UNDERSTANDING THE BARRIERS: GROCERY STORES AND VISUALLY IMPAIRED SHOPPERS

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Abstract: The Accessibility for Ontarians with Disabilities Act, 2005 (AODA) is legislation that aims toward having complete accessibility within the province of Ontario by the year 2025. The accessible built environment is one of the key areas covered by the legislation; therefore, grocery stores, as part of the built environment, should be designed to accommodate shoppers with different abilities.

Grocery stores include many different zones and services with the aisles area being one of the main barriers to access for people with impaired vision. This area features many different sections such as canned goods, dry packaged goods, spices, drinks and snacks, baking supplies, baby items, cereals, cleaning products, pet supplies, and health and beauty items. For visually impaired individuals, however, it can be hard to reach these various sections and to find the relevant products. The purpose of this paper is to present a study that sought to understand the barriers that shoppers with vision impairment (VI) face in the grocery store`s built environment.

The research approach was based on the application of the ethnography method, Think-aloud Protocol (TAP), Interviews, and behavioural mapping method.

Abbreviation:

AODA: Accessibility for Ontarians with Disabilities Act, 2005, LV: Low Vision, VI: Visually Impaired, CNIB: Canadian National Institute for the Blind

Introduction

The term "visually impaired" (VI) refers to individuals with low vision (LV) who can rely on a combination of their limited vision and other senses to do daily tasks. VI individuals are unable to read from a normal viewing distance even with the aid of eyeglasses and contact lenses (Catteneo & Vecchi, 2011, p. 138). Two terms in vision impairment that need to be understood are "object vision" and "travel vision." Object vision is the ability of people to determine what kind of object they are seeing but not knowing its type or details. An example of this is seeing a person but being unable to recognize them. Travel vision refers to the ability to move in space independently without the help of a cane, a guide dog, or a guide (Chapman, 2001, p. 14).

When designing a layout for a grocery store, the main focus is the relationship between the seller and the consumer, with the seller always thinking of what to display and where to display it. One of the main elements considered when designing a grocery store is the floor layout and the human behaviour within that layout; as a result, retailers focus on the store magnets, which are the main sections that attract the most customers. The types of sales sections have a pronounced effect on customer flow. Each section can be designed in a way to have a magnet that attracts customers and increases sales.

When designing a grocery store, the main layout elements are the entrance, exit, aisles, and the different zones, such as meat, vegetables and fruits, dairy, and the cash out area, which all should be welcoming and friendly

(Ohta & Higuchi, 2013). According to a study where magnet areas inside of 64 grocery stores were analysed, all of the displays designed for the perimeter of the store had more magnets than the middle area displays. Most stores are designed to have the fruit and vegetable section near the entrance, with the cash out and exit on the other side, and the aisles usually located in the middle area.

Most grocery stores use these designs and do not make special assessments for people with vision impairment. According to the literature review, no grocery stores have been designed to provide access to visually impaired people to shop independently. Visually impaired people depend on friends, families, and a store's customer service department because they want to find their items and shop fast. How can retailers provide a physical environment to help visually impaired people shop independently?

In Ireland, 240,000 people are living with vision impairment. A study by the National Council of the Blind Ireland (NCBI) estimated the barriers in grocery stores as follows ((RNIB), n.d.).

- 79% stated that the shop is not easy to navigate through the different zones
- 96% had difficulties accessing the information on signs
- 95% had difficulties accessing the information on labels
- 73% face obstacles in the aisles
- 89% mentioned that to improve their shopping experience they want their bill to be read to them.

What about finding the right section in a zone? And how they can find the right shelf and right product?

The Royal National Institute of Blind People (RNIB) has researched the shopping experience for those who are visually impaired and found that users are looking for someone to help (customer service) and to navigate them to find their products.

Customer service. It is important for customer service to be found easily by the blind or visually impaired. Customer service should be aware that most people who are visually impaired can distinguish between light and dark

colours and that not all of them carry a white cane or use a guide dog. In addition, some visually impaired people are also deaf. How can they be included in a design to help them shop independently?

Customer service should be near the entrance to be easily accessed by users and where customers can be monitored.

If customer service employees see a customer who needs help, they should introduce themselves, tell why they are here, and help the user through the shopping journey ((RNIB), n.d.).

