

The kitchen and the elderly: universal design of environment and products

La cocina y las personas mayores: diseño universal del medio ambiente y productos

A cozinha e os idosos: design universal de ambiente e produtos

Camila Feldberg Porto
Edson José Carpintero Rezende

ABSTRACT: We perform a literature review to show the importance of universal design in designing the kitchen environment and some kitchen utensils, focusing on the elderly user. As such, we argue about the importance of the built environment for the elderly and particularly of the kitchen. We also provide examples of universal design solutions for the kitchen and some of its utensils. At the end, we discuss the relevance of this study for an aging society.

Keywords: Elderly; Universal design; Kitchen; Utensils.

RESUMEN: *Realizamos una revisión de la literatura para mostrar la importancia del diseño universal en el diseño del entorno de la cocina y algunos utensilios de cocina, centrándose en el usuario de edad avanzada. Como tal, discutimos sobre la importancia del entorno construido para los ancianos y particularmente de la cocina. También proporcionamos ejemplos de soluciones universales de diseño para la cocina y algunos de sus utensilios. Al final, discutimos la relevancia de este estudio para una sociedad que envejece.*

Palabras clave: *Ancianos; Diseño universal; Cocina; Utensilios.*

RESUMO: Foi realizada uma revisão da literatura para evidenciar a importância do design universal no projeto do ambiente da cozinha e de alguns utensílios de cozinha, com foco no usuário idoso. Assim, discute-se a importância do ambiente construído para os idosos e, particularmente, da cozinha. Também são fornecidos exemplos de soluções de design universal e para alguns utensílios. Ao final, discute-se a relevância do estudo para uma sociedade que está envelhecendo.

Palavras-chave: Idoso; Design universal; Cozinha; Utensílios.

Introduction

Currently, the world is going through a phase in which the number of seniors has been increasing. In Brazil, in 2010, the percentage of the senior population was 10% (Alves, 2015; Kuznier, Souza, Chianca, Ercole, & Alves, 2015; Marin, and Panes, 2015). In 2015 there was an increase to 11.7%, and it is predicted to be 18.8% in 2030, and 29.3% in 2050 (Global Age Watch Index, 2015).

Because the elder population is growing fast the concerns about their well-being has also increased, as well as discussions and solutions about this issue. To address the well-being and quality of life of seniors the concept of active aging has been greatly studied. According to WHO (2005), active aging is a process that highlights autonomy, making it possible for a senior to notice his/her physical, social, and mental abilities, thereby making it possible to assure his/her presence in society while respecting his/her capabilities, desires and necessities and focusing on the overall well-being of the individual.

The environment influences considerably on the senior's daily life because it interferes on one's independence, autonomy and emotions (Bestetti, 2006). Haselwandter, *et al.* (2015), for instance, affirm that the features of a built environment may act in benefit or in a negative way for a person's will to engage on physical activities. Leyden (2003) also affirms that the built environment may influence social activities. Hence, if the environment is designed to encourage walking habits, socialization will be encouraged among the residents.

Demirbilek, and Demikran (2004) valorize the importance of psychological well-being for older adults, and assert that the environment have great influence on it. The place where they live and the pleasure taken in living there determine the composition of their emotions.

Therefore, the older adult may become more confident and more independent when his/her home provides features to encourage that, participating on slowing emotional declines very common during late aging.

Thus, planning a house for the aging process is strategic because, as Kochera, Straight and Guterbok (2005) maintain, it improves the life quality and independence of the dwellers, it assures that the whole house is used efficiently, and the residents can live there for longer periods.

Universal Design (UD) can support that idea since it is a strategy to create environments suitable to be used by any person, despite the age, sizes or capabilities (Null, 2003). UD is a design concept that understands, respects, and tries to attend to a great variety of human needs in every product or environment (North Carolina State University Center For Universal Design, 1997).

Using UD strategically may bring benefits for all, especially for senior users. Having the older person in mind at the beginning of the design project provides a range of insights because these people have physical limitations due to aging, and solutions that consider the decrease of dexterity and strength, for instance, will certainly attend younger users (Raviselvam, *et al.*, 2014).

To focus on specific solutions, this study aims to understand the importance of the house and the kitchen for elderly. Then, we make a research of universal design solutions for the kitchen environment and for some kitchen utensils. We chose to study the kitchen because it is one of the house rooms that have shown a high number of accidents, which gives a dangerous characteristic for this environment. Also, the utensils were chosen under the criteria of being designed having seniors as target audience.

The House

The house is a stable spot that transforms itself into a place to live and where people have personal items with which they identify (Barbosa, 2012). The home is comprised of a little bit from each occupant and it in turn reflects their personalities because people often stay in their homes for the greater part of their lives. Thus, one must aim to adjust the house to the individual manners of each person, making it comfortable, safe and pleasant regardless of the occupants (Flores, 2010).

Increasingly, it is being recognized that residential design must be directed towards a wider number of people. Currently, dwellings must be adaptable to accommodate different needs and to satisfy users' requirements. Individual characteristics, such as strength or agility, should not prevent a person from using and safely enjoying all of his/her home's amenities (North Carolina State University Center for Universal *Design*, 1997).

During the third age, a person's home is extremely relevant because it is in this phase that the environment in which the person lives affects and/or interferes with his/her individual necessities. Hence, the dwelling is a decisive point for quality of life, well-being maintenance and development because it includes both physical and social aspects. It is important for one's environment to promote an appropriate lifestyle, guarantee satisfaction, maintain functional abilities, and preserve independence. When losing some abilities, one's space may interfere with the fulfillment of chores, and consequently with people's behavior (i.e., the space may or may not contribute to the person's independence) (Tomasini, 2005).

