

# Parking Meters, need change?

Having a look at the world of parking meters...

## How many roads to Rome?

They are everywhere and, admit it, nobody likes to use them: parking meters. The focus of this article is to compare parking meters around the globe and to find the basic commonalities or remarkable differences in their interfaces, and whether improvement is needed.

When thinking about the task of using a parking meter, you might expect this to be a universal design challenge. Getting a parking ticket in Brazil shouldn't differ much from getting one in New Zealand, should it? Are parking meters all over the world basically the same or are there a lot of variations of the concept? Are there patterns in the design of parking meters all over the world and is it possible to create a universal meter that could potentially be used everywhere by anyone?

To get an overview of what variations there currently are in the parking meters all over the world, we asked usability professionals in various countries to describe a typical parking meter in their country. These parking meters were then compared to find common challenges and solutions to the problem of making people pay for a parking space, or at least allowing them to.

What we have found is that no two parking meters in our survey are completely the same and that the complexity of operating the parking meters varies considerably. There is a world of difference between the auto-detecting parking meter in Tokyo and the complex and error-prone parking ticket dispenser in Amsterdam.

## About this study

### Why?

13 November 2008 is World Usability Day. This year transportation is the theme.

The UXalliance ([www.uxalliance.com](http://www.uxalliance.com)) wished to observe this by looking into a common transportation design challenge, the Parking Meter.

### What?

The focus of this study is to get an insight into how the common task of paying for a parking space is addressed globally. Do parking meters differ between countries or are they all facing the same design challenges?

### How?

Usability professionals in nine different countries went out and tried to use a local parking meter. They took pictures of this process and reported their findings to us. We then compared the different reports to find common patterns and problems.

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## Areas of complexity

To compare different meters we focused on identifying common areas of complexity in the process of using a parking meter. What exactly are some of the design challenges that meters need to solve? When looking at the parking meter interfaces in our sample it begs the question: Why are some meters so much more difficult to use than others? More importantly, why are they complicated at all?

When comparing the various meters in our sample, we identified some common factors that contribute to the complexity in interacting with these machines:

- Space selection (paying for a specific space)
- Instructions (complex printed instructions vs. interactive displays)
- Buttons and flows (does the hardware support the task?)
- Number of tasks (just inserting coins vs. selecting ticket type, paying for the ticket and printing the ticket)
- Payment methods (cash, parking card, creditcard or a choice of any of those)
- Feedback (does the meter provide feedback and is it useful?)
- Displaying the ticket (is it clear what to do with the ticket?)
- Error correction (does the meter allow actions to be undone?)

These identified areas of complexity in the interaction will be explained in more detail in the following chapters.

### Space selection

One factor that seems to influence the complexity of the meter is the number of parking spaces it has to provide 'metering' for. The meters in our sample that are dedicated to one or two spaces were considered much easier to use than meters that serve multiple parking spaces (Pay and Display).



**China:** select where you are parking: in the space left or right of the meter.

One of the properties of a dedicated parking meter is that it's assigned to a specific parking spot. However, some parking meters are placed between two spots and allow users of both spots to pay at that meter (left and right of the meter). This means that the user will have to select for which of the two spaces they are paying. The only meter in our survey that requires this is the Chinese parking meter and it provides the user with a very straightforward way of selecting the space they are paying for.

## Contributors

This study was conducted with co-operation between a number of the UXalliance partners & associates:

### Brazil:

Mercedes Sanchez Usabilidade  
([www.mercedessanchez.com.br](http://www.mercedessanchez.com.br))

### China:

User Experience  
([www.userexperience.cn](http://www.userexperience.cn))

### France:

Axance  
([www.axance.com](http://www.axance.com))

### Germany:

SirValUse  
([www.sirvaluse.de](http://www.sirvaluse.de))

### Japan:

Mitsue-Links  
([www.mitsue.co.jp](http://www.mitsue.co.jp))

### The Netherlands:

User Intelligence  
([www.userintelligence.com](http://www.userintelligence.com))

### New Zealand:

Optimal Usability  
([www.optimalusability.com](http://www.optimalusability.com))

### UK:

Serco Usability Services  
([www.serco.com/usability](http://www.serco.com/usability))

### US:

User Centric Inc.  
([www.usercentric.com](http://www.usercentric.com))

The meter in Tokyo, Japan was able to detect when a car had parked in 'its' space. This made it possible to automatically indicate which meter to use. A light would flash on the meter the user just parked at and would not stop flashing until you've inserted enough coins.

