

# **Denmark Street car park, Wokingham**

## **Confusion of users, leading to wrong ticket purchase**

### **Introduction**

For a decade, the Denmark Street car park in Wokingham Berks has been a cause of controversy. Time and again, the press has reported people who have bought a parking ticket from the wrong machine, and then incurred a hefty financial penalty for having an invalid ticket. Prior to 2001, the Council operated the whole car park, part of which it owned, and part of which was privately owned. In 2001 the private owner withdrew from this arrangement and contracted Euro Car Parks (ECP) to manage its portion. As a result, the car park is now operated as two areas. The theme has recurred in both news and letters column of the Wokingham Times. The operators blame motorists for not reading the signs. The operators have added more signs in an attempt to reduce user error, but their attempts have been only partially successful since errors still occur. In early 2011, an ECP car park attendant said that the frequency was 'about one a day', whereas previously it had been as high as four a day. Errors in the reverse direction (people in the Council area buying an ECP ticket) are relatively infrequent.

When different people repeatedly make the same error, the cause is usually a weaknesses in the system design, notably in the interface between its human and non-human parts. In this case, the system is the car park, comprising the physical layout, the signs, the payment machines, the vehicles and the human users.

This paper looks at the car park from an ergonomic perspective, to identify features that are likely induce user errors. It then proposes several interventions that would help to prevent future errors.

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## Data gathering

This section is based on visiting, observing and photographing the car parks, in order to understand the spatial layout, the visible signage, and other factors likely to influence the behaviour its users.

### Layout

The car park has an elongated shape, about 150m long. It runs behind, and more or less parallel to, Denmark Street. The access road from Denmark Street is some 35m long, and includes a few parking spaces within its length. The main part is divided into two separate areas, which are operated by different owners, as shown in Figure 1.

The larger area, to the left as motorists drive in, with over 100 spaces, is operated by ECP (ECP). The remaining area, ahead and to the right as you drive in, has less than half this capacity (46 spaces), and is operated by the Council. The access road also serves a small private car park.

There are three pedestrian exits to Denmark Street, one by the access road, one from the middle of the ECP area, and one from the Council area past the library entrance. There are several gaps in the fence along the length of Cockpit Path at the rear of the car park, which also serve as exits.