Because most environments are built for younger users, those who are a regular size, and those who have at least average functional abilities, the issue of space adjusting to the user is only recently becoming urgent due to the increase in the elderly population. These environments must be designed to favor their users' autonomy, life quality, and lifestyle (Rojas, 2005). Aging-in-place concept is currently accepted as the basis for a new dwelling. The building of homes expressly for the elderly allows them to enjoy their lives with autonomy, which is essential for a positive aging process (Buildings Department, 2008).

The Kitchen

The kitchen is one of the house's primary rooms that requires attention. For seniors, the kitchen and the bathroom are the most problematic areas in the house, which is why they also present greater opportunities for improvement (Martin, Santinha, Rito, and Almeida, 2012). Messias, and Neves (2009) conducted a research on 56 seniors who had suffered falls. The research's conclusions were that the main place where falling occurred was in the kitchen. Other research, conducted by Nascimento Júnior, Magnani, Guedes, Andrade, and Pessoa (2013), on 96 seniors capable of doing everyday activities with little or no help, had the objective of understanding the difficulties for seniors using domestic utensils.

The results showed that 94% had complaints about at least one domestic utensil. According to this study, the kitchen was the room that presented the highest number of complaints by seniors.

The kitchen is the most expensive room to build in a house. The permanent nature of the kitchen's fixtures, such as its counters and cabinets, hampers the evolutionary ability of the kitchen to meet life's progressively changing needs. Therefore, the kitchen must be planned in a universal way because a universal kitchen allows the house dwellers to use it auto-sufficiently (DeMerchant, and Beamish, 1995).

Furthermore, the kitchen is one of the most important and popular rooms in the house; it is where most of the activity occurs and where guests relax and serve themselves (Miller, and Rama, 2011; Sâmia, 2008). The main activity occurring in the kitchen is the preparation of food, but it is also a place where meals are eaten and where people gather with other residents or friends. This often occurs because of the cooking process, which is considered to be a social act. Because kitchens have characteristics for each necessary cooking activity, it is important to pay attention to illumination, materials used, decoration and comfort while designing the kitchen, all of these factors elevate the kitchen's activities to a pleasurable level (Sâmia, 2008).

Perhaps due to the interaction between people, the kitchen has been targeted for greater aesthetic concern. People seek to have a harmonious set of utensils, furniture and appliances (Martins, 2013). This is why the kitchen is often shown as an attractive place within a house. The kitchen stimulates designing products, accessories, and electronic equipment because it is a place where people stay for long periods of time and where people receive guests. Thus, the kitchen is the room that evolves the most, reflecting the changes of society's habits. Designing the kitchen anthropometrically to be ideal for the user is not sufficient, and the designer must consider the users' routine and habits since these issues interfere with the needs of the dweller(s) (Costa, *et al.*, 2009). Design projects that do not consider these difficulties for seniors make the act of cooking harder and more dangerous. Often, complications in cooking are due to poorly designed kitchens and the effects of the natural aging process upon the elderly (Ibrahim, and Davies, 2012). The organization of the activities performed in the kitchen, its layouts, and its design depend upon the sociocultural and historical context in which they are present. This influences the actions and desires of people while also creating some of the problems that seniors experience (Johansson, *et al.*, 2011).

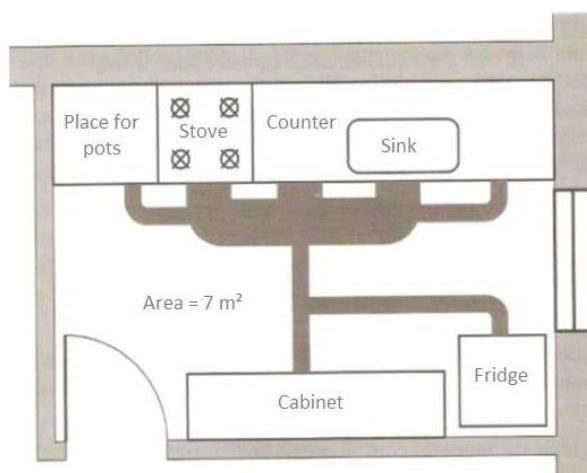
The kitchen's functionality is related to the comfortable use of utensils and to the number of movements one makes, which depends on the ability to move and on the distances between the main action stations.

Although there are several kitchen layouts, there are four primary types considered: I-shaped, in which the storage area, cleaning station and cooking station are located on the same wall; L-shaped, in which the stations formerly mentioned are distributed between two walls; U-shaped, in which the stations are present in three walls; and the island shaped, in which the stations are distributed considering the existence of a central sector (Costa, *et al.*, 2009).

The most basic kitchen layout concept is the one that minimizes walking and has clean and clear paths between the work stations. Traditionally, the kitchen layout was a triangle, but currently, with the use of appliances, the kitchen may have four or more stations. The distance between these stations must be greater than 1.2 m and less than 2.75 m, and if there is an island or obstacle, it must not obstruct the path by more than 30 cm (Mitchell, n.d).

For Iida (2005), the counter is the kitchen's irradiator station (the main activities are related to it and it is where they start and end). The movements counter-sink and counter-stove are the most commonly taken; other paths highlighted are counter-fridge and counter-closet (Figure 1). This indicates that by designing a kitchen layout, the sink and the stove ideally must be next to the counter, whereas there is more flexibility in placement for the other components, which depends on the individual family's habits. There is another layout that is more ideal than the previous: the parallel shaped layout, in which the fridge and the cabinet are on one side of the kitchen and the sink, the counter and the stove are on the other.