In New York, the parking meters are also placed between two parking spaces. The angle of placement of the parking meter determines for which parking space it is. We feel this could be made more explicit.



**New York:** the meter is placed exactly between two parking spaces. In the picture, this meter does not belong to the white van, but to the empty place behind it.

## Instructions

Looking at the interface of various parking meters in this study, one common complication seems to be the number of information items that have to be 'taken in' and understood in order to use the meter. A meter from the Netherlands for example shows five or more areas on the interface with instructions used to explain how to use the machine.



**Amsterdam:** Instructions on when to pay, different available tickets, how to pay, what to do in case of a defect and what happens if you forget to pay.

In many cases it is necessary to give instructions on how to use the parking meter. This in itself suggests the interface design could be better. However, if instructions are required the design of this information is as important as the design of the rest of the interface. In some cases the instructions are displayed in a flow, which makes it easier to follow. However, in most cases users need to read text that offers little structure.

The instructions on parking meters that are dedicated to one or two spots are in general much shorter and simpler. For most users, these types of machines should be relatively easy to understand. Of course, language can still be an issue for foreigners. Most non-English language machines offered instructions in different languages, but this is not a

general rule (e.g. Brazilian and Japanese meter).

In some cases instruction are not very easy to understand. On one of the UK meters the instructions to explain that it is illegal to insert new coins after your initial time has expired is worded as: "*Subsequent insertion of a coin is a contravention*".

Parking during (public) holidays is sometimes free. Although this is mentioned on the machine, some machines did not actually list which dates are considered holidays.

Examples of differences in the layout of instruction texts



Parking meter in Chicago offers text and icons.



Meter in Brazil only offers text. The small colored dots indicate the color of the button to use.

## Buttons and flows

Another common element in the designs we have looked at is the use of buttons (only some of the dedicated machines didn't need any buttons at all). Using buttons to let users operate parking meters makes sense; we did not find any meters that made use of other input mechanisms (e.g. voice control or interaction by mobile phone). Although the use of buttons is not a big surprise, the way buttons are used (in terms of colour, placement, shape and size) greatly affects the ease in which the interface can be understood and used.



**Amsterdam:**  
to start, select ticket using the yellow button;  
  
increase desired parking time by pressing the blue button;  
  
confirm by pressing the green button.

What we found is that the order of the buttons rarely matches the flow users need to take. In the Dutch meter, users first need to choose what kind of ticket they want. This isn't the first button of the four, but the second one.



**Munich:** size of the blue 'add time' button is much smaller than the green 'confirm' button.

One issue observed with the buttons is that the size of the buttons didn't always correspond with its importance. On the German machine, the button to increase the time you wanted to park was a small blue button.

All machines that had multiple buttons used colour to distinguish different functions. Colour was also used in the instruction to refer to the buttons. There was however often no other indication on the buttons themselves, such as labels. In cases of people having difficulty recognizing colours (colour-blind / poor lighting conditions) this could be an issue. Using different shapes and labels could address this issue.



**Chicago:** Besides different colors, the buttons have different shapes and labels.

When looking at the various parking meters, we observed that some countries used similar models. It appears that some manufacturers service multiple countries. The meter in Brazil used the identical model as the one in the Netherlands, New York and Paris. The meter from Chicago was the same basic model as the one found in Germany and Pantin (France).