Navigating, locating, and selecting products. Usually, visually impaired people push the cart and their assistant picks up the products. The problem they face in this process is there may be many obstacles between the aisles: staff may leave their pallets, some freestanding displays block the aisles, or some products may be on the floor after being dropped from the shelves. Moving around to find the needed product is really challenging, especially when the products are arranged seasonally. Another barrier can be reading detailed product information if it is in small letters. When product information is not accessible, the customer is prevented from knowing the ingredients, the items on sale, and the promotions.

Some solutions provided by the NCBI are to:
- Keep aisles as free as possible from any obstacles
- Use colour contrasts in the building environment and product packaging
- Use floor signs
- Ensure customer service is located near the entrance and accessible by users
- Use larger print text
- Use audio-labelling

As mentioned previously, all of these are some solutions, but they are solutions that do not make visually impaired people fully independent in a grocery store ((RNIB), n.d.).

Paying for products. Most visually impaired people have difficulties in cashing out; for example, if they pay by cash they do not know which bills the cashier returned in change. The different chip and pin machines may be stressful and challenging because of the different layouts and the periodic updates that make it hard for a visually impaired person to use ((RNIB), n.d.).

Some solutions have been suggested, such as sales staff reading the final amount for the customer, confirming the amount handed to that customer, and count out any cash amount handed back to the customer. For chip users, the sales staff can scan the card and the customer can sign it. It has been suggested that all chip machines should retain the same layouts and have raised letters for accessibility.

Objectives

The objective of the study was to investigate the barriers that people with vision impairment face in grocery store`s building environment and to identify the gaps in the retail design.

Research Methods

Six low vision (LV) participants took part voluntarily in the research to help identify the barriers faced in their shopping journey. This created an inclusive study of a participatory action research method that included different vision-impaired groups as well as their experiences through different shopping stages.

Different methods were used to gather information, such as ethnography (shadowing), behavioural mapping, and interviews. Each method was documented using different tools and will be discussed later in this paper.

Ethnography (Shadowing)

Ethnography is a social science research method that helps to deepen the understanding of people's daily practices and behaviour. In researching

individuals with vision impairment, ethnography helps understand their behaviour and how they interact within a building and the environment during a shopping journey (Hoey, 2013). Shadowing techniques are used throughout the study; this is an observational technique in which the observer tracks the participant while they are completing their tasks, which helps the observer to understand a participant's experience and their pain (D-Lab, 2012). Shadowing observation should be documented through behavioural mapping, photos, videotaping, and field notes. The think-aloud method is another way to support the shadowing technique and is needed to understand the 'why' behind patients' behaviours. During the research, two male participants participated in the shopping journey.

The research team met with a low-vision volunteer on Nov 9, 2013 at the Liberty Village Metro in Toronto to document his shopping journey within the store. Field notes, video recordings, photos, behavioural mapping, and think-aloud method were used in the research. The participant was looking to buy seven items located in different zones. A map of the store and the behavioural mapping records for the needed items in the different zones are shown in Figures 1 to 9 below.
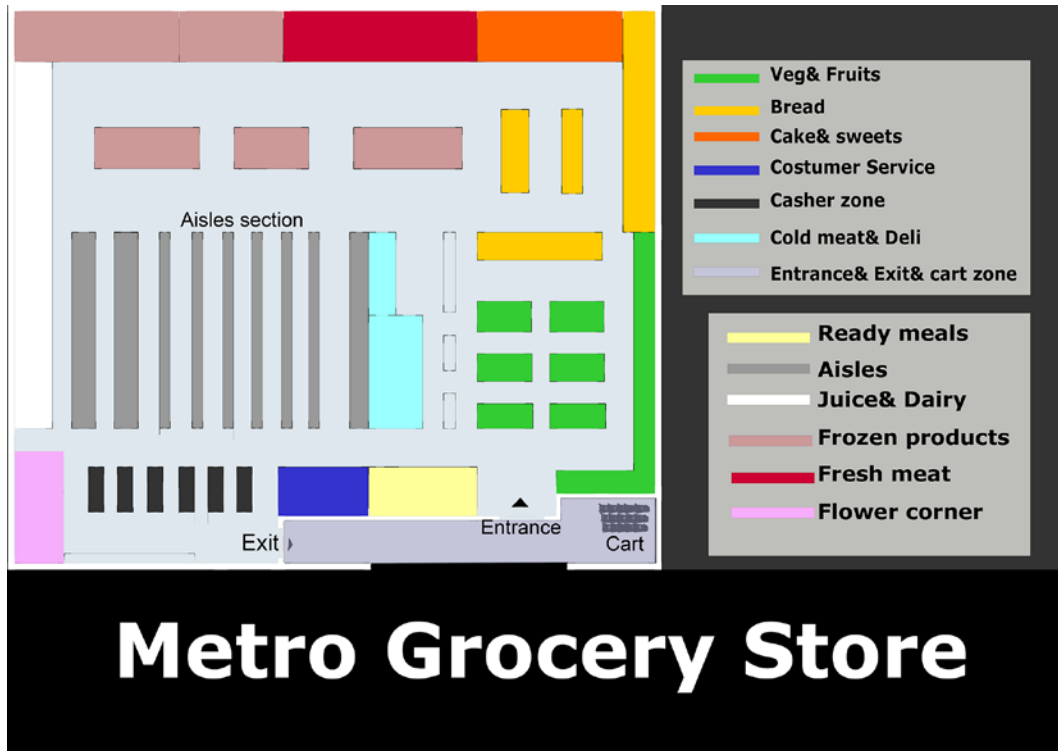
Figure 1. Metro Grocery Store.

