# Bootlegging: Multidisciplinary Brainstorming with Cut-Ups

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## ABSTRACT

We introduce *bootlegging,* a structured brainstorming technique particularly suited to multidisciplinary settings. Participants first generate ideas in 2 rough groups, one having to do with users and usage situations and the other pertaining to a specific technology or domain. Results are then randomly combined to form unexpected juxtapositions. These combinations are used as the basis for several quick application brainstorms, after which promising ideas can be fleshed out to complete scenarios. Bootlegging stimulates participants' creativity without abandoning the target domain, and can be run efficiently even without a skilled facilitator. The technique has been successfully used in several thematic workshops.

## Author Keywords

Design methods, brainstorming, idea generation, multidisciplinary design

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Researchers, designers and application developers all benefit from methods that can help them think "out of the box" and come up with unexpected ideas. A particular case is quite familiar to engineers and researchers: to have a new and exciting technology available, for instance RFID tagging and sensors, but no clear vision of how to turn it into a viable product. Another case is when a new application area is made possible by technology, such as digital photography, which could enable a complete break from familiar analogue products. In an age of ubiquitous computing and ambient intelligence this is becoming increasingly urgent – what shall we do with all the networks, sensors and embedded processors that are turned out by research and engineering labs around the world?

We have developed *bootlegging,* a brainstorming technique that can be used to generate ideas in situations where the problem area or technology is fairly well defined but still open for new application ideas. It is particularly suited to situations where participants come from many different disciplines. Like other forms of brainstorming, the technique should be used in early in the process to generate ideas and possibilities. Interesting results could then be picked up and developed further using ethnographic studies, participatory design and other user-oriented methods. In this paper we give an overview of the bootlegging process, and present examples of how it has been used to generate application ideas in various domains, including music, robotics and architecture.

## TOWARDS EFFICIENT BRAINSTORMING

*Brainstorming* is a well-established technique for generating a large number of new ideas quickly [8]. Typically performed in groups, the goal is to generate as many ideas as possible related to a given topic or a specific problem. Brainstorming has been practiced for over 50 years, and several complementary techniques have been proposed. For instance, *bodystorming* turns abstract ideas into physical experiences in a form of role-play [7].

While the basic method of brainstorming is simple, there are many pitfalls that can make a session less efficient. One potential pitfall is that the process loses speed and gets stuck in discussions that are only interesting for a limited number of participants. Another is that the idea generation stagnates and the session does not produce any novel ideas. It is easy for people to fixate on their favorite topics and they may be unable to think outside their own experience – even though this is the primary goal of a brainstorm. Both these problems can be avoided by having an experienced and active facilitator, but this is not always available.

When we were devising our new brainstorm method there were two important goals. First, creating a sense of excitement and make it less likely for a session to loose speed or be derailed. Second, to support creativity by introducing an element of controlled randomness. The first part is accomplished by having very strict time schedules; for the second, we took inspiration from an artistic method.

## CUT-UPS AND BOOTLEGS

*Cut-up* is a form of literary collage, which was popularized by author William S. Burroughs [2]. Burroughs writes: "The method is simple. Here is one way to do it. Take a page. Like this page. Now cut down the middle. You have

four sections: 1 2 3 4 . . . one two three four. Now rearrange the sections placing section four with section one and section two with section three. And you have a new page. Sometimes it says much the same thing. Sometimes something quite different (…)" [2]

The principles have also been applied to other media. In popular music, *bootlegging* denotes the combination of disparate elements to create new works, e.g. joining the vocals of one song with the instrumental track of another [1]. We took the name of our technique from this practice.

## THE BOOTLEGGING TECHNIQUE

Bootlegging applies the concept of cut-up to brainstorming workshops. By mixing familiar concepts, it creates juxtapositions that stimulate creativity. However, it should not be confused with brainstorming methods based primarily on chance, such as *random words* [9]. Instead, it is closer to methods such as *extreme characters* and *interaction re-labelling* where the designer is forced to think in unusual paths, stimulating creativity [4].

When performing a bootlegging brainstorm, participants generate a number of ideas, which are then randomly combined. The type of ideas is very important. There should be one set of ideas that have to do with use and users, and another set that reflects the technology and/or specific domain under discussion. The power of bootlegging comes in the juxtaposition of these independently generated ideas, where the user side meets the technology side. Just as with the literary cut-up technique, such combinations often have interesting qualities not found in the original parts.

### The process

The bootlegging technique can be adapted for different conditions, e.g. available time and physical resources. Strict time constraints are important. Therefore, timekeepers must be designated to keep track of time for the whole group as well as in the smaller groups. In the following, we have given suggested time limits for each section, suitable for a fairly quick session taking approximately ½ day.