Figure 1: The intensity of movement flow registered in the kitchen



Available at: IIDA, 2005, p. 568.

However, Cunha, *et al.* (2007) performed a study with 10 senior women aged between 65 and 74: the results showed a preference for the I-shaped layout, composed of the fridge-sink-stove arrangement, and highlighted the necessity of improving ways to develop the space and its organization to improve the technologies' perceived functionality. Nonetheless, the ladies did have some complaints about the kitchen, such as: needing to walk too much, having a lack of organization, the distance between equipment, exaggerated physical efforts needed, inadequate equipment measures, cleaning requirements, physical wear caused by large displacements and difficulty in understanding the use of equipment. Priority must be given to the kitchen layout's design, especially related to the proximity of the action stations. Moreover, the storage places must be easily accessible and each station must accommodate extreme users, such as seniors and children (Ibrahim, and Davies, 2012; Maguire, *et al.*, 2014).

Nascimento Júnior, *et al.* (2013) have identified, through their research, complaints about specific kitchen equipment. For the refrigerator, the main complaints were the height, having compartments lower than the functional limit, and being difficult to open. There were complaints about the blender due to the noise, the lack of instructional information for its use, and its weight. Weight was also an issue with the irons. There was discontent regarding the cabinets being too high, too heavy and with uncomfortable handles; regarding the chairs being uncomfortable and hard to move; tables had sharp edges and were too heavy; and the silverware were slippery and hard to grab. Cunha, *et al.* (2007) explain that in general, the elderly would like to have more functional and practical kitchens, to prevent fatigue during their daily activities. Hence, there must be greater concern given to technological and structural issues within the kitchen for the third age.

UD can provide solutions for these problems and thus explore the potential opportunities found in kitchens for the elderly. The ability to understand the difficulties found in the kitchen, and in particular, the difficulties with using utensils (with and without use information provided to the user), must be carefully investigated to create adequate and economically viable products (Hrovatin, and Vizintin, 2013; Ribeiro, *et al.*, 2001). The ideal kitchen for every family does not exist out-of-the-box because needs are considerably individual in nature. Each family must plan their kitchen based upon their lifestyle, assuring an efficient and pleasant result. The kitchen's organization, the color used, and the distribution of the products in it are very important for the health and happiness of the users (Ricardo, *et al.*, 2005).

Solutions for a universal kitchen

UD's principles can be applied to the kitchen's environment, and they offer some strategies. For upper cabinets, it is important to lower the height so that short people, seated people or people with physical limitations can reach them. If there is a taller user in the kitchen, it may be an interesting possibility to alternate the heights of the cabinets, thus, meeting everyone's needs. Some solutions to the cabinet problem that were found include not using default heights but rather heights that are specific to the family, including an organizer that can be accessed only when needed, and inserting pull-down shelves, allowing access for shorter users (Flores, 2010; Hrovatin, and Vizintin, 2013; Ma, 2002; NAHB Research Center, 1996; Sâmia, 2008).

For lower cabinets, the suggested strategies are using different types of drawer organizers; installing drawers that extend with greater range, easing access to deeper items; rollout shelves; shelves with doors that allow easy access; and using storage units that can be pulled to facilitate ease of reaching. For instance, there are organizing trays for knives, silver, and seasonings, as well as slippery racks and closets with rotating shelves (Flores, 2010; Hrovatin, and Vizintin, 2013; Ma, 2002; NAHB Research Center, 1996; Sâmia, 2008).

The counter is the place where the person positions himself/herself, prepares the food (often using a cutting board), and where the dishes are piled and utensils placed (Miller, and Rama, 2011). Varying the counter height is a good strategy so that all family members can use the it. Also choosing counters without sharp edges reduces risks; creating a part of the counter to be made of a heat-resistant material that can also be used as a cutting surface and that has contrasting colors and lighting under it favors people with impaired vision (Afacan, and Demirkan, 2010; Flores, 2010; Ma, 2002; NAHB, 1996). Pullout shelves and space for meals at the end of the counter allow for all of the family to help in preparing the food. A counter with a space underneath it for people's knees creates a dual purpose for the counter, allowing for eating or studying. The different heights of the counter assist in food preparation while seated and reduce fatigue for shorter people (DeMerchant, and Beamish, 1995; NAHB, 1996; Sâmia, 2008).

For cabinet doors, using a D-shaped handle instead of the more typical rounded shape allows for more easily grasping of the handle, and doors with magnetic latches are easier to open and close for those who have little strength in their hands (Ma, 2002).

Using colors or illustrations on the doors can make it easier to understand what may be found inside the cabinet (Johansson, *et al.*, 2011).

Regarding the sinks, faucets with single-lever controls are best for people who have difficulty in securely grasping the controls (Flores, 2010; Ma, 2002; Sâmia, 2008). The sinks should be at a lower height, have space underneath to provide adequate wheelchair access, and have a spray hose that facilitates watering dishes and vegetables (Ma, 2002).

The appliances must be stored with lower-reach and easy to reach access in mind, so they can be retrieved with greater ease (Flores, 2010). In an L-shaped kitchen, the appliances can be stored in the corner, which allows a senior easier access to the item (Boschetti, 2002).

Bosse (2013) has studied the use of blenders and microwave ovens by seniors and young people, comparing the ergonomics of the products. She suggests awareness of some concerns to produce these utensils in a more accessible way, such as using a precise fit with clearly identifiable markings to assist seniors with articulation problems, arthritis or arthrosis, and also those with vision impairments. She also suggests developing an iconography, which is of previous knowledge to the elderly and favors intuitive use. To encourage perceptual use, she suggests studying the luminosity of the control panels and the typography of the appliance's information (i.e., brightly lit buttons on the control panel and large fonts in user guides).