Figure 2. Entrance.

Figure 3. Wayfinding cues. Veggies and fruits.

Figure 4.Wayfinding cues. Searching the product.
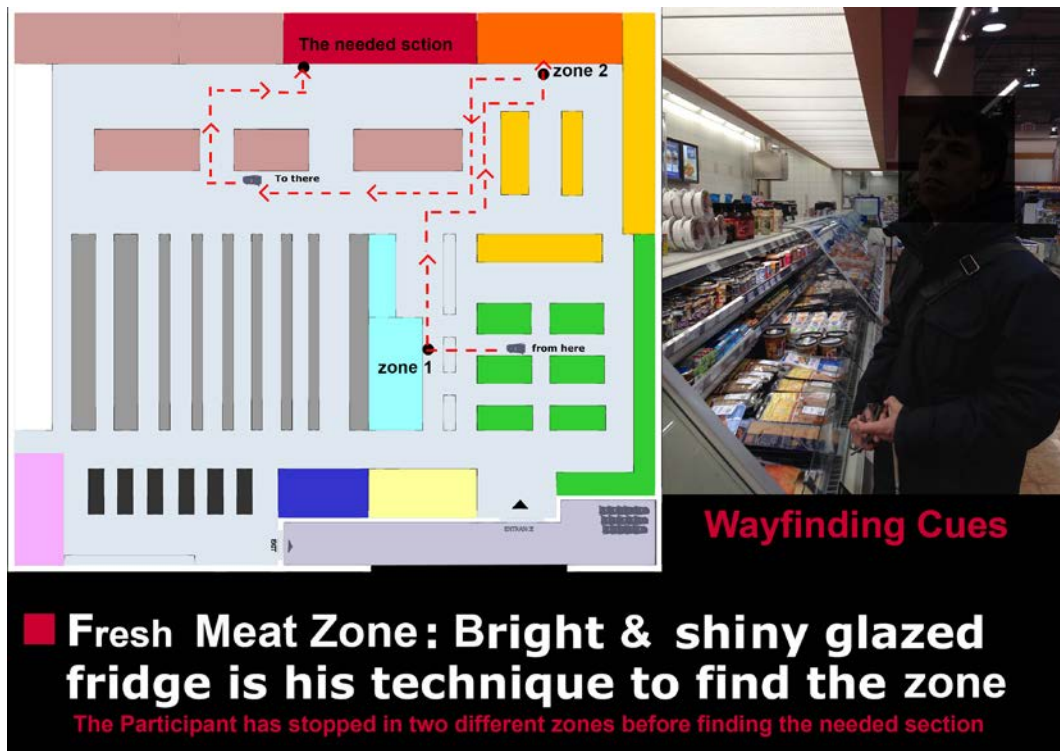
Figure 5. Wayfinding cues. Freash meat.
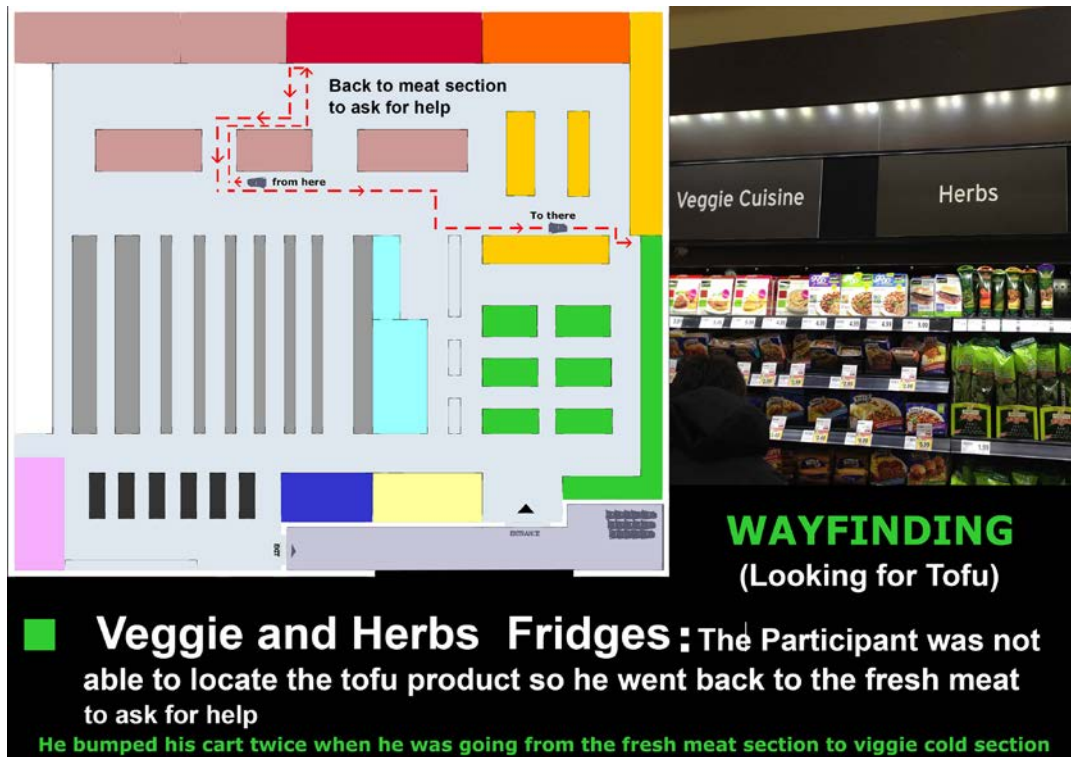