*Preparation:*
1. Decide the overall theme of the session, for instance *applications for intelligent buildings* or *entertainment applications on the road.*
2. Define four categories. Two of them should constrain the user side (e.g. *user group* and *activity*). One should be directly related to the theme (e.g. *type of vehicle*) and one should constrain the technical aspect (e.g. *infrastructure*)
3. Decide on a presentation format (e.g. physical mock-up, video prototype, an improvised performance, etc.)

*Generation (whole group):*
1. Brainstorm in the whole group on a category to create individual instances. Write down each instance on a single post-it note, with one color for each category *(5 minutes per category)*

*Mixing (whole group):*
1. Pick one item at random from each category to create a combination
2. Repeat until you have generated several combinations for each group (at least 4-5 each)

*Brainstorming (smaller groups):*
1. Pick one of the combinations and brainstorm about potential applications *(15 minutes each)*
2. Repeat several times depending on available time

*Final idea (smaller groups):*
1. Select one of the ideas for final presentation
2. Prepare a presentation of the idea in the chosen format *(45 minutes)*
3. Each group presents their idea to all participants in the chosen format *(10 minutes each)*

## PRACTICAL EXPERIENCE

We have successfully used the bootlegging technique in a number of settings. Below are brief accounts of three practical experiences, two led by the author and one by an independent facilitator.

### Designing robot applications for everyday use

This workshop gathered about 20 participants from a wide variety of backgrounds, both industry and academia. The purpose was to find new forms of interactive applications for robots, and go beyond the pre-conceived notions that are limiting their current use. It was a 2-day workshop, out of which bootlegging occupied about half the time.

We first split participants into 3 groups. Student volunteers were assigned to keep time in each group. Participants brainstormed for 10 minutes within each of the following categories:

- *Place or situation* (e.g. in the kitchen, running, commuting to work, etc.)
- *User or user group* (e.g. grandmothers, musicians, a secret agent, etc.)
- *Type of robot* (e.g. humanoid, wheeled robot, etc.)
- *Property of robot* (e.g. autonomous behavior, collaboration with others, etc.)

There were colored notepapers for each category and the participants generated several hundred notes in total. The notes were then mixed up and re-distributed among the groups, so that each group got to work with a mix of the results from all other groups.

Next, each group generated combinations by randomly pulling one note from each category and stapling them to a paper (see **Figure 1**). They brainstormed for 10 minutes about the potential application suggested by the combination, and wrote directly on the paper. Many combinations seemed surprisingly logical even though they had been generated completely at random. In most cases, participants found it easy to turn the combinations into application sketches. However, a few combinations were obviously unworkable, containing combinations that failed to generate any useful application ideas.
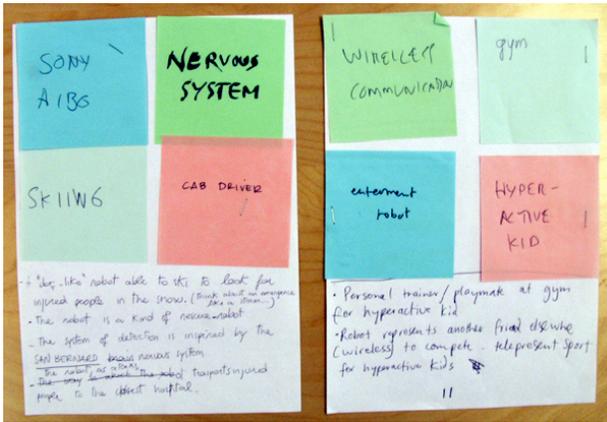
**Figure 1.** Examples of combinations generated in the Robot workshop

Below are two examples of initial combinations and the idea for applications that they inspired:

*Type:* Small flying robot
*Property:* Can perform face recognition
*Place/situation:* Plate
*User:* Dancer
*Application idea:* A flying plate at a discothèque offering drinks when it recognizes the face of customers

*Type:* Entertainment robot
*Property:* Wireless communication
*Place/situation:* Gym
*User:* Hyperactive kid
*Application idea:* A personal trainer or playmate for hyperactive children. The robot represents another friend somewhere else through wireless communication and lets the kids compete remotely

The participants then went through several guided steps to refine the application ideas, again within strict time limits. The final results were presented as mock-ups built with available material such as clay, paper, straw, glue, etc.; for more information see [5].

The overall impression of bootlegging from this workshop was very positive. Since participants came from many different backgrounds, the technique allowed them to explore novel ideas on a "level playing field" without any particular discipline or viewpoint being allowed to dominate. While many of the application ideas that were generated were quite far-fetched and not likely to become products any time soon, it was clear that the bootlegging technique also inspired many unusual and potentially useful application areas for robots. Overall, we felt the discussion, as well as the final results, were much more stimulating than they would have been if we had conducted a more traditional brainstorm.