Although this in itself is an interesting observation, what was striking was that this made it clear that these machines are made as 'can-do-all' machines. Depending on the wishes of the owner, some options are 'turned off'. However, these 'inactive' buttons are sometimes still visible. In our sample we found

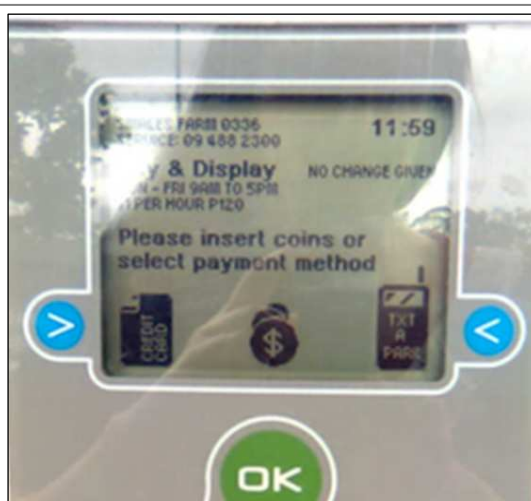
examples of buttons that were made black and didn't serve any purpose. Removing these completely from the interface would reduce the complexity of these machines.

The same model can be found in different countries



Also note the black 'inactive' buttons on the French, Brazilian and American machines.

The parking meters that had the most clear button flow were the machines from China and New Zealand. The Chinese meter had the buttons ordered from top to bottom, creating a clear flow. The New Zealand meter used a clear LCD display that showed the options the user has with clear buttons to make your choice.



Examples of two clear displays and use of buttons.

Left: Beijing, CN

Right: Auckland, NZ

One minor point with the Chinese display was that the buttons were hard to press. Some strength was needed to make it work. The same can be said of the 'Cancel' button on the Dutch, Brazilian and the New York meter. This button needed to be turned which needed quite some finger strength

## Number of tasks

One key aspect that was considered to cause the most complexity is the variation of 'tasks' that have to be achieved with that meter. Some machine made it possible to buy different types of tickets or allowed other options like checking the balance on your bank card or charging a special card used to pay for parking.

UK: Example of a simple parking meter located on Park Row, London.



Only one type of ticket and just one payment method possible.

In the simplest case, the parking meter only allows the purchase of one type of ticket with only a single method of payment. In some cases there was even only one pre-defined period of parking time. To the left is an example of one of the meters from the UK, of one of the simplest parking meters that was part of this study.

In contrast to the 'single tasks' meters, in many locations the parking meter enables the user to purchase various types of tickets *and* using various payment methods for varying lengths of time. This means the tasks that can be accomplished makes the process more complicated, as do the challenges for the user interface.

We found that with more variation in the tasks the interface becomes much more complex. There are more

'elements' to understand and instructions become necessary.

In the sample studied, there were two meters that allowed users to get different types of tickets. One meter in France had different rates for residents and visitors. The meter in the Netherlands allowed users to get five different types of tickets (e.g. an 'evening ticket', 'Sunday ticket' or a '24 hour ticket').

The question arises whether the variation in tickets is needed and cannot be solved in some other manner. The meter could for instance let the users just 'tell' the machine how long they want to park and then give them the most appropriate ticket. In one of the New York meters, the machine would automatically charge the reduced rates when users indicated to park during those times. All of a sudden your quarter would automatically allow you to park longer...



Amsterdam, NL: users have to choose between five different tickets (A-E).

Note that not all tickets are always valid (e.g. Sunday ticket).

Also the 'discount' of an all day ticket is exactly one hour. If you park after 10:00 you're better off paying per hour.

## Payment methods

As remarked above, different payment methods increase the complexity of a parking meter. Besides that this means that extra elements need to be added to the interface (e.g. an additional slot to enter your card), the flow is often influenced based on the desired payment method.



UK: Example of a very simple way of operating a coin-only parking meter on Greenwich South Street, London.

Of the parking meters we observed in our review, four of them only accepted coins (Japan and all the three UK meters). Two meters only accepted a specific card (China and Paris). All other machines allowed payment by some type of card as well as cash. None of the machines accepted bills. If you want to park for a long time, you

either need to be able to pay by card or carry a lot of coins...

