Key Card Readers in the Allen Center

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Figure 1. *This is the key card reader outside the main doors of the Paul G. Allen Center.*

Observation

It was a dark and stormy night. We'd just had dinner, and a fellow grad student and I were returning to the Allen Center after dinner to continue working. It was after building hours so the doors were locked and we had to use our key cards to get in. The other grad student got out his card first, so he went to the key card reader (Figure 1) to unlock the door. I stood and watched.

First, he slid his card such that the stripe made contact with the left side of the card reader. He did it quickly since it was cold, dark and raining outside. The door did not unlock. Since the card reader sometimes does not recognize the card if the card is passed through the reader too quickly, he tried it again, more slowly, with the card in the same orientation as before. It did not work. Figuring he had swiped the card too slowly that time, he swiped the card a little more quickly. It still did not work.

At that point, I decided to ignore all correct user observation techniques in usability testing due to the fact that I was wet and shivering. I swiped my card with the stripe on the right-side of the reader, and the door opened.

(Note: I assumed my friend believed the problem with the card reader was the speed at which he swiped his card due to the fact that he swiped it at different speeds each time he tried to swipe it.)

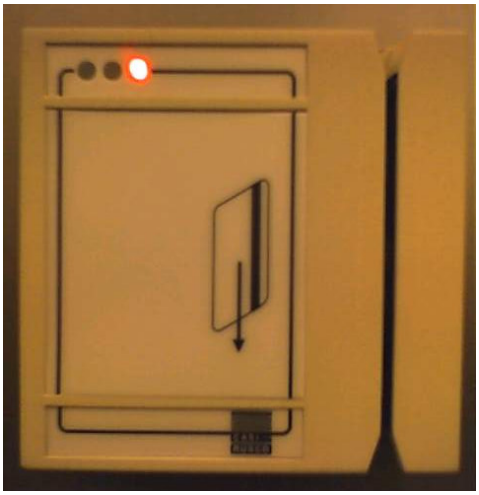

Figure 2 *A close up of another key card reader in the Allen Center. Notice the drawing in the middle, that is supposed to clue in the user as to the orientation of the card.*

Description of the Key Card Reader

A photograph of the key card readers used in the Paul Allen Center can be seen in Figure 2. It is a small, approximately square box attached to the wall near doors in the Allen Center that require secured access. On the right half of the box, there is a narrow indentation about an inch deep, slightly wider than the width of the edge of a credit card, and that runs the length of the entire box from top to bottom. This is where the user slides the key card. On the upper left of the reader are three small lights in different colors: green, yellow and red, only one of which is on at any time. The red light is on most of the time, indicating the door is locked. When the user correctly swipes a key card through the reader, the yellow light flashes, and the green light turns on when the door is unlocked. After several seconds, the door automatically locks again, and the red light turns on again.

The key card must be swiped through the key card reader in the proper orientation and at the proper speed in order for the key card to register and the door to unlock. The magnetic stripe on the key card is on one side of the two sides of the card only, near the edge, and along the length of the entire card. This card must be slid downward through the reader with the stripe facing the user's right-hand side, and with the stripe making contact with the reader. (See Figure 3 for examples.) In the middle of the card reader, next to the swipe indentation, is a drawing showing the correct orientation in which to swipe the key card.

Problems

I had never had trouble with the key card reader because the drawing on the reader, to me at least, clearly indicated which way the card should be swiped. So I was surprised to find my friend had trouble. As a result, I informally asked a couple other occupants of the building whether they'd had trouble with the reader in terms of

swiping their card the wrong way, and to my surprise, they said yes. Why did they have trouble despite the drawing? Were people just not looking at it? I asked my friend who had been stuck out in the rain with me.

The drawing on the reader, he told me, was ambiguous. The drawing consists of three parts: a parallelogram slanted with the right side higher, a stripe along the right side of this parallelogram, and an arrow pointing downwards. The arrow is obvious enough--the card needs to be swiped towards the ground. And it is also obvious enough that the magnetic stripe must have contact with the card reader. But that still leaves two possible ways of swiping: one with the stripe on the left, and the other with the stripe on the right. The drawing shows the magnetic stripe on the right hand side of the parallelogram, but since the drawing is rather abstract, it's hard to tell if having a stripe on the parallelogram means that the key card's magnetic stripe should be visible on the same side as the drawing, or not. In other words, does the drawing mean that the key card must mirror the image (stripe on the left) or copy the image (stripe on the right)? It's like one of those optical illusion trick drawings--do you see the old woman with the wart on her nose, or the young woman? The vase, or the profile of two faces?