**Mobile music workshop**
This workshop explored the emerging field of mobile music technology [6]. It attracted about 20 participants from industry and academia, including sociology, technology and

art. To stimulate communication and idea generation we included a bootlegging session of about 4 hours.

The whole group first brainstormed collectively for 5 minutes each in the following categories:

- *Situation or place* (e.g. driving, swimming, etc.)
- *Users* (e.g. school kids, artist, etc.)
- *Technology* (e.g. mobile phone, GPS, etc.)
- *Type of music use* (e.g. share, listen, organize, etc.)

As participants called out ideas, they were written down simultaneously on a whiteboard and on paper notes. Combinations were created by randomly selecting one note from each category. The participants then split into smaller groups. Each group was assigned 3 of the combinations to brainstorm on. An example outcome was the following:

*Situation:* Riding a bicycle
*User:* Taxi driver
*Technology:* 10 second flash-memory
*Type of music use:* Discovering new music
*Application idea:* The driver of a bicycle taxi plays short music fragments through a horn on the roof to attract customers. Since a bicycle taxi is about leisure rather than efficiency, the driver becomes a "social hub" for music. He helps passengers find new music and even sells songs to them, getting a cut of the profit.

Each group then selected their favorite idea and acted it out as a bodystorming scenario to explore the interaction in the application. Finally, the results were presented as a performance before the whole group (see **Figure 2**).

**Collaborative Artefacts workshop**
Inspired by one of our events, an independent person used the bootlegging technique at a workshop on collaborative and intelligent artefacts [3]. The session explored new types of intelligent objects that could be introduced in a building. The group was about 10 people and the session took 6 hours in total. The facilitator modified the method slightly to include only 3 categories:

- *People* (professor, secretary, etc.);



**Figure 2.** Workshop participants acting out a scenario – discovering new music in a taxi

- *Activity* (eating, flirting, spying, etc.)
- *Objects in the place* (books, tables, etc.)

After brainstorming for 5 minutes in each category, participants randomly combined one result from each category. They then brainstormed 5-10 minutes on each combination. An example was the following:

*Object:* Painting
*Activity:* Power extension
*People:* Visiting faculty
*Application idea:* Support for recharging computers; a digital image of the wall pinpoints the best available socket

The participants decided on their favorite application ideas and worked these out in smaller groups. The final results were presented in the form of act-outs.

This experience showed that the bootlegging technique can easily be picked up and used by others. The facilitator's impression was that the random combinations were very useful to get people away from their "pet" ideas and approach the topic with an open mind. He also experimented with letting participants create a few combinations by selecting keywords actively instead of at random. However, these self-selected combinations were found to be very disappointing, and no good ideas came out of this method. The impression was that the non-intuitive combinations generated by bootlegging were the most interesting, and that the technique made the overall process much more efficient than an ordinary brainstorm.

## DISCUSSION
All three of the above bootlegging sessions were successful in that they made a group of people who had for the most part not previously met, and did not share a common background, communicate creatively and break out of pre-conceived notions of their topic. The sessions generated a number of novel application ideas, some of which were obviously unrealistic but some which may lead to further development and perhaps even become actual products somewhere down the line. The time limits stopped participants from getting stuck in unproductive conversations and kept the process moving forward. The semi-random combinations, where the basic material is created by the participants and then mixed at random, was successful in inspiring new ideas without straying too far from the given theme. From informal feedback we also know that most participants enjoyed the bootlegging sessions very much and felt that they were very productive.

We found it to be more useful to generate the initial ideas and combinations in the full group rather than in smaller groups, as this creates a common ground and lets participants motivate each other. The main attraction of bootlegging seems to be the inspirational and unexpected juxtaposition of familiar elements. In the robot workshop we had designated almost half the time for selecting and refining a final design concept. However, several participants in the music workshop remarked that the most creative and enjoyable part was to brainstorm application ideas around the random combinations. Therefore we suggest dedicating proportionally more time to brainstorm about individual application ideas, and less to the refining and presentation of one or a few ideas. The final presentations are good to bring everybody back to the same page and share ideas, and here it seems the format of acting out scenarios worked very well. Mock-ups was also a good format but requires more preparation and materials.

## CONCLUSION
Our bootlegging technique has let participants break out of pre-conceived notions and generate novel application concepts within a specific theme. We have clearly seen how can create a common ground among a very diverse set of participants. It is simple enough to be picked up and applied by others after attending a single session. We believe that there are many opportunities for others to take advantage of bootlegging to stimulate idea generation.

However, since the process is very strict, the technique is less useful for experienced brainstormers or participants who want to speculate more freely within a topic. Furthermore, it is mainly meant to be used at the start of a design, and must be complemented with other user-oriented methods to carry ideas through to a completed design.

## ACKNOWLEDGMENTS

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