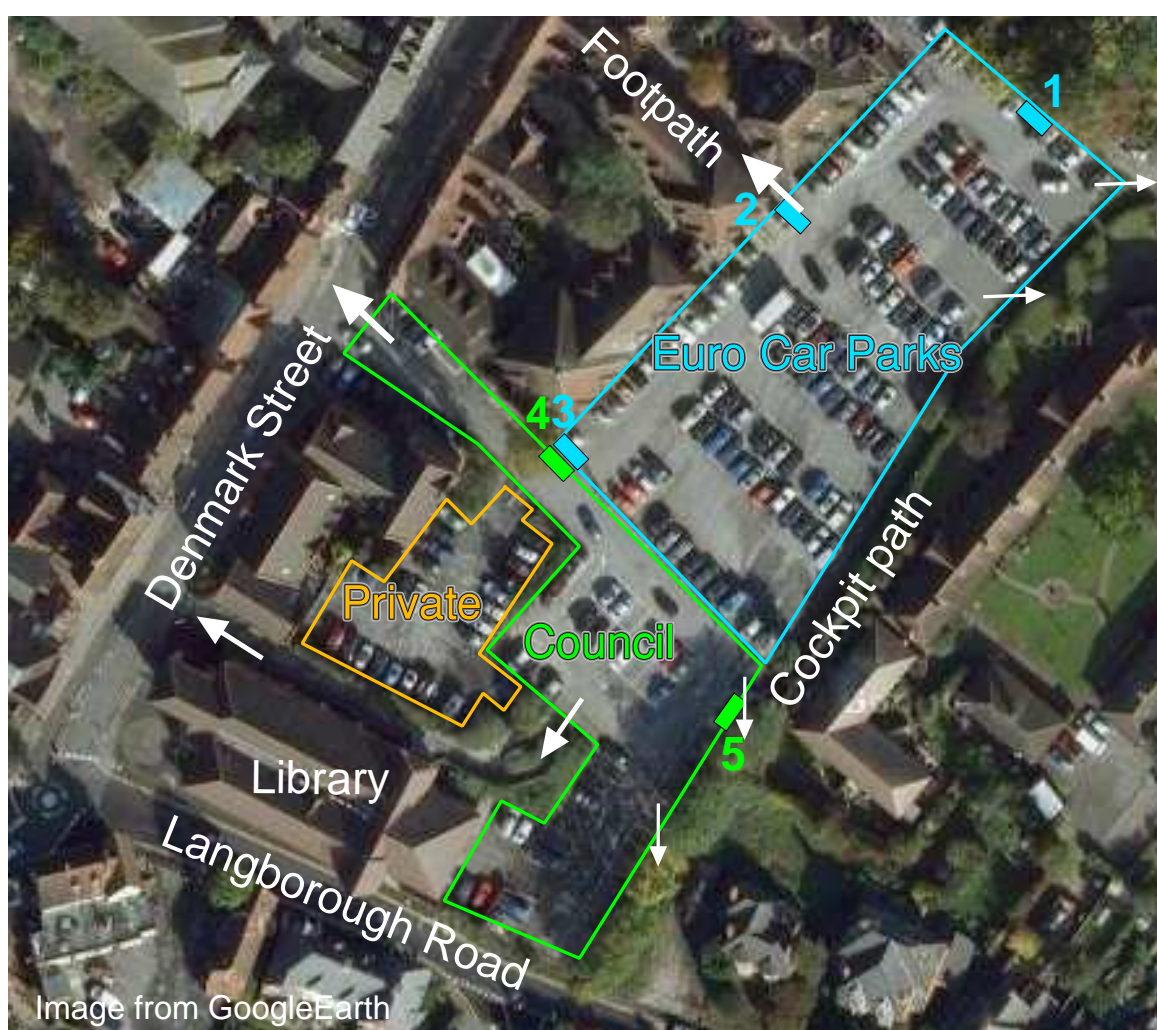


Figure 1: Aerial view of the car parks (photography source Google)

There are five Pay & Display machines, three in the ECP area and two in the Council area. For ease of reference they are numbered and shown as coloured rectangles in Figure 1. In the ECP area, one is fairly central, by the pedestrian route to Denmark Street, and one is at the northeast end. In the Council area, one is at the back (east). The other two machines, one for each operator, are back to back by the vehicle access between the two areas.

### Signs

There are many signs, some of them quite complex because over the years, the operators have added and augmented signs in an attempt to reduce the problems caused by people buying tickets from the wrong payment machine.



The two operators use quite distinct colour schemes. The Council signs are mainly green with white writing, and the ECP signs are blue and yellow, often a mixture of yellow on blue and blue on yellow. Figures 2 – 18 give an overview of the signage in both halves of the car park.



Figure 2: Green Council sign in the the access road from Denmark Street (L), and Enlarged (R)



Figure 3: View from the access road, showing more green Council signs. The pedestrian is walking into the ECP area



Figure 4: View from near where the car is in Figure 3, showing green Council signs on both sides of the entrance to the ECP area, with the Council payment machine next to the nearer sign.





Figure 5: Looking into the ECP area from the Council area. Large green Council signs by the entrance, and the yellow and blue ECP signs in the distance on the left (by payment machine 2)



Figure 6: View from further into the Council area. Behind the cars on the right is Council payment machine (machine 5), and associated signs. The fence on the left forms the boundary with the ECP area. A yellow and blue ECP sign is visible on the left. The other blue sign (in the Council area, above the silver car) is not an ECP sign, but a Council sign about abusive behaviour, shown enlarged (R)



Figure 7: The green signs on the Council side of the boundary fence are clearly visible because there are no parking bays to obscure them. Behind each Council sign, on the other side of the fence, is a corresponding ECP sign.



Signs are less noticeable in the ECP area, partly because it is a bigger area, so signs on its perimeter are farther away from the interior, and partly because some of the critical ones are often hidden by parked cars.



*Figure 8: The blue ECP signs on the fence are easily hidden by parked cars. Here one sign is visible, and another is almost completely obscured by the car at the left.*



*Figure 9: The same location at a different time. One sign is visible, and another is behind the middle of the three cars on the right*



*Figure 10: Standing a few paces further west of Figure 9, both signs are hidden. The only ECP sign visible is on the far left*





Figure 11: A sign on the fence, may be glimpsed briefly if you look between the cars as you walk past.



Figure 12: A view along the fence (completely hidden) at a busy time, showing yellow and blue ECP in the far distance (see enlarged inset)



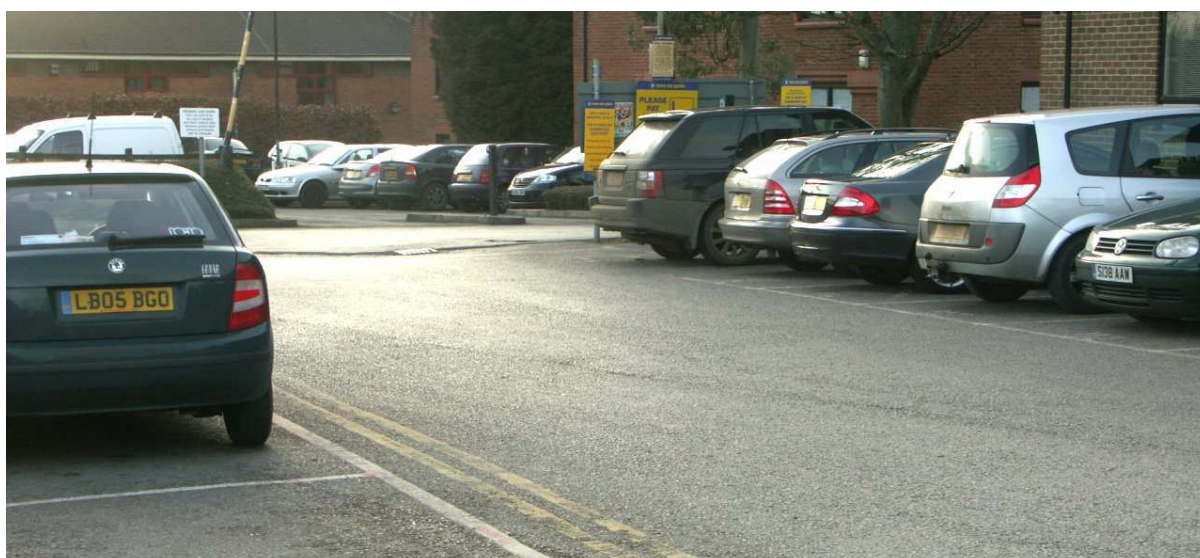
Figure 13: Another view towards the fence (just visible to the right of the cars). The anonymous grey board is the back of a Council sign.