The coin-only operated meters are generally easy to use. The standard method is: add coins until the desired parking time is reached and, if needed, press a button to get a ticket.

For payment with a card there was no standard way of using the meter. In some cases users first needed to indicate how long to park and then insert their card to pay. In other cases users needed to insert their card first and then start the process of telling the machine the desired parking time. The order in which to do this was not apparent from the interface and explanatory text was needed.

To pay at some meters, a special kind of card is needed. These machines did not accept standard credit or bank debit cards. The Chinese meter for example requires the 'Beijing municipal administration and communication card' to pay for parking. Even though the most basic instructions on this meter are available in English, the instruction on what card to use, and how to use it, is only available in Chinese. Even in Chinese, it is not very clear that the card needs to be placed in front of the machine (over the instructions).

In case a special type of card is needed, machines do not explain how to get hold of such a card. In Brazil for example, the meter tells you to get a card at the 'Customer Service of Autoparque', but doesn't explain what the exact address is.

## Feedback

In this case 'feedback' is referring to the elements of the parking meter interface that let the user know what is happening. Where they are in a process and what they should do next. This element in the meters we have reviewed often involved some sort of LED / Digital display.

## Parking costs

What does parking your car cost?

The prices below are all converted to Euros and are the costs of parking your car for one hour.

<b>Beijing, CN:</b>	€ 0.25
<b>Auckland, NZ:</b>	€ 0.45
<b>São Paulo, BR:</b>	€ 0.50
<b>Paris, FR:</b>	€ 1.00
<b>Munich, DE:</b>	€ 1.00
<b>London, UK :</b>	€ 2.30
<b>Chicago, US:</b>	€ 2.35
<b>Tokyo, JP:</b>	€ 2.40
<b>Amsterdam, NL:</b>	€ 3.80

**Note:** For the countries in this study with multiple parking meters, the most expensive meter is displayed. Only rates for the meters within this study are shown.

The information the machine displays is important to give the user a sense of progress and accomplishment. Most of the meters we have seen in this survey use a very simple (LCD-based) screen to show some basic information like the current time and the end of the parking period paid for.



Two examples of digital displays.

**Left:** UK (Greenwich South Street)

**Right:** US (Chicago Illinois).

For the dedicated meters, this screen also shows how much parking time is left for that spot. This is important information for both the user and the parking attendant who needs to determine whether someone has paid for that spot.

The Japanese meter has an extra, very visible indication that the parking time is up: a blinking light. This makes it very easy to spot parking violations.



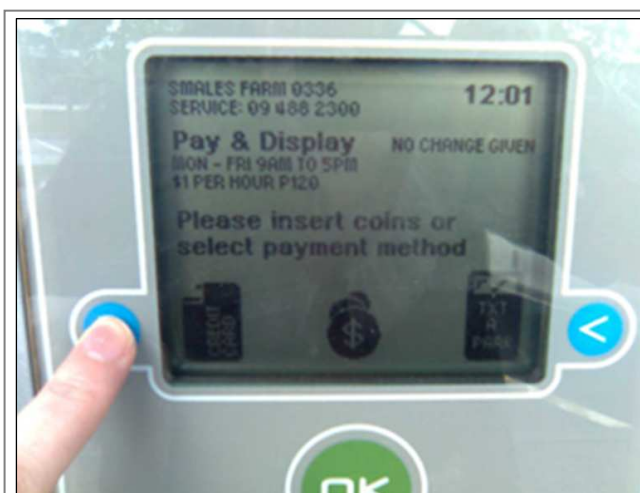
**Tokyo, Japan**

**Left:** The meter automatically detects when a car is parked in 'its' place (see sensors bottom of machine on the left).

**Right:** When a car is detected, a red light starts blinking until user has paid (see image on the right).

The meter in Beijing and Auckland both used a more advanced display. Each step in the process of paying for the parking space is supported clearly through this screen. This removed the need for printed explanatory text on the meter itself.