The side-by-side refrigerator allows easy access to the fridge and to the freezer; and an ice dispenser removes the need to make ice in molds (usually requiring dexterity and strength) (Ma, 2002). The fridge must also have shelves that are easy to access and disallow heavy items being placed in the door (Flores, 2010).

Wall microwave ovens must be installed at an accessible height for children. The wall ovens must have side-opening doors to reduce the risk of accidental burns and must be installed at an accessible height for seated people. Concerning cooktops, the modern ones that have the burners under a glass are preferable; this eases cleaning and reduces accidents. Having frontal or lateral controls lowers burn risks, and press buttons are easier to use. Having a heat indicator that shows which surface is hot after the "fire" is put out is a good option. Contrasting colors allow people with limited sight to identify hot and cold areas. A mirror above the cooktop allows wheelchair users to see inside the pots (Ma, 2002; NAHB, 1996). Regarding stoves, it is recommended to mark the "off" position with a flashy color adhesive tape (Flores, 2010). It is also recommended to use round buttons, to increase movement amplitude (Silva, 2011).

Kitchen Utensils

Domestic utensils are products whose interfaces have recently been undergoing several changes with the goal of easing handling and reducing discomfort during its use. Aesthetic changes are also very common in these objects. It is important to study these products in terms of comfort and safety during use, so solutions for both functional and aesthetic needs can be found (Bonfim, *et al.*, 2014).

The use of kitchen utensils should elevate the pleasure to be found in the acts of cooking and eating. However, currently, people are resistant to using new objects in the kitchen, probably due to the security they feel using older, familiar utensils. For this reason, a new product must have some resemblance to its previous incarnation (Wilson, 2012).

It is believed that UD can create considerable value for enterprises. An example of this is OXO Good Grips, founded in 1990 with an initial offering of approximately 15 products. The company's owner, Sam, noticed the difficulty his wife, who had arthritis, had in using kitchen utensils. Based on his perceptions, he hired the company Smart Design to develop a set of user-friendly kitchen utensils, and he called attention to his requirements that the utensils be designed for quality, value, and a wide range of users (not just people with special needs). As payment, he proposed a certain amount of advanced money and then 3% of the royalties. The Smart Design Company believed in the importance of creating excellent products to contrast with the sub-par products currently on the market. They searched for the best materials (e.g., the blades of the potato peeler were Japanese steel), they worried about the grips because they should apply for multiple people types, including ones with arthritis, and they designed an attractive shape for the utensils (Coleman, *et al.*, 2007).

The OXO peelers represented a radical change toward the ergonomic forms of utensils and started a wave of peeler competition (Figure 2), to the point that an owner of a kitchen product store in the UK would affirm to have up to seventy different types in stock. Non-electric utensils and utensils that do not hurt their users during handling are part of a new ergonomic design in the kitchen. Other products that have these characteristics are: ergonomic spatulas, drainers, soft hold beaters and silicone brushes. Theoretically, all kitchen utensils should be ergonomic because the proposal of ergonomics is to help in the cooking process. However, many of the older, non-ergonomic utensils are, in a way, harmful to the user, even if only on a low level.

The ergonomic products address a different need in the kitchen: to solve problems of preparing food and/or cooking. The goal is to make cookery easier, not to reinvent it (Wilson, 2012).

Figure 2: OXO Good Grips peelers

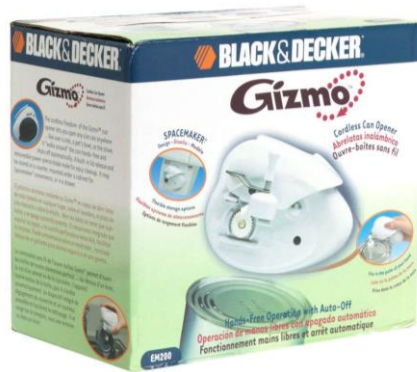


Available at: <<http://smartdesignworldwide.com/work/oxo-good-grips/>> Accessed on November 19th, 2016

The OXO products have rubber holds, which are soft and easy to handle. From the first potato peeler, another 350 products have been developed for the product line (Borges, 1999). This proves that using universal design is a possibility and a true goal to work toward (Talley, 2013).

Another UD use example is the case of applica Consumer Products, whose products are sold under the brand names Black & Decker, Windermere and Littermaid. The company has created an Ergo product line of little kitchen appliances. The line was designed to attract baby boomers, who were born between 1945 and 1964, who are advancing in age and have problems due to aging, such as arthritis. Owing to the great influence of this large generation, the company turned its attention to creating utensils concerned with the configuration and holding angles, the balance, the weight and functions and that have gone through tests run on people of different ages. One of these products was the can opener Gizmo-T (Figure 3), which was wireless. It was designed to fit in the palm of a hand and, also, to be used without the hands by walking itself around the can and turning off automatically (North Carolina State University Center for Universal Design, 2011).

Figure 3: Applica Consumer Products' can opener Gizmo-T



Available at: <<https://kenmoreconnect.com/appliances/black-and-decker-gizmo-cordless-can-opener-spacemaker-1-can-opener>> Accessed on November 19th, 2016

Another product developed by Applica Consumer Products, together with Black & Decker, was the jar opener LidsOff (Figure 4), whose initial project was designed by Jen Davis, a Yale student at the time, in 1999. LidsOff started being sold in 2003 after going through improvements. It was designed for people with little strength or who had difficulty opening industrialized vacuum-sealed jars. The equipment allows one to effortlessly open jars using only one hand, so it is useful for both people with difficulties and those without physical problems but who do not want to expend effort (North, 2011).

