing the competition in the open-half of each school.

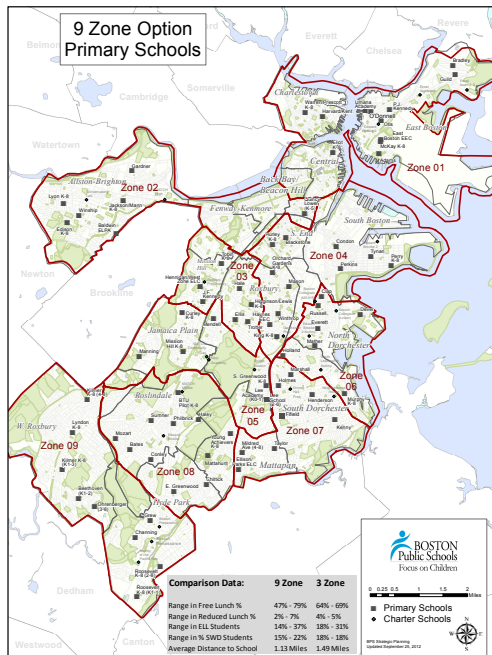
September 2012: BPS released five proposals to replace Boston's 3-zone assignment plan.

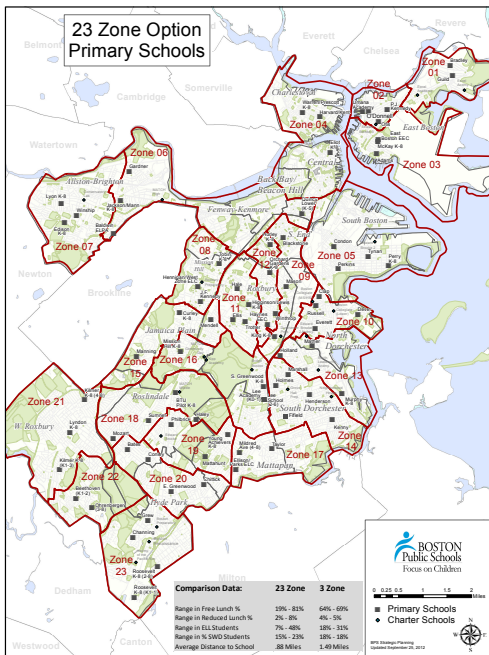
- ✓ 6-zone plan
- ✓ 9-zone plan
- ✓ 11-zone plan
- ✓ 23-zone plan
- ✓ No zone plan (a.k.a. Neighborhood assignment)

Current 3-zone Map









Plans upend Boston school assignments

Two of 5 would scrap geographic attendance in favor of neighborhoods

By James Vaznis and Travis Andersen | GLOBE STAFF | SEPTEMBER 25, 2012

ARTICLE PREVIEW GRAPHIC VIDEO COMMENTS (5) SUBSCRIBE

Boston school officials Monday night presented five proposals for assigning students to schools that would carve up the city into as many as 23 attendance regions. The other proposals would divide the city into either six, nine, or 11 zones. A fifth plan has no zones and would attempt to let students attend a school closest to their home. The proposals represent a big departure from the city's 23-year-old system of assigning students to schools, which chops up the city into three sprawling geographic regions.

BPS receives feedback on school choice plans from more than 1,850 people

'What we are hearing' report to External Advisory Committee includes results from 14 meetings and online survey

Contact Information: BPS Communications Office 617-635-9265,
communications@bostonpublicschools.org
October 23, 2012

A new report released Monday by Boston Public Schools[®] shows Boston families value walk zone priorities and believe the school choice system can be improved to create a student assignment system that's more predictable, more fair, and continues to offer more quality schools throughout the city. Independent reports have also determined the current three-zone system does not balance quality and diversity across the city and has room for improvement.

The Boston Globe

Metro

Study finds inequities in schools' zone plans

By Kathleen Burge | GLOBE STAFF | OCTOBER 01, 2013

ARTICLE GRAPHIC COMMENTS (2) SUBSCRIBE

PRINT REPRINTS E-MAIL SHARE

As Boston school officials propose new ways to assign students to schools, an analysis last week by a Harvard professor suggests that the plans are less fair than the current system and would make it even harder for students in the poorest neighborhoods to get into the city's best schools.