*Figure 14: The exit from the ECP area. No ECP signs are visible except the top of the signs by payment machine, 3 just visible over the roof of the parked cars on the right of the entrance.*

Note that the spaces on the right of Figures 14 & 15 are all reserved – the tall vehicle shown in front of the machine is regularly there. The glare on the surface of the tarmac in these pictures is a reminder that this view is facing south, and the sun will be in the face of anyone walking towards the machine on a sunny day.



*Figure 15: The exit from a slightly different angle, with yellow and blue ECP signs a bit more visible.*



*Figure 16: A car looking for a space moving from the ECP area to the Council area*





*Figure 17: Just inside the ECP area, near the exit, the green face of the Council sign is visible.*



*Figure 18: One pace nearer the exit, the green Council sign is more prominent. A small blue ECP sign on the fence is also just visible alongside the parked car.*

## Payment machines

There are five payment machines, two in the Council area and three in the ECP area. Their locations are shown in Figure 1. The Council machines are green, in keeping with the green and white theme of the Council signs. Each is marked with one or more orange labels saying 'COUNCIL CAR PARK MACHINE'. The ECP payment machines are pale grey, and do not follow the yellow and blue theme of the ECP signs, but there are ECP signs near to them. The machines carry a small white sign saying that cash is not left in them overnight'

The machines numbered 1 & 2 are well inside the ECP area, a very long walk from a car parked in the Council area. Machine 5 is similarly well inside the Council area. It is quite near the southern corner of the ECP area, but getting to it would require stepping over the fence. All these machines are unlikely to be used to buy a ticket for the wrong area. The machines numbered 3 & 4 in Figure 1 are located back to back on the boundary between the two areas, next to the vehicle entrance to the ECP area from the Council area. Figures 19 – 22 show various views of these machines.

Figure 19 shows an end-on view of machines 3 & 4. From this view both machines are visible, together with one ECP sign. Both machines are marked with identical blue and white 'P' signs, and could be seen as a pair. Machine 4 on the left is in Council green, while machine 3 on the right is an anonymous grey. The orange label on the side of machine 4 looks a very similar colour to the yellow of the ECP sign next to machine 3.





Figure 19: Edge-on view of payment machine 4 (left) and 3 (right)



Figure 20: View of the ECP machine and signs

The short piece of ‘fence’ between the two machines (part covering the text at the bottom of the notice) is presumably symbolic of the boundary, though it rather gets lost among the sign poles, waste bin and payment machines.





Figure 21: A couple of paces past the boundary, the ECP machine is almost completely hidden



Figure 22: The Council Pay & Display machine on the left, a lot of information in the middle, a notice advising the use of the 'correct machine' on the right, and the token 'fence' visible among the sign poles

Note the differences between Figure 21 (taken in December 2010) and Figure 22 (taken in March 2011). The material has been rearranged, but in both cases, critical warnings are in orange, the colour used in the ECP area, thus undermining the message that this machine is for the Council area.





*Figure 23: The ECP machine and signs by the pedestrian exit to Denmark Street.  
The cabin in ECP colours, the other side of the footpath, is used by car park attendants.*

There are some small differences in the charges for parking in the two areas, as shown in Table 1. In almost every case the Council charges are 10p or 20p dearer than the ECP charges, but there is one exception. The Council offers a half hour rate, whereas ECP does not. So anyone wishing to park for less than half an hour would pay 50p for half an hour in the Council area, which is 10p less than the minimum 60p for up to an hour charged by ECP.

<b>Duration up to:</b>	<b>Council area</b>	<b>ECP area</b>
½ hour	£0-50	—
1 hour	£0-70	£0-60
2 hours	£1-20	£1-00
4 hours	£2-00	£1-80

*Table 1: Parking charges compared*



## Tasks performed by car park users

This section looks at the tasks performed by car park users, and the way that they might be influenced by features of the car park, in the light of the information gathered above. In particular, it looks for features that might induce or facilitate the recurrent problem where someone would park and buy a ticket from the wrong payment machine.

