



Expanding opportunities for online shoppers with disabilities

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ABSTRACT

The Internet promises many opportunities for consumers who shop online. While prior studies identify problems with online access for persons with disabilities, research has not examined whether consumers with disabilities shop online similarly to persons who are not disabled. The study attempts to fill this gap in two unique ways. First, this paper specifically considers the frequency of online shopping, the amount spent, and reasons for shopping online among both disabled and non-disabled persons. In addition, the study groups persons with disabilities into six major categories according to disability type rather than aggregating into one general category. Telephone surveys of 1053 persons reveal both differences and similarities that suggest opportunities for improving online access and developing a richer understanding of the online shopping motivations and needs of persons with disabilities.

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1. Introduction

Just like any other customers, persons with disabilities come to bricks and mortar stores and to retail web sites with the expectation of looking at merchandise, inspecting its attributes, gaining insight from salespersons or customer postings, and eventually making a decision whether or not to buy. Heralded as a great equalizer, the Internet promises to eliminate disabling spaces by creating a barrier-free virtual commons where consumers of all types can interact in the marketplace, unhampered by limitations such as those related to geography, education, ethnicity, and disability status.

Ownership and access to computers limit such benefits. Early studies suggest that persons with disabilities are less likely to own computers, to have Internet access, and to make online purchases than persons without disabilities (Kaye, 2000a,b). Assurance of access is not automatic even if computers and the Internet are available. Both industry and academic web studies show that a substantial number of web sites are not useable by persons with disabilities since their content is not transmitted accurately, clearly, or completely (Dorsey et al., 2003; Ritchie and Blanck, 2003; Schaefer, 2003).

Because of these limitations, a sizeable market of consumers is likely to experience difficulties shopping interactively. Statistically, persons with

disabilities represent 54 million or 20% of the United States' population, larger than the size of major ethnic groups such as Hispanics at 39.9 million or Blacks at 35.8 million (U.S. Census Bureau, 2003; National Organization on Disability, 2002). That is, one out of five persons who log on to any retail web site can have one or more disabilities. This number is likely to be an underestimate of persons whose computer and online shopping use are affected by some personal limitation, as many persons without disabilities also experience a natural decline in eyesight, dexterity, and hearing as they become older. Surprisingly, some firms argue that the market is not large enough to warrant special accommodations online (Heim, 2000). In fact, estimates of the disposable income of persons with disabilities vary from more than \$176 billion (Johnson, 2000) to approximately 1 trillion dollars (Milliman, 2002). Despite such significant potential, marketers have largely overlooked this substantial market both online and offline (Baker et al., 2002; Kaufman-Scarborough, 1999).

While several studies have investigated ownership and usage of computers by persons with various disabilities, none has examined issues related to how persons with specific disabilities shop online. Computer ownership and/or basic Internet usage data do not provide clear evidence that online shopping is actually useable and useful to shoppers with disabilities. This paper fills that void by addressing the nature of online shopping for individuals with disabilities. More than 1000 persons with and without disabilities participated in interviews about their Internet access and usage, types of access, likelihood of online purchasing, reasons for shopping online, and typical amounts spent.

2. Background

When the Americans with Disabilities Act (ADA) became part of the U.S. legal system in 1990, it focused on accommodations needed in

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physical buildings. The Internet, however, was not discussed in the ADA since online communication was in its formative stages, used by universities and researchers in a primitive form that was text-based and non-graphical in format. Public access was just beginning through providers such as CompuServe and MCI Mail (Federal Communications Commission, 2004), and online retail sales had not begun. Title III of the ADA focused on access at physical places, that is, places of “public accommodations and commercial facilities” such as restaurants, movie theaters, shopping centers, and schools where barriers were easily identifiable (Baker and Kaufman-Scarborough, 2001; Stephens and Bergman, 1995). The resulting regulations concentrated on physical access, mandating specific ramp designs, automated doors, and parking spaces.

Since the ADA does not take the online environment into account, recent critics have noted its reactive approach to web accessibility and usability (Franklin et al., 2004). Web sites have not been uniform in their attention to accommodations. In fact, numerous prominent retailers, including Barnes and Noble, Southwest Airlines, Bank of America, and Wells Fargo Bank, have been charged with web accessibility violations (Kretchmer and Carveth, 2003). Recently, the National Federation of the Blind filed a suit charging that Target's web site (www.target.com) is inaccessible to the blind (Disability Rights Advocates, 2006).

2.1. Increasing access for persons with disabilities

Paradoxically, adults with disabilities are more likely to indicate that the Internet can improve their quality-of-life, yet adults with disabilities historically have been less likely to be online (Kaye, 2000b; Ritchie and Blanck, 2003). A 1998 Current Population Survey reports that persons with disabilities are “less than half as likely as their non-disabled counterparts to own a computer and ... about one-quarter as likely to use the Internet (Kaye, 2000b, p. 1).” Just under one quarter (23.9%) of persons with disabilities has access to a computer at home, compared to slightly more than half (51.7%) of persons without disabilities. More importantly, only one-tenth (9.9%) of individuals with disabilities report using the Internet, in comparison to almost four-tenths (38.1%) of non-disabled persons.