The report suggested that although students who live in different parts of Boston now have unequal access to the city's best schools, the proposals would increase that inequity and at least one would create new school zones without any high-quality schools.

"In general, all of these plans are less equitable than the current school assignment policy," said Meira Levinson, a professor in the Harvard Graduate School of Education and the mother of two Boston public school students.

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Metro

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Tips pour in on Gardner Museum art theft

Boy Scouts a surprise success in Boston

Air files on Internet activist's case, father asks

'Rockefeller' said to have been seen digging in yard

Based on Heavy Criticism Initial Zone Plans Lose Favor

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Middlesex DA will leave office next month

Middlesex DA Leone to step down, join Boston law firm

Shake Shack's local fans await a burger bash

MIT has plan for Boston school assignments

By [James Vaznis](#) | GLOBE STAFF | OCTOBER 28, 2012



ARTICLE



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SHARE

A new proposal for Boston school assignments presented Saturday by a Massachusetts Institute of Technology doctoral student was essentially pushed to front-runner status by an advisory committee, as five other proposals began to fall off the table, just one month after they were unveiled.

The [External Advisory Committee](#), appointed by the mayor, heard a presentation on the MIT proposal for the first time during a meeting Saturday morning at City Hall. Several members said it showed the greatest potential of providing equitable access to the city's limited number of quality schools, as the panel seeks to create a student-assignment system that allows more students to attend schools closer to their homes.

A key challenge in overhauling the current system, which provides students a wide range of school choices, has been a troubling reality: Long after Boston's period of busing students, the system continues to be unfair, with many students attending schools that are lackluster or failing, typically located in impoverished areas, while others go to better ones.

Under the proposal developed by Peng Shi of MIT's Operations Research Center, Boston would scrap its 23-year-old student-assignment system that divides the city's schools into three sprawling geographic zones. Instead, a computerized system would simply generate a choice of at least four schools near a family's home.

Critical Flaws in Initial Evaluations of Alternative Plans

- While numerous groups evaluated these plans, none of them used the DA, or any formal algorithm in their analysis.

Moreover evaluation of these alternative plans would require a thorough **demand analysis** since students historically did not have access to many schools that are available under these alternatives.

Simply put, these initial evaluations were “very crude” to say the least.

- With assistance from Parag Pathak and Peng Shi from MIT’s School Effectiveness and Inequality Initiative, a more careful analysis of various plans was provided for EAC evaluation in early 2013.
- This is also when “precedence” became part of the debate in Boston.
- **January 2013:** Pathak and Sönmez presented to EAC the **de facto elimination** of walk-zone priority under the current precedence used by the BPS.

BPS Proposes to Change the Precedence

Carlton Jones, Executive Director, Capital & Facilities Management, explained to the committee that BPS's recommendation is to utilize the compromise method in order to ensure that the walk-zone priority is not causing an unintended consequence that is not in stated policy.

Minutes from the EAC Meeting, January 14, 2013

But Various Groups Heavily Lobby Against the Change!



Smart Growth & Regional Collaboration

Preliminary Analysis of 10-Zone and Home-Based Assignment Proposals Metropolitan Area Planning Council¹ February 7, 2013

Summary

MAPC has completed a preliminary review of the most recent school assignment proposals put forward by the Boston Public School Department (BPS) and presented to the External Advisory Committee on School Choice (EAC) on January 23, 2013. The proposed “10-Zone” plan would allow each student to choose from any schools in their zone or any school within a mile, even if in another zone. The “Home-Based” plans (“A” and “B”) give students a choice of all schools within a mile of their home and additional higher-quality schools beyond that distance². All three alternatives include citywide schools, an ELL overlay, and a Students with Disabilities overlay.

Our conclusion—although preliminary—is that under the Home-Based plans, equity of access to quality would be comparable to or better than the current system, while average travel distances would be substantially reduced. However, we have serious concerns about the district’s proposed use of a new processing order for walk zone priority and, more generally, the applicability and relevance of a 50% goal for walk zone attendance under such a plan. With regard to segregation, all three alternatives could modestly increase the degree to which some schools have a disproportionate number of students from any given racial or socioeconomic background. Given the available data, it is not yet clear how significant the changes might be.