People do make mistakes. It is built into the way our brains work. When mistakes are frequent, and especially when different people make the same mistake, the root cause can usually be traced to some aspect of the task, the equipment used to perform it, or the environment in which it is performed. The characteristics that induce systematic errors in humans are well known, and considerable effort is spent to avoid them when designing systems where the cost of error would be high. Similar effort is not normally justified when designing a car park, though in this case effort has already been expended on additional signs. Errors continue, which suggests that there are still some features of the design that facilitate, or even encourage, human error.

The cost to society of an error in a car park is much lower than in say a nuclear plant, but to the individuals concerned it is non the less distressing. Superficially they should not occur at all, but they do when several factors combine to undermine a critical decision or action.

Users of the car park have several tasks to perform, including:

- Choosing where to park
- Finding a space
- Choosing a payment machine
- Finding their way out of the car park to their destination
- Other tasks such as loading buggies, collecting bags, securing the car, and so on.

Depending on the circumstances, one or other of these tasks will take priority. For example, on a busy day, finding a space is likely to take precedence over choosing which part of the car park is most desirable. With small children on board, spaces with plenty of room to open side doors are likely to be attractive. When in a hurry, proximity to the intended exit and/or payment machine is likely to dominate. Familiarity or lack of it will also influence behaviour.

### Choice of exit route

People who use the car park do so as a means to an end – walking to a destination in the town. So when they drive into the car park, they will be thinking ahead to the next part of their journey on foot, and will tend to look for a parking space somewhere near their intended walking exit.

There are several pedestrian exits from the car park, and anyone familiar with them and with the town is likely to use the one that gives the easiest route to their destination. The footpath from the middle of the ECP area into Denmark Street offers the shortest route to much of the town centre, but for some destinations, the other exits offer a shorter, or in some cases quieter, route.

People unfamiliar with the car park may not know of any exit other than the access road, which will thus be their default pedestrian exit. Some of them, aware of the direction of the town centre, may assume that there is likely to be another way out, nearer to the town, and there is a fair chance that anyone parking in the centre of the ECP area will discover it. Otherwise, it seems reasonable to assume that unfamiliar users of the car park will leave it on foot by the route they came in – by the vehicle access road.

### Choosing where to park

As discussed above, people will probably park somewhere not too far from their intended exit, providing spaces are available. The likely areas for each exit are listed in Table 2 and marked in yellow on Figure 24. Note that these are only approximate areas. Note that the parking spaces along the northwest side of the ECP area, and along the southwest side of the access road, are reserved, so they are not included in any of these areas shown.







car moving the other way on a busy Saturday morning.



Figure 25 A car that has found no space in the Council area transferring to the ECP area

Where the cars are parked in rows off the main spine (as in the ECP area), people may drive along the spine looking along each row to try to see an empty space, or they may drive into each row hoping to find one. Where there is a circuit (as in the Council area) they may just drive round it looking for a space. If a car is seen leaving an area, anyone still searching might go back in the hope that a new space has been created.

The longer it takes to find a parking space, the more the pressure on the driver will increase, especially if there are aggravating factors like an appointment deadline or other compounding pressures such as previous hold-ups or fractious children in the car.

## Choosing a payment machine

The payment machines are numbered 1–5 in Figure 22 – machines 1, 2 & 3 in the ECP area and machines 4 & 5 in the Council area. Several factors may influence the machine that someone uses:

- People will generally use the nearest machine to where they park, providing they see it.
- People who have passed a machine on the way to the parking space, may simply go back to it if it is fairly near, rather than looking for another one.
- Highly conspicuous machines are more likely to be used than less conspicuous ones.
- Anyone aware that there are different types of machine for the two parts of the car park will try to choose a machine of the appropriate type.

**Driving past** – Everyone using the car park drives past machine 4 on the way in. Depending on where they park, they may or may not drive past other machines, as shown in Table 3. Two areas in Figure 24 are subdivided in this table. Area D is split near/far, relating to before/after passing machine 2. Area E is split ECP/Council side of the fence. Machine 3 is shown in brackets to signify that although it is passed, most drivers will not notice it because it is only visible sideways/backwards on the passenger side when entering, just after the junction by the fence. At that point, a driver's concentration is likely to be focused on other things.



Area	Machines passed	Other machines nearby (maybe farther on)
A	4	5
B	4	5
C	4, (3), 2	1
D (near)	4, (3)	
D (far)	4, (3), 2	
E (ECP)	4, (3)	
E (Council)	4	
F	None	4

*Table 3: Payment machines passed on the way to different areas of the car park*

In some cases, when passing a payment machine, the driver will deposit a passenger to buy the ticket, while he/she goes to park the vehicle in a space that may or may not be in the area corresponding to the machine.

**Nearest machine** – In most areas (B, C, D, F) one machine is nearer than the others, usually not far from the relevant exit. In the nearer part of area A, machines 4 & 5 are more or less equidistant. Machine 3 is only a couple of paces farther than machine 4, but it is hidden both on the way in, and when coming from area A, so unlikely to be significant.