Figure 4: Jar opener LidsOff



Available at: <<https://www.amazon.com/Black-Decker-JW400-Open-Center/dp/B0009AFW0E>> Accessed on November 19th, 2016

With a motivation similar to Applica's, the entrepreneur Morison Cousin, Tupperware's design vice-president, noticed in 1990 the need to reach a new generation of plastic container users. The opportunity was detected when he noticed his mother, who was 87 years old, having difficulty opening containers. In addition to her, the brand's loyal users (who would have started consuming Tupperware in approximately 1945) were growing older in the 1990's and starting to show difficulty in opening the containers. For this reason, Cousin redesigned the Tupperware products and developed the One Touch seal (Figure 5-1), which is easy to open and close by pressing on the middle of the lid. He also redesigned the Wonderlier container's lid, to ease the grasping of it (Figure 5-2), by changing the narrow lip seal to larger seal tabs with double-arc handles. Moreover, he used strong and contrasting colors on the lids and on the containers, improving usability for people with sight issues. Thereafter, the company added 100 new products to the line, all of them able to endure the users' entire life and to attend to all of their container needs throughout life (North, 2011).

Figure 5: Tupperware One Touch and Tupperware Wonderlier containers



1 – Available at: < <http://www.indiamart.com/ez-store/tupperware.html>> Accessed on November 19th, 2016.

2 – Available at: <<http://www.kaboodle.com/reviews/tupperware-wonderlier-3-piece-bowl-set>> Accessed on November 19th, 2016

Another example is the Siberthead Company's case, who developed a mug that solves the burning issues due to hot beverages (Figure 6). Often, people walk around the house while drinking their hot coffee; however, many have difficulty holding a mug due to arthritis, and accidents become a serious concern. Based on this problem, the company has developed a mug with different handle but that is still aesthetically pleasant.

The designers developed an easy to grab mug due to the size, shape and details on the handle, which is large, accommodates different types of hands, and enables great support around the mug, besides having an aesthetically pleasant structural design. The mug is also easy to carry, due to the handle on the lid, and reduces the chances of spillage thanks to a border that can be oriented by the lid's handle and a lid that can be opened or closed. The handles are made of rubber to ease holding the object, even though technology allows the use of different materials (Helen Hamlyn Centre, 2002).

Figure 6: Safe mug with comfortable grabs



Retrieved from: Helen Hamlyn Centre, 2002, p. 4

The company Design Factory has developed an inclusive saucepan project. The designers verified the difficulty that some people had while holding objects and cleaning them, because of accentuated edges. The team created a solution with a universal capacity, in that it can accommodate different types of food and can be used in every type of cookery. This saucepan was created due to the desire of many users to not have to use different pots when cooking. The conic shape of the saucepan eases mixing and widens the base, whereas its large radius favors cleaning of the product (Helen Hamlyn Centre, 2003).

The saucepan is made of aluminum, which it is lighter than other metals, with an anti-adherent interior and a copper base, to enhance the ease of cooking and cleaning. There is also an aluminum strainer for draining and a lid of two parts, aluminum and polycarbonate, with an arched grab that is easy to lift. However, the greatest differential is the long handle, ergonomic and divided in two parts, which greatly changes the way the user holds the pot (Figure 7).

The handle is angled downwards for intuitive use and presents an oval platform that has a comfortable edge. This allows transference of effort from the arm, instead of only one point on the wrist, assuring better balance, safety and less pain. The handle is made of a light material and is resistant to heat (lined in expanded polyurethane). On the other side, there is a second handle, also arched, for grasping the saucepan with two hands and in a way that the weight can be divided while cooking (Helen Hamlyn Centre, 2003; Wright, 2014).

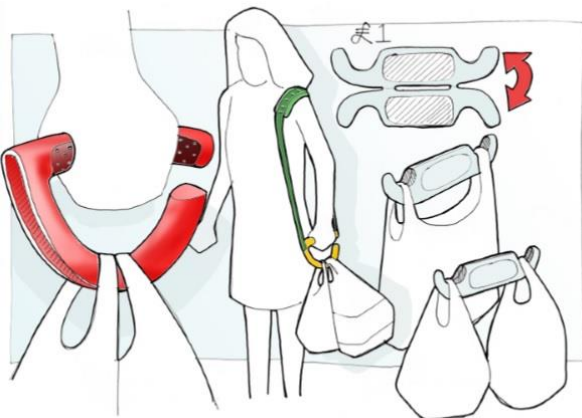
Figure 7: Inclusive saucepan, Factory Design's design



Retrieved from: Helen Hamlyn Centre, 2003, p. 4

The company Rodd Industrial Design was responsible for developing an accessory to carry bags, similar to a quadrangular hook with an optional handle (Figure 8). The product can help any person having difficulty carrying things. At first, the project had been looking at designing an accessory that helped walking, but with extended research in markets and supermarkets, they noticed the difficulty people were having carrying their purchases. For that reason, the projects guidelines were changed. Independent from age or mobility, the team realized that carrying things is an issue for everyone without a car, especially for those who can use only one hand because they have to hold a child's hand or because they use accessories with the other hand, such as a walking stick (Helen Hamlyn Centre, 2007).