As mentioned earlier, one problem to be solved is how to create a parking meter that can be used for various tasks in various locations (countries). The display focused design from New Zealand is a good possible solution. It would allow the variation to be in the display (software) allowing the rest of the interface to remain simple and easy to use.



**New Zealand:** No instructional text on the parking meter itself. All interaction is done through the display.

## Displaying ticket

For ten of the fourteen parking meters we reviewed, a ticket needed to be printed and displayed in the car (Pay and Display). Not all instructions on the meters explained what to do with the ticket (e.g. where to display). Users that are unfamiliar with this might place this ticket underneath their windscreen wipers, running the risk that someone else will 'borrow' their ticket and display it properly behind their windscreen.



US: Example of a ticket to be displayed on the driver's side of the dashboard.

Some tickets did have this information printed on the ticket itself. The ticket in Chicago was a sticker which allowed two wheeled vehicles to use stick the ticket to their motor.

Besides missing explanation of what to do with the ticket, there were no big issues with actually printing and receiving a ticket. So even though this step is not a huge challenge in itself, any reduction in steps will be an improvement.

## Error correction

An issue generally observed is that it's not always easy to correct a mistake. Especially when the feedback is slow, it's easy to press the 'time' button once too often, resulting in too much parking time. Most machines did not allow users to go back a single step. **The easiest way of correcting a mistake was often to cancel the whole process and start again. Exception to this rule appears to be the New Zealand machine. This parking meter allowed users to not only add time, but also decrease time.**

The meter in Japan had no form of error correction. Users only have the option to feed three 100 Yen coins in the machine. It does not allow other size coins or cards. There is no way to get your coins back once you've fed this meter your first coin. Also, meters generally do not give change. Paying with coins means that you need to have exact change to stay the desired time or 'overpay' (feeding the meter too much).



Left: China, only the option to add time (pressing 'plus sign' button). No possibility to deduct time.

Right: Interface of the meter in New Zealand offers the option to easily change time period.

## Other issues

Besides identified areas of complexity in the actual interaction with the machine, there are some other factors in the use of parking meters that need to be considered. These factors are not directly coupled to elements on the parking meter interface, but they do influence the usability of the machines.

### Environmental influences

Because all of the parking meters are placed outside, along the streets, they are susceptible to the influences of weather. In the case of one of the English parking meters, condensation on the inside of the plastic dome made the LCD screen very hard to read. Next to that, the outside location makes the parking meters possible targets for vandalism and “guerilla marketing”. Stickers and graffiti can seriously affect the legibility of instructions.

**The only example in our study that protected the device against some of the elements was the parking meter in New Zealand; it offered users protection from the rain and wind.**



**New Zealand:** No umbrella needed if you are operating this machine in bad weather.



**Left Brazil:** The interface on this parking meter is heavily scratched, making the instructions on the LCD display hard to read.

**Right UK:** Condensation inside meter made display almost illegible.

### Forward planning

A factor that generally makes using parking meters difficult is the need for ‘forward planning’. At the moment you’ve parked your car you need to estimate how long you’re going to need that parking space. You do not want to pay too much, but you do not want to have to return to the meter to feed some extra coins in the machine (or run the risk of a fine).

If you compare parking spaces along the road with parking in a garage, one of the big differences is the need for this planning. In parking garages you generally park your car in an environment that has control over the exit (e.g. with a barrier). This allows for a process where you can make users pay for the time they have actually used the parking place. It will register when a user enters (you get a ticket) and upon leaving this information is used to calculate the exact parking time. You then pay the amount due and receive the right to leave the garage (e.g. an exit card).

In this case no forward planning is needed. If you need to park longer than expected, you do not have to return to feed the meter and when you return earlier, you pay less.



**Japan:** No planning needed, users can only buy one ticket: 60 minutes parking for 300 YEN...

Some of the meters we studied did not require any forward planning. This was possible by greatly reducing the options given to users. The Japanese meter for example had just one time period: 60 minutes, take it or leave it. If you only had to park for 15 minutes, you still paid the full price. This simplicity took away the need for planning. In fact, it just didn't offer users the possibility of planning.