Also, you have no feedback regardless of whether you swiped the card too quickly but in the proper orientation, or if you swiped the card at the correct speed but at the wrong orientation. The red, yellow and green indicator lights, which one might suppose provides some clue to such common swiping problems, actually will stay red until the card is correctly swiped, at which point the yellow, and then green, lights will turn on.

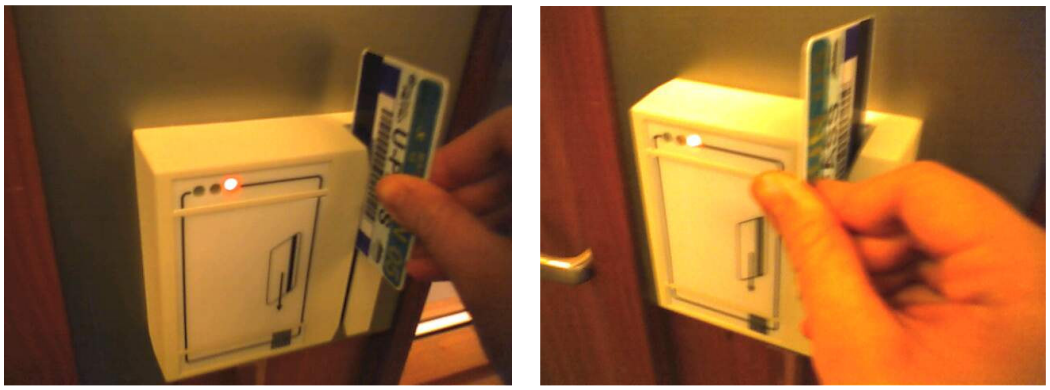

Figure 3 ***Two ways to swipe a card. On the left, a user is swiping the card in the wrong orientation: the same way my friend tried to swipe the card. See how it seems to match the picture if you are looking at it from the position where the camera is? You can see both the stripe on the card, and on the drawing--this must be right! In the photograph on the right, the card is swiped in the correct orientation, with the magnetic stripe on the right. The drawing makes sense here, too.***

Analysis of Problems & Discussion

The two problems with this interface are mapping and feedback (as described in the Norman paper we read). First, it is difficult to map the drawing of the card orientation with reality--there's no reference point for us to figure out which of the two possible interpretations of the picture is correct. Secondly, even if it were easy to map the drawing to reality, human beings are bound to occasionally make mistakes nevertheless, and having some sort of feedback to let the user know whether the problem was with the speed, the orientation, or perhaps an unreadable card, would prevent such situations as the one with me and my friend getting drenched in the cold rain: my friend kept swiping the card in the wrong orientation because he believed the problem to be with the swiping speed.

The designers of the system had tried to address the problem of users swiping cards the wrong way by providing the drawing as a guide. However, they possibly didn't test their drawing on users before they employed it, or if they tested it, maybe they figured that the users that did get it wrong were just anomalies. Perhaps, perhaps not, but this raises the question of whether you should design such that all of your target audience can use the product without trouble, or if *most* is good enough. This example itself is fairly enlightening though, because I myself had thought the drawing was obvious until talking to other users of the system. It illustrates a good point: do not assume the user will be just like you.

The designers also tried to address the problem of feedback by providing colored lights--users know when they've got it right when the yellow light turns on, even if the door hasn't unlocked yet, and users know the door is unlocked when the green light turns on. This is actually a good interface, but doesn't account for swiping problems.

So, the designers had actually made very good attempts fixing usability issues, but didn't take it far enough. Perhaps they had noticed the problems, but figured it was not a big deal. After all, as long as the speed was correct, the user need only try twice before getting the door to open, which in total would take no more than perhaps two or three seconds. And sure, the users might be a bit frustrated, but only for a moment. Perhaps the designers felt it was not worth it to fix this problem? In my case, though, standing out in the rain, I feel it certainly would have been!