Figure 8: Lugga sketches, accessory to carry purchases



Retrieved from: Helen Hamlyn Centre, 2007, p. 2

Thus, the Lugga Project redistributes the weight to take the pressure off the wrist and hands and allows many bags to be carried. Its shape guides the bags to a point equivalent to the core of the hand, allowing for a good weight distribution and reducing the risk of the user harming himself/herself. The grip is comfortable and allows the person to lift the products. The padded shoulder strap is adjustable and enables the weight to be distributed between the spine and the shoulders, also enabling the hands' freedom. The main hook would be made of recyclable plastic (Helen Hamlyn Centre, 2007).

Final Considerations

The elderly are a part of the population, who even though still in the minority, have been greatly increasing all over the world. The concerns with the third age have become urgent, and many items have been tailor-made for the elderly. It is noteworthy that the rise of this age group leads to several business opportunities and brings up problems that were formerly unconsidered. Research and actions oriented to their well-being have already been made and have been opening doors for many more, both in the academic arena through research, and in the market through products and services.

Design, as a study area that solves problems, is a strong collaborator in favor of increasing the quality of life for the elderly. The designer is the professional who primarily gets involved with the target-audience because he/she knows them and is who pursues the best solutions through tools and methods. In the large design area, universal design highlights itself as an objective to be reached because it refers to the product designed for the greatest number of people as possible. This is why it tries to surpass the natural barriers of each person, such as anatomy, capabilities, abilities, and senses, among others. For this reason, designing with focus on the entire aging process makes it is possible to embrace all of these different particularities, since every single individual goes through that process. When we take the elderly as examples for designing products, environments and/or services with universal design, we are considering one of the age extremes. Thus, if a senior is capable of enjoying the product, the chance of a great number of people being able to use the same product increases.

Designing for an aging society may extend products and environments lifetime, since they will attend to a person's needs for longer periods. Hence, using the UD strategy enables a great focus on the user and on the functionality of products, environments and/or services, considering a good quality of life at home for many years.

Therefore, spreading the benefits of universal design and designing for an aging society to the academic world and to the market is of great importance because it may spark ideas for other researches with greater depth and/or ideas for exploring other issues. This would eventually lead to results that would serve as a theoretical basis and as briefing for future projects, which may bring practical and beneficial results to the society in general.

References

- Afacan, Y., & Demirkan, H. (2010). A priority-based approach for satisfying the diverse users' needs, capabilities and expectations: a universal kitchen design case. *Journal of Engineering Design*, 21(2-3), 315-343. Available at: <http://dx.doi.org/10.1080/09544820903303423>. Accessed on: November 19th, 2016.
- Age Watch Index, G. (2015). Age Watch report card: Brazil. Available at: <http://www.helpage.org/global-agewatch/population-ageing-data/country-ageing-data/?Country=Brazil>. Accessed on: November 19th, 2016.
- Alves, J. E. D. (2015). O fim do bônus demográfico e o processo de envelhecimento do Brasil. *Revista Portal de Divulgação*, 45, 6-17. Available at: www.portaldoenvelhecimento.com/revista-nova/index.php/revistaportal/article/.../549. Accessed on: November 19th, 2016.
- Barbosa, M. E. R. (2012). *A casa lúdica*. Matosinhos, Distrito do Porto, Portugal: MA thesis, Escola Superior de Artes e Design (103 p.).
- Bestetti, M. L. T. (2006). *Habitação para idosos: o trabalho do arquiteto, arquitetura e cidade*. São Paulo, SP. Phd thesis. Universidade de São Paulo (184 p.).
- Bonfim, G. H. C., Silva, J. C. R. P. da, Campos, L. F. de A., Fernandes, F. R., Lanutti, J. N. de L., Paschoarelli, L. C., and Okimoto, M. L. L. R. (2014). Percepção de desconforto na utilização de um produto: ralador de queijo. *Ação ergonômica*, 9(1), 64-70. Available at: <http://hdl.handle.net/11449/135531>. Accessed on: November 19th, 2016.
- Borges, A. (1999). O design que fez a revolução dos anos 90. *Gazeta Mercantil, Empresas & Carreiras*. Available at: www.geocities.ws/unb_id/anos-90.rtf. Accessed on November 19th, 2016.
- Boschetti, M. A. (2002). An observational study of older people's use of standard U.S. kitchens. *Housing and society*, 29(1-2), 01-12.
- Bosse, M. (2013). *Avaliações ergonômicas em cozinhas domésticas considerando limitações físicas e cognitivas do público idoso*. Florianópolis, SC: Post-Graduation dissertation, Universidade do Estado de Santa Catarina, Florianópolis (162p.).