Area E is more complex. We have defined it as the area likely to be used by people walking out via the access road, but that includes spaces on both sides of the boundary fence between the two areas. Apart from a small part on the Council side near to machine 5, the nearest machines are 4 & 3. As noted above, machine 3 is hidden from anyone parked on the Council side of the fence. Machine 4 is hidden from anyone well inside the ECP area, but both machines are visible to anyone crossing the spine lane opposite the machine, as shown in Figure 19,

Area	Nearest machine
A	5 or 4 (or 3)
B	5
C	1
D	2
E	3 or 4
F	4

*Table 4: Nearest payment machines to different areas of the car park*

**Conspicuous machine** – Being the nearest machine doesn't guarantee that it will be spotted in a busy car park by someone who doesn't know it is there, and is focused on other things. From many locations in the car park some or all of the machines are either not visible, or are so far away as not to be noticed. Most people will stop seeking more machines when they find one.

Machines 4 & 2 are more conspicuous than the others. Everyone using the car park drives past Machine 4, with its associated payment signs, on the access road as they enter. Machine 2 is prominent because it is adjacent to the highly coloured attendant's cabin half way along the spine lane running the length of the ECP area.

**Working machine** – Whichever machine people choose, if it doesn't work when they get to it, they will look for another one. If they see one nearby they will probably use it, but failing that they will return to one that they passed on the way to the parking space. Table 5 assumes that the broken machine is the optimum for the parking space used, and that the driver went direct to it, rather than 'touring' the car park to find a space. Note the prominence of machine 4 as a substitute, and of machine 3 as a substitute for machine 4.



Broken machine	Nearest to it	Machine(s) passed
1 (E)	2 (E)	4, 3 (E), 2 (E)
2 (E)	1 (E)	4, 3 (E)
3 (E)	4 (C)	4 (C)
4 (C)	3 (E)	–
5 (C)	4 (C)	4 (C)

*Table 5: Nearest payment machines to different areas of the car park*

**Type of machine** – In some parts of the car park it would be hard to use the wrong type of machine, but for people parking near the boundary, it is possible to do so. To be sure to select the right type of machine, it is necessary:

- To be aware that there are different types of machine for different areas.
- To knowing which operator runs the area where you have parked.
- To identify a matching machine.

The car park contains many signs, and each operator uses a distinct colour scheme, so there is some ‘branding’ to give users clues. Council signs are mainly dark green with white writing, though they contain some white panels with black writing. ECP signs use blue and yellow, with most signs being a mix of blue text on yellow and yellow text on blue.

A few signs don’t conform to the operator’s colour scheme. They are the small blue sign on the Cockpit Path boundary of the Council area, about abuse of officials, see Figure 6 (R) and the orange warning signs on Council machines (which are similar to ECP yellow, see Figures 21 & 22).

But large numbers of coloured signs doesn’t guarantee that all car park users will see the relevant ones, or that they will make sense of the ones that they see. For example people driving into the ECP area pass prominent green Council signs at its entrance, but nothing in ECP colours to indicate that the area they are entering is different. They might see the ECP signs way ahead (possibly half hidden by cars, see Figure 5) but if they turn immediately right to park along the first lane, they may well not do so. Having parked, they might (or might not) spot ECP signs in the distance, but still not get the impression of ‘being in a different coloured area’ (see for example Figures 12 & 13) When walking back along the lane to buy a ticket, there are no ECP signs facing them.

**Unknown choice** – One further factor can influence the machine from which a driver obtains a ticket. Someone else may have bought it. When they leave the car park, some drivers offer their part expired tickets to other drivers who have just entered the car park. The frequency of doing so is probably low, but it was observed several times within an hour or so walking round the car park.

Most ‘second hand’ tickets will be for the correct part of the car park, but any handed over near or in the common access road may not be.

Ticket sharing seems a grey area. The operators no doubt want to sell a ticket for each vehicle, but the signs in both Council and ECP area simply state that each vehicle must display a valid ticket, not that it must have been bought by the driver of that vehicle.

## Key weaknesses and potential improvements

This section describes factors that contribute to the risk of people using the wrong payment machine, together with changes that could be made to reduce the likelihood of error.

- Split operation
- Shared access road
- Signs within the ECP area
- Signs by the ECP area entrance
- Signs near payment machine 3
- Lack of signs by exit from ECP area
- Perception of machines 3 & 4 as a pair
- Proximity of machines 3 & 4
- Council branding
- Information overload

### Split operation

Splitting the operation of inter-connected areas within a car park, with common access, is the root cause of the problem. It introduces inherent uncertainty that will inevitably lead some people to make mistakes. If the signs and facilities are very carefully designed to reduce confusion, then errors may be minimised, but not necessarily eliminated completely. Adjacent car parks can be separately operated, as they are for example with the long term car parks at Heathrow Airport, but they are separate, and have separate access, unlike the Denmark Street car park.

If the whole car park were operated as a single entity, it would be impossible for people to buy a ticket from the wrong machine. There would be no need for warning signs, enforcement would be confined to anyone evading payment, and economies of scale would make the combined car park more cost effective to run.

Removing the barriers would also permit a slight increase in capacity, since the row of spaces running along the boundary fence could be moved slightly and doubled.