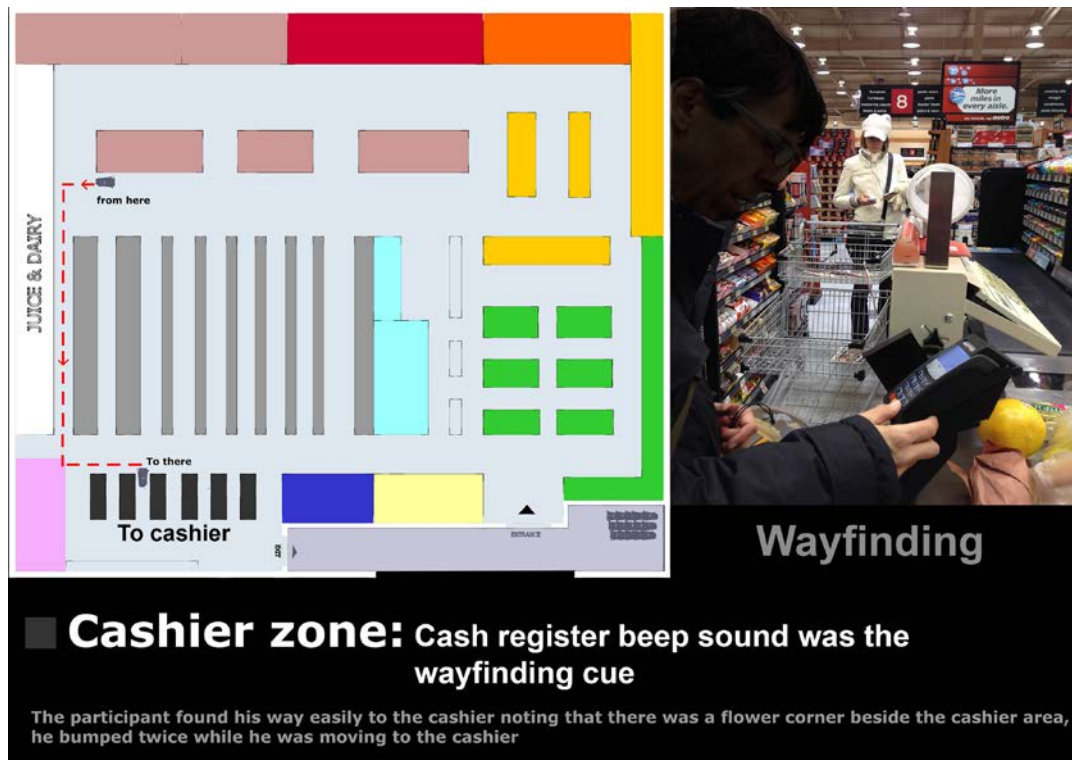*Figure 6. Wayfinding. Veggies and herbs fridges.*