There are some systems in the market already that combine the principle used in parking garages for regular parking spaces. Users can subscribe to a special service and pay by using an SMS based service. To pay for parking, users 'check in' by sending an SMS that informs the system where they have parked (e.g. by including a special code displayed on the parking meter). When done parking, users need to send a second SMS in which they 'check out'. The system then calculates the amount due and charges the user accordingly.

A special sticker on the car tells parking attendants that the owner of the car uses this service and can check with the system to see if the owner has checked in.

## Acceptance

When we started this project, we assumed that parking meters were a global phenomenon. It turns out that this is not the case. Parking meters are a new sight in countries such as Brazil and China. Parking places in crowded (inner city) areas are often privately owned and manually controlled. In recent years automated meters have been introduced in these countries. However, since there is little or no policing and fines are relatively low, users often take the risk of not paying. Combined with difficulties in operating the machines (e.g. unclear payment methods) this leads to users often ignoring the use of these parking meters. Offering an easy to use interface could help in the acceptance of using the meters in these countries.

# Conclusions

Based on the results from this study we can safely draw the following conclusions:

Generally speaking, it's striking that not two meters have the exact same interface to support the task of paying for a parking ticket. Even though some of the parking meters in this global study are built by the same manufacturer, none function exactly the same. The French, Dutch, Brazilian and US meters may seem very similar but are not operated in the same manner.

Overall, the parking meters that are dedicated to one or two spots are the simplest to operate. They provide the user with just one task: put money in the meter! The maximum parking time is always limited and even though this may be frustrating in itself, it makes payment a lot simpler. Luckily there is no ticket to display, which adds to the simplicity.

The downside of this type of meter is of course that it needs as many meters as there are parking spots (or at least half as many) in a city. But from a usability point of view this meter is simply the easiest to operate!

The dedicated parking meter in Tokyo recognises when a car is parked 'in its spot' and notifies the driver to pay upon leaving his vehicle. Because of its simplicity and the clear advance warning to the driver, the Japanese meter is our favourite, keeping in mind that the majority of users are locals.

The machines that require payment and placement of a ticket are in general much more complex than the dedicated parking meters. These pay and display meters do (often) have to cater for multiple and more complex tasks (e.g., the number and different types of tickets offered) and are therefore tend to have more complicated interfaces.

Irrespective of their fundamental complexity, we still observed a number of striking differences. The amount and complexity of the instructions is a complicating factor, as well as the number of tickets offered. Generally speaking, the pay and display meters with a large display seem to offer the user the best chance to succeed in their task. **Our favourite in this respect is the design from New Zealand, combining a large variable display with a few very simple buttons. It supports the user throughout the process and allows for software updates to support functional changes in the future and/or in different locations.**

The pay and display parking meters in Amsterdam succeed in combining all complicating factors into one machine: plentiful instructions, 5 different kind of tickets to chose from, combined with buttons that can only be distinguished by colour and are not in line with the user's task flow. Complexity and violation of some basic usability guidelines confuse the user. Perhaps the intention is to deliberately bamboozle this user so he or she will not notice paying one of the highest hourly parking rates worldwide!

So, one would expect that the machines that support a task that is worldwide so common and similar, would have similar and recognisable interfaces as well. The opposite seems to be the case: there are many roads to Rome when it comes down to paying for a parking spot! And some are longer than others...

With advanced technological initiatives (i.e., SMS payment, GPS and license plate recognition), the future of parking ticket payment around the globe may become an easier task at some point. Until then, it seems that users will have to accept some of the impractical hurdles that current parking meters present.

## More information

If you would like more information regarding this study please feel free to contact the authors at:

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More information about the possibilities of conducting global usability can be found on the website of the UXalliance, the international network for user experience: [www.uxalliance.com](http://www.uxalliance.com)

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Also many thanks to all the colleagues in the Amsterdam office of User Intelligence for putting up with our parking meters anecdotes for the last few weeks...

We wish you all safe and easy parking!

Chris Pierson, Martijn Klompenhouwer and Jacco Nieuwland  
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