Assuming that neither owner was willing to sell the land, unified operation could still be achieved by one owner subcontracting the other as operator, with an agreed split of the proceeds.

The currently different charging rates (see earlier section) would have to be harmonised. If ECP adopted the Council's charging scale, rates for 1, 2 & 4 hours would increase very slightly (which would benefit ECP), but there would be a ½ hour rate (which would benefit short-stay car park users).

The fact that such an obvious solution has not emerged after many years suggests that there are some hidden barriers, maybe political, preventing it. So the rest of this section looks at the problems of dual operation, and how fairly simple changes could be made to enhance awareness and provide better information, and so reduce the number of errors made by car park users

### The shared access road

The access road leads to both ECP and Council areas, and is itself part of the Council area, because it contains three parking spaces on the left at the Denmark Street end. (The spaces on the other side are reserved, and not for public use.) Everything visible in the access road (many signs and a payment machine) brands it as the Council car park. There is nothing in ECP colours to suggest that it also leads to the ECP car park.

This could be improved, to inform drivers that there are two separate car parks ahead, before their minds became occupied with finding spaces and negotiating people and cars within the parking areas. The information must be very simple, since at this point, drivers have just crossed the main opposing flow of traffic out of the town centre, and are probably encountering pedestrians and cars coming out of the car park. A good way to do this is with a simplified 'map' of the different areas, as shown in Figure 26.



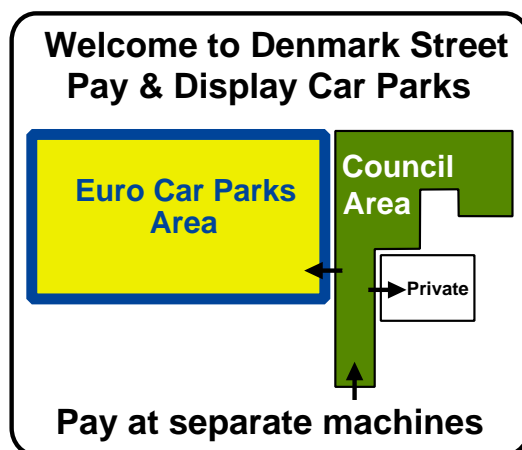


Figure 26: Suggested sign for location by the Denmark Street entrance

The sign would be located by the entrance, as illustrated in the mockup in Figure 27. As shown here, it intrudes into the pedestrian walking space, so it, and the existing sign, may need moving to the left, for which there is space. Note that the orientation is correct for drivers at this point, just before they decide either to turn left into the ECP area, or to go straight on into the main Council area. Drawing the two areas using the respective colour schemes of the operators helps to make the link with other signs within the two areas of the car park.



Figure 27: Possible location of car park map

## Signs by the ECP area entrance

The entrance to the ECP area is flanked by three large signs, but they are Council signs in Council colours (see Figures 4 & 5). The signs (all three identical) are too complex for a driver to take in much (if any) of their content while negotiating a junction with two-way traffic and pedestrians. The wording says 'PLEASE NOTE' in large letters, followed by 23 words in medium print and 38 words in small print. Even if a driver catches some of the wording, the key statement: 'The car park beyond this fence is privately owned and operated' is ambiguous.

- 'Beyond this fence' makes little sense for the left hand sign, because the vestigial piece of wood is lost among the cluster of poles holding signs, and the payment machine.
- The main fence, which is more likely to be visible, runs away from the driver, with parking to the left and the right – does 'beyond' mean left, right or maybe along?
- Reference to a 'private operator' suggests a private rather than a public space. The driver has just passed the entrance to a private space, on the right off the access road – and it is behind a fence.

This ambiguity can be reduced in several ways:

- Use ECP colours for signs denoting the ECP area.
- Simplify the wording to focus on the two key messages: (1) you are entering a different area (2) pay at the corresponding machine.
- Replace vague words like ‘beyond’ with specific visual indications of left and right.

Figure 28 shows a mockup of how these improvements could be achieved. On the left of the entrance is a simpler, more informative sign in ECP colours. On the right is a pair of signs, one in each operator’s colours, with arrows pointing left and right, reflecting the choice that a driver has at that point between the two areas. The use of arrows, together with the colour schemes, enable the message to be conveyed without the need to read any words.



Figure 28: Improved signs at the entrance to the ECP area

## Signs within the ECP area

The identity of the ECP area would be enforced if signs in ECP colours were clearly visible as part of the surroundings. There are signs, and some are visible from most locations if you look for them, but they are not prominent. The signs on the perimeter by Cockpit Path are too far away from most parking spaces, and also behind anyone walking back towards a payment machine. The signs along their boundary with the Council area, would be more useful if they were visible, but they are often hidden by parked cars (see Figure 10).

An obvious improvement would be to mount the signs at around head height, where they would be visible above the cars. The mockup in Figure 29 illustrates this. The three signs show different possibilities. The one over the red car is the same as those currently on the fence. The one over the grey car is enhanced with a yellow border. The one at the right has the colours reversed, like the signs next to Cockpit Path (see extreme left).



