

## Abstract

While recycling is considered one of the easiest environmental behaviors for the general public to perform, those seeking to implement recycling on-the-go infrastructure have many unanswered questions about designing the most effective program. This poster begins to answer some design questions based on survey data that asked respondents to identify:

- which bin shapes, colors, and lids they associated with trash, recycling and composting
- what signage (language and images) helped them accurately determine what should go into a recycling bin.

## Introduction

Since the 1990s, many communities have provided curbside recycling for their residents. The number of such communities grew exponentially in the 2000s, along with the number of drop-off centers; surveys indicate that nearly 90% of households have access to recycling options (Moore Recycling Associates, 2011; Beck, 2009; American Forest and Paper Association Community Survey, 2010). Recycling in the commercial sector has also been growing, as businesses calculate the economics of recycling – realizing that it often can reduce costs or even, in some cases, generate revenue. However, unlike in homes and businesses, recycling options are woefully insufficient in public spaces, including parks, malls, and streetscapes, to name a few. This is largely due to the fact that there is an absence of infrastructure (or bins) for on-the-go recycling and because implementing recycling in such locations often presents operational costs that are sometimes difficult to overcome. According to a national study conducted by KAB in 2009, only 12% of the public spaces within the study's sample had recycling bins (Action Research, 2009).

## Methods

This survey was designed in partnership with Dr. Monique Turner at The George Washington University (GWU), and it was distributed to multiple audiences: a random purchased Survey Monkey sample, a snowball sample of KAB and GWU contacts, and a sample of Purdue students and faculty. The sample size varied from n=697 to n=489, as not all questions were asked of all audiences due to time constraints. These data were analyzed to identify recommendations for effective public space recycling bin infrastructure.

The survey covered the following categories:

- bin shape,
- bin color,
- lid cutout shape,
- bin signage (language and images)

Different options for each category were shown to respondents, and respondents selected which options, if any, they most closely associated with trash, recycling, or composting. Respondents were able to select as many options as they felt appropriate, as the focus was on learning all the bin elements that were associated with various disposal types, rather than only the primary.

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## Bin Shape

To rate bin shapes, photos of each bin shape were displayed in a uniform color, and respondents were allowed to select as many shapes as they associated with the type of bin in question (trash, recycling, composting).

- Trash - 56% of the respondents identified a round bin as a trash bin
- Recycling - The rectangular shaped bin was most frequently identified as a recycling bin (56%), however, 1/3 of the audience identified the wireframe (37%) or square (35%) bin shapes as recycling containers as well
- Composting - Bin shape is not an identifying factor for composting bins, as no shape was recognized by more than 1/3 of the audience.

**Key Takeaway: Recycling bins should be square or rectangular in shape.**



## Bin Color

Earlier research suggests that for trash, recycling, and composting bins, colors can be used to communicate the intended use of a bin (Montazeri, Gonzalez, Yoon, & Papalambros, 2012). In order to learn if there were one or more colors associated with each type of disposal, survey respondents could select as many colors as they associated with the given bin type (trash, recycling, composting). Survey results indicate that respondents identified the following:

- Trash - gray bin (78%).
- Recycling - blue bins (79%), followed by green (39%).
- Composting - respondents were less certain what color the bin should be, but nearly half the audience selected the brown (51%) or green (41%) bins, indicating that these may be good colors to use for this purpose.

**Key Takeaway: Recycling bins should be blue. Trash cans should be gray. Compost is not strongly associated with a color.**



## Bin Lid Cutout Types

To evaluate the understanding of different bin lid cutouts, respondents were presented with a series of pictures of bin lids, each with a different cutout shape (e.g. circular hole, slit, no cut out [i.e. intended to be lifted], etc.). For each bin lid cutout type, respondents were asked to choose which lid should be used to dispose of a set of materials: plastic water bottle, newspaper, banana peel, glass beer bottle, and candy wrapper.

- Respondents associate a lid with a circle cutout with plastic (81%) and glass (66%) bottles, a lid with a slit cutout with newspaper (81%), and a lid with both a circle and a slit with all three materials (plastic: 56%; glass 51%; newspaper: 54%).
- The “no cutout” lid seemingly had some association with a trash bin, so this shape may be best used for that purpose (banana peel: 40%; Candy wrapper: 31%).
- The diamond cutout lid and the no cutout lid were less strongly associated with a specific type of waste.