MAPC plans to continue its analysis of the proposed assignment plans and will issue a final report in advance of the EAC’s final decision.

Final EAC Recommendation

- Various groups argue that all of the proposed plans severely restrict choice and some lobby for completely removing walk-zone priority while others lobby for keeping the current precedence.
- **February 2013:** EAC recommends
 - ✓ Home-Based Plan A,
 - ✓ with walk-zone priority, and
 - ✓ **unchanged precedence.**
- EAC was mostly divided on whether to keep walk zone priority or to remove it, but it decided to recommend it since it has minimal effect on the outcome under the current order of precedence.

Last Minute Efforts by Market Designers

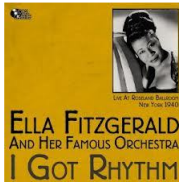
- Following the EAC recommendation, Pathak and Sönmez testified before the School Committee arguing that the current precedence not only **misleads the community** on the role of walk-zone priority but also it is **inconsistent with its original description** approved in November 1999 by the School Committee:

“Set the walk zone preference at 50% of seat allocations within school. Fifty percent walk zone preference means that half of the seats at a school are subject to walk zone preference. The remaining seats are **open** to students outside the walk zone.”

11/3/1999 BPS Memorandum

Reaction to Market Designers: Mixed Bag

“I got algo-rhythm, who could ask for anything more?”



past few years confirms the news. Wouldn't this be a great time to prove the word on the street wrong?

You know the word on the street. You've heard it as much as the Parent Imperfect has, and you've probably said it yourself. The [Boston School Committee](#) lacks vertebrae. As a committee appointed by the Mayor, it is a rubber stamp that almost never takes a position in opposition to its Appointer, and it absolutely never does that on an important issue. Even a quick look at the Committee's decisions over the

Comic relief was provided by two professors (one from BC, another from MIT) who spent an entire half hour explaining an arcane aspect of the way the famous “algorithm” works. All they needed to do was get up and dance across the stage singing, “I got algo-rhythm, who could ask for anything more?” Their point was a serious one, but did they deserve six times the space given to Quest or MAC to speak on behalf of an important segment of the district's parents? Frankly, I smelled a rat, as did one other Quest parent, who rose to speak about the professors

later. At the end of the professors' dissertation defense, School Committee member John Barros dismissed the importance of their point in about forty-five seconds. If this idea of playing with the “processing order” surfaces again, I'll need no more evidence that City Hall is marionetting this thing.



Final Decision: Transparency Wins in Boston

- **March 2013:** Supt. Johnson supports the EAC recommendation of Home-Based Plan A, but recommends against keeping the walk zone priority.

*"For the EAC effort I am extremely grateful, however, after considerable thought and deliberation, after reviewing that struggle and after viewing the final MIT and BC presentations on the way the walk zone priority actually works, it seems to me that it would be **unwise** to add a second priority to the Home-Based model by allowing the walk zone priority to be carried over."*

Final Decision: Transparency Wins in Boston

*"Leaving the walk zone priority to continue as it currently operates is not a good option. We know from research that it does not make a significant difference the way it is applied today: although people may have thought that it did, the walk zone priority does not in fact actually help students attend schools closer to home. The External Advisory Committee suggested taking this important issue up in two years, but I believe we are ready to take this step now. We must ensure the Home-Based system works in an **honest** and **transparent** way from the very beginning."*

Statement to School Committee by Supt. Johnson, 3/13/2012

- On March 13, 2013 the School Committee approved the final recommendation of Supt. Johnson.

Conclusion

- Precedence emerged as an important element of market design problems with diversity considerations.
- A more general analysis available for matching problems with slot-specific priorities (Kominers and Sönmez 2012).

While the standard substitutes condition may fail to hold on this more general model, the key properties of the **cumulative offer mechanism** (Hatfield and Milgrom 2005) – a natural generalization of DA – continue to hold.

- Much of the recent market design literature has focused on the design of allocation mechanisms.

With the wide recognition of DA and its generalizations in recent years, **design of priority structures** might prove to be a fruitful research area.