Figure 29: Signs raised to head height on the boundary of the ECP area

## Signs near payment machine 3

The sign directing people towards the (frequently hidden) payment machine 3 uses a bent arrow, as shown in Figure 30 (L). While the head of the arrow does indeed point towards the machine, a bent arrow also carries the connotation of ‘round the corner’, which in this case could lead people to machine 4, especially since machine 3 is likely to be obscured by a parked car when the arrow is first seen. The connotation of ‘round the corner’ can be avoided by using a diagonal arrow, as shown in Figure 30 (R).





Figure 30: Sign pointing to payment machine by vehicle entrance: (L) Current sign, (R) Modified sign

In fact, the arrow itself is often wholly or partly obscured as one walks towards it, as shown in Figure 31 (L). Visibility would be enhanced by placing the sign higher, as shown by the mockup in Figure 31 (R) which also uses the diagonal arrow.



Figure 31: Signage on right of exit from ECP area: (L) current, (R) enhanced

## Lack of signs by exit from ECP area

Anyone parked in the ECP area must leave it in order to pay at the wrong machine (machine 4). When people walk from their parked cars, they emerge on the side of the spine lane opposite they payment machines, so if the spine lane is busy with traffic, they may walk along the left side of the lane. From here, they can leave the ECP area without seeing any ECP sign reminding them not to do so until they have paid (at an ECP machine). As they approach the entrance they see the grey backs of Council signs, as in Figure 32 (L).

This could be improved by the addition of a sign or signs in ECP colours (a) to point you to payment machine 3 to your right (possibly the other side in two lanes of cars) and (b) to remind you not to go outside the boundary. This is illustrated by the mockup in Figure 32 (R). Note that the upper sign is a copy of an existing one. It could be simplified.



*Figure 32: (Absence of) signage on left of exit from ECP area*

Figures 32 and the mockup in Figure 33, show how this change and the previous one would alter the view of the exit from the ECP area.



*Figure 33: Exit from ECP area as it is now*



*Figure 34: Exit from ECP area with enhanced payment signs*

## Perception of machines 3 & 4 as a pair

Having machines 3 & 4 back to back makes them look like a pair – their associated signs even share some posts. At busy times, if machine 3 is in use, it would be quite natural for anyone approaching it to use machine 4 instead, rather than queuing to use machine 3. This section looks at visual confusion between the machines and how it could be reduced. The next section looks at the possibility of physically separating them.

Visual differentiation of the machines is currently poor, as shown in Figure 35 (L). Machine 3 is a neutral grey, rather than being in ECP colours. Machine 4 is in Council green, but without the matching white it does clearly not stand out as 'coloured'. Both machines carry virtually identical blue 'P' signs. To add to the confusion, the Council machine has a prominent orange sign, which looks similar to the yellow of the ECP signs. The words on this orange sign say that it is a Council machine, but that is no help to anyone who has not already worked out that there are two different sorts of machine, and which is which. The other doesn't say it isn't a Council machine!

The mockup in Figure 35 (R) shows how visual discrimination between the two machines could be enhanced by rendering the ECP machine in ECP colours, removing the confusing orange from the Council machine, and providing complementary labels on both machines.



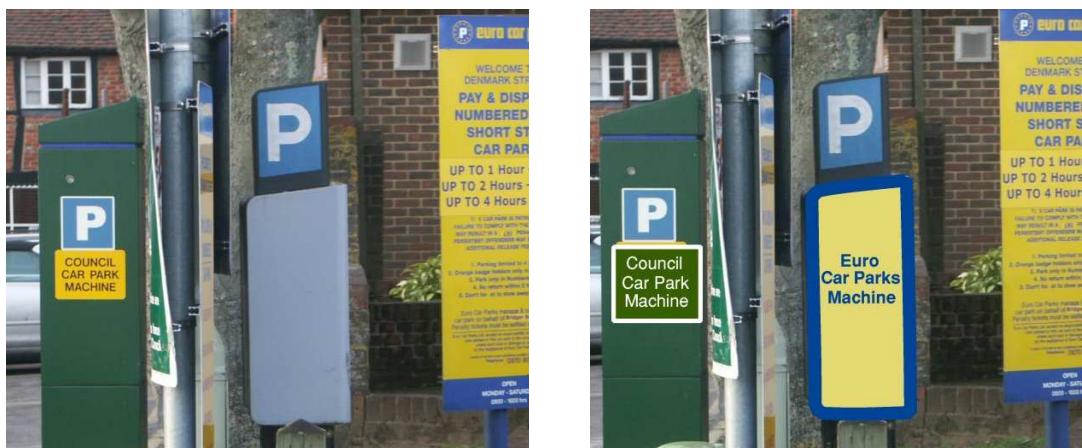


Figure 35: Machines 4 (L) & 3 (R) compared

At the same time, the front of machine 3 could be made less anonymous, as illustrated by the mockup in 36(R).



Figure 36: Machine 3 as it is (L) and as it could be (R)

## Proximity of machines 3 & 4

Another way to make machines 3 & 4 seem less like a pair would be to move one or both of them, so they were no longer near each other. Is this possible without creating other problems?