- Buildings Department. (2008). *Design manual: barrier free access*, 119-123. Hong Kong: Buildings Department.
- Coleman, R., et al. (2007). The business case. In: Coleman, R., et al. *Design for inclusivity: a practical guide to accessible, innovative and user-centred design*, 33- 56. Burlington: Gower.
- Costa, A. C., et al. (2009). Aplicação da ergonomia em cozinhas residenciais. In: Workshop de Análise ergonômica do trabalho na UFV, 4, 1-13. Viçosa, 2009. *Anais ... Viçosa, MG: Universidade Federal de Viçosa*.
- Cunha, E. F., et al. (2007). Elaboração de uma metodologia para a avaliação da funcionalidade em cozinhas para pessoas da terceira idade. In: Workshop de Análise ergonômica do trabalho na UFV, 4, Viçosa, 2009. *Anais ... Viçosa, MG: Universidade Federal de Viçosa*. (16 p.).
- Demerchant, E. A., & Beamish, J. O. (1995). Universal design in residential spaces. *Housing and society*, 22(1-2), 77-91. Available at: <https://www.tandfonline.com/doi/abs/10.1080/08882746.1995.11430222>. Accessed on: November 19th, 2016.
- Demirbilek, O., & Demirkan, H. (2004). Universal product design involving elderly users: a participatory design model. *Applied Ergonomics*, 35, 361-370. Available at: 10.1016/j.apergo.2004.03.003. Accessed on: November 19th, 2016.
- Flores, A. R. B. (2010). *Interferência da afetividade no projeto de habitação da terceira idade*. Florianópolis, SC. MA Dissertation, Universidade Federal de Santa Catarina, Florianópolis (97p.). Available at: <https://repositorio.ufsc.br/bitstream/handle/123456789/94660/281592.pdf?sequence=1>. Accessed on: November 19th, 2016.
- Haselwandter, E. M., Corcoran, M. P., Folta, S. C., Hyatt, R., Fenton, M., & Nelson, M. E. (2015). The built environment, physical activity, and aging in the United States: a state of the science review. *Journal of Aging and Physical Activity*, 23, 323-329. Available at: 10.1123/japa.2013-0151. Accessed on November 19th, 2016.
- Hellen Hamlyn Centre. (2003). *Factory Wares: an inclusive saucepan*. *Factory design*. Available at: <http://www.hhc.rca.ac.uk>. Accessed on November 19th, 2016.
- Hellen Hamlyn Centre. (2002). *Handle with care: inclusive cup and holder for all needs*. Sieberthead. Available at: <http://www.hhc.rca.ac.uk>. Accessed on November 19th, 2016.
- Hellen Hamlyn Centre. (2007). *Lugga: a hands-free carrying device*. Rodd industrial design. Available at: <http://www.hhc.rca.ac.uk>. Accessed on November 19th, 2016.
- Hrovatin, J., & Vizintin, J. (2013). Kitchen Furniture for elderly people. In: International Conference Research for Furniture Industry, 26, Ljubljana, 2013, *Proceedings...* Ljubljana, 35-40.
- Ibrahim, N. I., & Davies, S. (2012). Aging: physical difficulties and safety in cooking tasks. *National center for biotechnology information*, 41, 5152-5159. Available at: doi: 10.3233/WOR-2012-0804-5152. Accessed on November 19th, 2016.
- Iida, I. (2005). *Ergonomia projeto e produção*, 2. São Paulo, SP: Blücher (632 p.).
- Johansson, K., et al. (2011). The cognitive kitchen: key principles and suggestions for design that includes older adults with cognitive impairments as kitchen users. *Technology and disability*, 23, 29-40.
- Kochera, A., Straight, A., & Guterbock, T. (2005). *Beyond 50.05: a report to the nation on livable communities*, 52-75. Denver: AARP Public Policy Institute, Report.

- Kuznier, T. P., Souza, C. C. de, Chianca, T. C. M., Ercole, F. F., & Alves, M. (2015). Fatores de risco para quedas descritos na taxonomia da Nanda-I para uma população de idosos. *Revista de Enfermagem do Oeste Mineiro*, 5(3), 1855-1870. Available at: <http://www.seer.ufsj.edu.br/index.php/recom/article/view/783>. Accessed on: November 19th, 2016.
- Leyden, K. M. (2003). Social capital and the built environment: the importance of walkable neighborhoods. *American Journal of Public Health*, 93(9), 1546-1551. Available at: Accessed on November 19th, 2016.
- Ma, X. (2002). *A web-based user-oriented tool for universal kitchen design*. Cambridge, MA: MA dissertation. Massachusetts Institute of Technology. (94p.).
- Maguire, M., et al. (2014). Kitchen living in later life: exploring ergonomic problems, coping strategies and design solutions. *International Journal of Design*, 8(1), 73-91. Available at: Accessed on November 19th, 2016.
- Marin, M. J. S., & Panes, V. C. B. (2015). Envelhecimento da população e as políticas de saúde. *Revista do Instituto de Políticas Públicas de Marília*, 1(1), 26-34. Available at: <http://www2.marilia.unesp.br/revistas/index.php/RIPPMAR/article/view/5641/3865>. Accessed on November 19th, 2016.
- Martin, I., Santinha, G., Rito, S., & Almeida, R. (2012). Habitação para pessoas idosas: problemas e desafios em contexto português. *Sociologia, Revista da Universidade de Letras da Universidade do Porto*, Número temático: Envelhecimento demográfico, 177-203. Available at: <http://ler.letras.up.pt/uploads/ficheiros/10586.pdf>. Accessed on November 19th, 2016.
- Martins, C. G. (2013). *Cozinhas, eletrodomésticos e modos de vida: Implicações dos eletrodomésticos nas transformações de rotinas domésticas na cozinha, em residências de Florianópolis, SC*. Curitiba, PR: PhD thesis. Universidade Tecnológica Federal do Paraná. (264p.).
- Messias, M. G., & Neves, R. F. (2009). A influência de fatores comportamentais e ambientais domésticos nas quedas em idosos. *Revista Brasileira de Geriatria e Gerontologia*, 12(2), 275-282. Available at: <http://www.scielo.br/pdf/rbagg/v12n2/1981-2256-rbagg-12-02-00275.pdf>. Accessed on November 19th, 2016.
- Miller, B., & Rama, M. (2011). *Cozinha básica para leigos*, 3. Rio de Janeiro, RJ: Alta Books. (456 p.).
- Mitchell, T. (n.d.). *Someone's in the kitchen: the ergonomics of cooking and kitchen design*. Available at: <http://www.working-well.org/articles/pdf/Cooking.pdf>. Accessed on November 19th, 2016.
- NAHB Research Center. (1996). *Residential remodeling and universal design: making homes more comfortable and accessible*. Raleigh, U.S.A.: Department of housing and urban development (127 p.).
- Nascimento Júnior, L. S. do, Magnani, K. L., Guedes, M. B. O., Andrade, A. de S., and Pessoa, J. da C. S. (2013). Aspectos ergonômicos no uso de utensílios domésticos por populações idosas. In: Congresso Internacional de Envelhecimento Humano, 3, Campina Grande, 2013. *Anais... Campina Grande, CIEH*, 1, 1-5. Available at: http://www.editorarealize.com.br/revistas/cieh/trabalhos/Comunicacao_oral_idinscrito_2069_9503340a62ac8f0e5388b45cc21923ec.pdf. Accessed on November 19th, 2016.