**Key Takeaway: A circle cutout is best for cans and bottles, a slit should be used for paper and a slit and circle should be used for a mixture of recyclable material.**



## Signage (Wording)

The survey question first asked respondents if the terms “commingled”, “single-stream”, and “mixed” recycling meant the same thing. Then, if the respondent said the terms were not all the same, they were given three follow up questions where they were asked to define what each term meant to them.

- 52% of the audience that did not believe these terms were the same were asked to define what they thought could go in a bin labeled with each term. Based on the data from this subset of respondents, the term “mixed” recycling most clearly indicates that all recyclables can go in a container (77%), followed by “commingled” (61%).
- “Single stream” seemed to be a point of confusion for most, as only 11% knew it meant all recyclables should go in the same container, while 45% had no idea what the term meant.

**Key Takeaway: Signage/wording should employ the term “mixed” to indicate all recyclables go in one container, versus using the term “single stream” or “commingled”.**

## Signage—Specific Material Communication

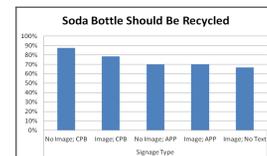
To communicate what goes into each bin, there is a variety of terminology for material types, as well as images, that could be employed. In order to learn the effectiveness of different types of signage, respondents were shown the 5 signs below and asked to choose which items they were CERTAIN could be placed in a bin with that label. Each sign varied in text and/or images. The text either read “Cans, Paper, Bottles” (CPB) or “Aluminum, Paper, Plastic” (APP). See the signs below.

The data was then graphed by material type in order to examine whether signage performed differently based on the item it was intended to collect.

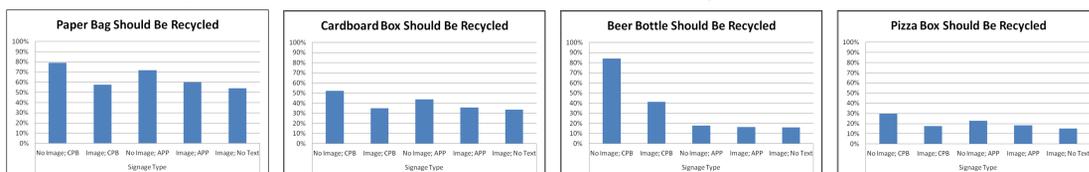


The analysis below is divided into three sections. The first section addresses materials that are always recyclable, and which should be deposited into the bin according to every signage scenario presented. The second section deals with materials that are sometimes recyclable, depending on the signage. Finally, the third section addresses materials that are not currently recyclable, and which should not be deposited into the recycling bin according to the signage presented.

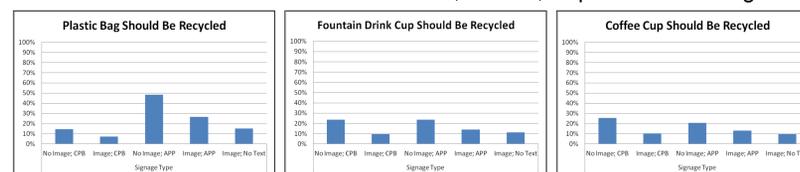
Over 80% of respondents understood that soda cans and water bottles were **always recyclable** under all signage conditions. For materials not pictured, understanding that they were also recyclable dipped slightly (Newspaper = 75% and Soda bottle = 68%).



Meaningful signage is so important, as materials acceptable for recycling varies by community. For those items that are **sometimes accepted** through a public space recycling program such as paper bags, cardboard boxes, beer bottles and pizza boxes, the results varied significantly.



For items that are **not recyclable** in almost all public space bins such as coffee cups, napkins, plastic bags, take-out food containers and fountain drink cups, the signage that was best suited to keeping these materials out of the bin was the use of the words “Cans, Bottles, Paper” with an image.



**Key Takeaways: Either text version and the use of these images will capture soda cans and water bottles. Be careful when using pictures as the exclusion of a commodity might decrease the recycling of that item. To dissuade users from placing non-recyclable items in a bin, use the text “Cans, Bottles, Paper” along with an image.**