**Could machine 3 be moved?** All three ECP machines, including machine 3, are next to the main pedestrian exits. The logic for doing so is presumably that anyone walking out of the car park having forgotten to buy a ticket would be reminded to buy one. If machine 3 is to remain by the exit, there are only two possibilities: to the right of the exit (where it is now) or to the left of the exit.

In terms of access and visibility, it would be better located on the left, since that is the side where all the public parking spaces are (the spaces on the right are all reserved for private use). So anyone needing a ticket approaches from the left of the spine lane, not from the right.

If machine 3 were located on the left of the exit from the ECP area, it would be where signs were proposed (see the right of Figure 28) to provide a clear distinction between the two areas.

**Could machine 4 be moved?** This machine is in a compromise position mid way between the main Council parking area and the three parking spaces at the Denmark Street end of the access road. If it were not for these three spaces, the machine would logically be moved out of the access road and into the main Council area. Not only would that move it away from the ECP machine, but it would mean that people would no longer drive past it on their way into the ECP area, so it would not be their default meter.

Figure 37 shows two possible locations marked by white arrows. The position on the right would still be next to the ECP boundary, and if machine 3 were left in its current position, then machine 4 would be nearer to people parked in spaces on the ECP side of the boundary than machine 3 (the ECP machine). If machine 3 were moved (as discussed above) then the two machines would again be back to back, though with the other factors discussed in previous sections, the error rate could be much lower.

The position marked on the left of Figure 37, by the bushes, would be well clear of the ECP area.



*Figure 37: Alternative positions for machine 4?*

Moving machine 4 to either of these locations would take it significantly farther from the parking spaces by the Denmark Street entrance. In Figure 37 these spaces are visible in the far distance. Two of the three spaces are occupied. These spaces already seem to be used by people who do not buy a ticket<sup>1</sup>, so moving the machine farther away might make that more likely.

A more modest move of machine 4 would be to move it a few yards to the left of its current position, to the other side of the tree, where there is space, see Figure 38. This would move it closer to the spaces by the entrance, but farther from the main parking area. In this position, it would not be perceived as part of a back to back pair, but everyone using the ECP area would still drive past it, so it would still be the ‘default meter’, in the absence of information leading to the choice of a different one.



*Figure 38: Space adjacent to machine 4*

## Council area branding

Council signs in orange/yellow and/or blue look like ECP signs, and undermine the ability to differentiate the two areas clearly by the colour of the signs. There are two examples: the orange warning signs on or near machine 4 (see Figures 21, 22, 38, 39) and the blue and orange warnings about abusive behaviour (see Figure 6). The identities of the two areas would be more clearly signalled if only signs in the ECP area used ECP colours.

## Information overload

Figure 39 shows machine 4 and the signs next to it, which contain over 230 words, excluding the small print! No one will read more than a tiny fraction of these words. Most people will just look at the charges and then buy a ticket. There is no reason for them to do more. They are in a car park. They need a payment machine. They are standing in front of a payment machine in the car park, which is either the only one they have seen, or the one that seems most convenient. What other information would they want?

The scale of charges is next to the machine. In terms of buying a ticket that is sensible, since it makes the information easy to find, but it makes it less likely that anyone’s eyes will wander across the reams of other information.

Among the other words there is useful information about which machine to use, but few people will look for it, and as noted above, some of the meaning can be ambiguous to anyone who does not already understand which area is which, and who owns it.

<sup>1</sup> Only one of the cars in these two spaces in Figure 36 is displaying a ticket, and during a period of 20 minutes or so, two other cars used the third slot without obtaining a ticket.





Figure 39: Excessive information by machine 4

To use the machine correctly, people only need two pieces of information: how much to pay and is it the correct machine for them to use. The first of these they will look for, but the second they might not realise they need, so it must be presented in a simple way that is hard to miss. One way to do this is with a diagram, as shown in Figure 40 (L). In the mockup in Figure 40 (R) this diagram is shown between the payment machine and the scale of charges, ie in a position that every user's eye will cross. Like the map in Figure 26, it exploits the corporate colours of the two operators, as well as a pictorial representation of the different areas. Note that the map is rotated 90° compared with Figures 26 & 27, in order to be the right way up for someone facing the machine.



Figure 40: Visual advice on use of machine 4 (L), mockup of how it could be incorporated (R)

## Conclusions

- The visual and spatial characteristics of the car park are consistent with continual errors by users buying tickets from the wrong machine. There are many aspects where key visual information is either missing or misleading.
- Many of the potential current weaknesses could be improved by making modest changes to the signs and payment machines. The aim should be to simplify information and ensure that it is helpful, rather than just adding lots more words, which has been done in the past.
- Moving either or both of machines 3 & 4 could help, though moving machines is likely to be more costly than modifying or moving signs. The strongest case is for moving (ECP) machine 3 to the other side of the exit. There are pros and cons of moving (Council) machine 4 to various locations.
- The most effective solutions require matching action on both ECP and Council signs.
- Unified operation is an obvious solution, and would eliminate the problem entirely, but it is assumed that there must be insuperable barriers preventing it.