- North Carolina State University Center for Universal Design. *The principles of universal design*. (1997). Available at: http://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciplestext.htm. Accessed on: November 19th, 2016.
- North Carolina State University Center for Universal Design. (2011). Product design case studies. *Design research and methods journal*, 1(1), 1-54. Available at: <http://pt.scribd.com/doc/220980492/128-sgdg>. Accessed on November 19th, 2016.
- Null, R. (2003). Commentary on Universal Design. *Housing and society*, 30(3), 109-118.
- Raviselvam, S., et al. (2014). Using elderly as lead users for universal engineering design. In: Universal Design 2014: three days of creativity and diversity. Lund, 2014. *Proceedings of the international conference on universal design...* Lund: IOSpress, 366-375.
- Ribeiro, M. A., et al. (2001). O design universal como abordagem ergonômica na concepção de produtos. In: Congresso Brasileiro de Gestão de Desenvolvimento de Produto, 3, Florianópolis, 2001. *Anais...* Florianópolis, SC: Elsevier Editora, 25-27.
- Ricardo, L. N., et al. (2005). Análise da segurança do trabalho no âmbito domiciliar a partir da ergonomia: uma avaliação do espaço cozinha. In: Workshop de análise ergonômica do trabalho na UFV, 2, Viçosa, 2005. *Anais...* Viçosa, MG: Universidade Federal de Viçosa, 01-12.
- Rojas, V. B. F. (2005). *Contribuições para o planejamento de ambientes construídos destinados à convivência de idosos*. Porto Alegre, RS: Professional master's dissertation, Universidade Federal do Rio Grande do Sul. (147 p.).
- Sâmia, C. O. F. (2008). *Cozinha funcional: análise do espaço e do usuário idoso*. São Paulo, SP: MA dissertation, Universidade de São Paulo. (92 p.).
- Silva, D. O. (2011). *O uso de aparelhos eletrônicos por idosos em ambientes domésticos*. São Carlos, SP: Post-graduate dissertation. Universidade de São Paulo, São Carlos. (75p.).
- Talley, A. B. (2013). *Universal design: designing products that all individuals can use*. Austin, TX: PhD dissertation, The University of Texas. (252 p.).
- Tomasini, S. L. V. (2005). Envelhecimento e planejamento do ambiente construído: em busca de um enfoque interdisciplinar, *Revista Brasileira de Ciências do Envelhecimento Humano*, 2(1), 76-88. Available at: <https://doi.org/10.5335/rbceh.2012.22>. Accessed on November 19th, 2016.
- World Health Organization. (2005). *Envelhecimento ativo: uma política de saúde*. Brasília, DF: Organização Pan-Americana da Saúde. (60p.).
- Wilson, B. (2012). *Pense no garfo: uma história da cozinha e de como comemos*. Rio de Janeiro, RJ: Zahar. (351p.).
- Wright, P. S. (2014). *Vision in Product design: as a method for universal design*. Trondheim, NOR. MA dissertation, Norwegian University of Science and Technology. (95p.).

Recebido em 21/11/2016

Aceito em 30/09/2017

Camila Feldberg Porto - Mestre em Design, Universidade do Estado de Minas Gerais, UEMG. Graduada em *Design* de Produto, UEMG. Experiência na aplicação da técnica de Grupos Focais com pessoas idosas. Atua na docência em nível de graduação nas disciplinas Metodologia Científica e Prática Projetual de Mobiliário e docência de inglês. Instrutora de inglês na escola profissionalizante SOS Educação Profissional e Secretária Voluntária no Grupo de Trabalho dos Idosos da Regional Oeste de Belo Horizonte.

ORCID iD: <http://orcid.org/0000-0002-7565-9091>.

E-mail: feldbergc@gmail.com

Edson José Carpintero Rezende - Doutorado em Ciências da Saúde, Faculdade de Medicina da UFMG. Mestrado em Saúde Coletiva, UEFS. Graduação em Odontologia, UFMG. Pós-Graduação *Lato sensu* em Odontologia Legal, Associação Brasileira de Odontologia; e em Microbiologia, PUC-MG. Licenciatura em Ciências, PUC-MG. Docente efetivo de Metodologia Científica e Pesquisador nos Cursos de Graduação e Pós-Graduação *Lato Sensu* e *Stricto Sensu*, Escola de *Design* da Universidade do Estado de Minas Gerais. Líder do Grupo de Pesquisa “*Design* em interface com a Saúde” e Professor-Pesquisador do “Grupo Extensionista e de Pesquisa em *Design* Social”, ambos cadastrados no CNPq.

ORCID iD: <http://orcid.org/0000-0003-0692-0708>.

E-mail: edson.carpintero@gmail.com