Figure 7. Aisles.

Figure 8. Wayfinding. Dairy.

Figure 9. Wayfinding. Cashier zone.

Behavioural Mapping Method

Behavioural mapping is used to document individuals' behaviours, their interactions, and circulation from one space to another. How individuals orient, interact with people and the environment, and the techniques they use to find their way helps researchers understand low vision people's patterns and how they interact with the building environment. Behavioural mapping also allows the study of low vision people's behaviours by culture, age, and gender within the building environment (Hanington & Martin, 2012, pp. 18-19). Through this research, behavioural mapping documented the behaviour of people with vision impairment through the different stages in the shopping journey starting from arrival at the store entrance, the movement through different zones, and then finally the arrival at checkout. We observed their routes of circulation among the different zones, the obstacles, where they stopped their carts, and the time it took them to find their items.

Findings (Ethnography)

Upon analysing the data, it became obvious that the participant was not familiar with this grocery store, although he was familiar with the retail chain it was a part of. Through behavioural mapping, it was observed that he knew the location of some zones such as the vegetable, dairy, and the aisles, but that he had difficulties locating the meat zone and the cold veggie zone. Three different themes were found through the research and are presented below.

Speculation and verification. For the participant, the shopping journey was a constant cycle of speculation and verification. He had to constantly speculate where something might be or which direction to go, what words were on a sign, or what was in a package. This constant speculation and verification requires great concentration and is mentally exhausting. A sighted user would not need to constantly speculate and verify his location.

'I can see that it's a bright… shiny… something. Okay, I'm going to go closer to verify that I think it's a… counter.' (Participant navigating towards the deli counter.)

During the wayfinding (navigation), the participant depended significantly on his other senses for verification. An improved design would reduce the need for constant speculation and help in locating the different zones as well as the products.

Once the participant arrived at the location, the shelf labels, rather than reducing speculation, continued to contribute to speculation because of the small print and poor labelling practices. Packaging of products is so variable that even sighted users sometimes need to speculate as to the contents of a product. For a low-vision shopper, the problem is even more acute:

'I know this is some kind of relatively plain tofu because it's not over there with all the fancy stuff. But it's not the color of typical tofu, so… what is it? And I'm looking at… Whoa, there's some kind of word there, what… ah," smoked" it says. Right, so that was the hierarchy.'

Better package and shelf label designs are needed to reduce the amount of speculation and verification necessary. Many design ideas could be developed that would help people find the right shelf and the right product; this can be done by designing a handheld device or designing the environment to be more accessible. The latter is our aim in this research.

Request for assistance and trust. During the shopping trip, there was a constant cycle of asking for assistance and trusting the helper. Our participant carried a white cane, not so much to guide him visually, but so that when asking for assistance people would be more willing and likely to help because of his low vision.

'I'm trying to figure out whether store clerks are paying attention to me... which is why it's useful to have this [white cane].'

'Excuse me, could you tell me where I would find tofu, or things related to tofu?'

In addition, the participant would have to leave his cart unattended to ask people for help.

'People who are comfortable with working with digital information should not underestimate the importance of other people in the environment. I ask people for assistance all the time and they are the most responsive machines of all!'

An improved store design would enable a low-vision user to ask for assistance and allow customer service to help customers through the all the different stages in the shopping journey in an easier way. But how can designers make a wayfinding system to be embedded in the store design without making the low-vision customer wait for human customer service?

Mistakes and apologies. As seen from the behavioural mapping of the store, the path taken by the participant was indirect with extra time needed for backtracking. To find two vegetable items took 15 minutes. The participant bumped his cart seven times during the visit and he was apologetic each time.

'Turning left is frightful.' [Speaking of driving the cart and going left.]

An improved design would need to minimise mistakes and errors. The cart could be designed with a device that detects obstacles and alerts the driver or automatically brakes. This technology is already available in some car models to help with parking.

We are uncertain as to whether the participant made mistakes with his product choices. He may have arrived home and realised he forgot an item or chose an incorrect item. He mentioned that to minimise error he usually shops in the perimeter of the store and does not venture into the centre aisles if he can help it.

Interviews

Phone interviews were conducted with five participants. The questions were semi-structured, open-ended questions to help the participants speak freely and to reduce any bias through the research. The questions were divided into four themes: the first theme was demographic, designed to find out about the participant's age and shopping habits; the second theme concentrated on the building environment, accessibility, and customer service; the third theme focussed on the packaging and information accessibility; and the last theme dealt with the checking out process. In this paper, we will concentrate on the demographic data and building environment theme. Below are samples of the questions asked during the interviews:

1. When/where do you typically do your grocery shopping? (Speciality store, retail store)

2. How do you go grocery shopping (with a friend? by car, bus?), and did you have hard time shopping alone and finding your product?

3. What do you make sure you have with you when you go shopping (list? magnifier? white cane?)

4. Do you think an iPhone may assist you in reaching the aisles and finding the product you need?

5. Do you think the building environment is designed to help you find the section you are looking for?

6. What can architects and designers do to reduce the barriers in a grocery store?

7. If you are familiar with a store, can you find the different zones? Can you identify the sections in the aisles?

8. Can you find the product on the shelf? How?

Findings (Interviews)

The participants stated that they go shopping at least once a week, on weekends or on their days off. They do their shopping with their family, a family member, or a friend; if necessary, visually impaired users are able to do their shopping alone if the grocery store is within walking distance. All participants stated that they use their cane because it works for them as an identification tool so staff and customer service can help them in the shopping journey. They use their iPhone or dictaphone for writing their shopping lists.

Building environment barriers. Most participants confirmed that they face great challenges in navigating a store when they visit it for the first time, but if they are used to a store, the environment is less challenging. Finding a product, customer service, and navigating between the aisles is really challenging.

'I cannot navigate the store alone. I am not going to explore the space it is not safe (for new stores). I can reach the different zones, I can access the product if it is unique. Someone has to assist me with the brand name. Random displays are an obstacle.' **Blind Participant**

'The biggest challenge is to find a product or someone to help. Random displays in the aisles shelves is a great obstacle.' **Visually impaired participant M**

'The outside perimeter is more accessible than the centre of the store (aisles). No overhead signage. No audio direction.' **Accessibility Specialist**

Conclusion & Recommendations by the participants

It is very important that we assist the aging population and people with vision impairment in creating a mental map of the built environment in grocery stores. Such a map will help them in orientation, deciding where to go, and taking action to move from one place to another; the mental map is based on information obtained from the built environment known as orientation cues. The orientation cues include spatial form, layout, signage, lighting, colour, texture, sound, information system, and tactile maps.

The participants had suggested the following solutions in order to come up with design solutions to mitigate those difficulties:

'Standardise the bag location. Use different flooring material. Signage. Put a line in the flooring in the aisles section to help know that we are heading forward and not in a zigzag direction.' **Blind Participant**

'Standard floor layout. Different floor colours with different materials. Staff training. Remove random displays from the middle of aisles.' **Visually impaired participant M**

'A good layout design, wider aisles, good lighting. Auditory signs.' **Visually impaired participant N**

'Contrast in colours. Lighting. Wide aisles to accommodate a guide dog. Auditory signs to alert the person to what is in the aisle.' **Accessibility Specialist**

Acknowledgements

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