Since that report, computer ownership and Internet use by both disabled and non-disabled populations have increased. Several national studies find that persons with disabilities are catching up in ownership, access, and use. However, ownership and use statistics do not provide any clear insights into problems or successes with online shopping.

In 2001, a Harris poll commissioned by the National Organization on Disability found that “about 38% of adults with disabilities used the Internet at home, more than five times the 7% who were online in late 1998. Over the same period, use among the non-disabled doubled from 26 to 56%” (People with Disabilities Still Lag on Internet Usage, 2000). A March–May 2002 survey of the Pew Internet Project found that “almost three quarters of Americans who report having a disability also do not use the Internet... and over a quarter of these respondents say their disabilities make it difficult or impossible to go online” (Lenhart et al., 2003).

2.2. Hidden problems and opportunities

Not surprisingly, Kaye (2003) reports that the gap in household computer ownership is also directly related to household income, educational attainment, and familiarity with computers, rather than limited to disability status. However, having a disability may exacerbate access since it may be burdensome to travel to places where computers are available for use (Kretchmer and Carveth, 2003).

As might be expected, Internet usage among the disabled increases in a more supportive environment, such as that provided by Centers for Independent Living (CILs). Participants in CILs, for example, tend to be “enthusiastic users of email, bulletin boards, and Internet support

groups” (Ritchie and Blanck, 2003). CIL support staff report that electronic communication can be a major part of a person's rehabilitation. However, lack of access to computers, modems, Internet Service Providers, and assistive technology hamper usage by members of the disabled community (Lenhart et al., 2003).

Even if they own a computer, persons with disabilities vary in their ability to acquire assistive technologies and in their skills in using them (Ritchie and Blanck, 2003). Assistive technologies are defined by Microsoft (2005) as “specialty products [that] provide additional accessibility to individuals who have physical or cognitive difficulties, impairments, and disabilities.” For instance, alternative input devices enable persons with manual dexterity disabilities to control their computers through means other than a standard keyboard or pointing device, such as modified keyboards, electronic pointing devices, sip-and-puff systems, wands and sticks, joysticks, trackballs, and touch screens. In addition, the assistive technology must be compatible with the computer itself and with any peripherals, such as printers and speakers. Some web sites may not be compatible with the assistive technology, and are likely to fail, providing little to no access (Russell, 2003).

The National Organization on Disability reports that Internet usage varies by specific disability type. For instance, the 2001 Harris poll found that “people with vision or hearing problems were most likely to use the Internet at home (43%), followed by people with learning or cognitive disabilities (39%), and people with mobility and movement impairments (35%)” (People with Disabilities Still Lag on Internet Usage, 2000). Thus, motivations and retail shopping behaviors may vary across disability types, but past research has not yet examined online shopping behaviors by persons with different types of disabilities.

2.3. Disability theory and the disabling environment

Just like any other consumers, persons with disabilities want to search for information, evaluate it, browse through products, make secure purchases, and return unacceptable merchandise. Even though their disabilities may require them to shop with assistance, use sign language and Braille, or use a mobility device to get through a store, consumers with disabilities have the same basic goals as other shoppers. Two contrasting theories provide approaches to analyzing the experience of consumers with disabilities. The medical model of disability focuses on a person's disability as something to be overcome by the individual in order for them to function as a member of society (Humphrey, 2000; Llewellyn and Hogan, 2000; Oliver, 1990; Paar and Butler, 1999). The focus is on actions that correct the disability. Thus, a person with hearing loss might be responsible to learn to read lips or a blind person may be responsible to bring a friend who can see. The social model, in contrast, considers whether a shopping environment enables a person to function effectively or not, potentially enabling or disabling persons in their roles as consumers based on the design and provision of support services (Baker et al., 2001; Chouinard, 1997; Imrie, 1999, 2000). Thus, a restaurant that does not provide Braille menus may disable their blind patrons.

For example, users of the medical model might describe a person who uses a wheelchair due to paralysis in terms of what a specific disease did to that person to render them incapable of participating in society. The social model, instead, considers whether retailers expect persons in wheelchairs as shoppers, necessitating ramps and elevators to be provided as a matter of course. If an individual lives with accessible buildings and adequate transportation, then that person could participate successfully in daily life. On the other hand, if that same person lived in a building with limited elevators and had no access to transportation, their environment would disable them, reducing their opportunity to be an active member of society.

The analysis of retail web sites can use similar logic. For instance, when a person with visual impairments shops on an accessible web site, that web site enables rather than disables them. They shop just like other consumers who do not have disabilities. Someone with

limited vision might use a screen enhancement program to enlarge text and product designs so that they can evaluate product features much more conveniently than in the bricks and mortar environment. The retailer expects them as a participant and, thus, they can experience consumer normalcy (Baker, 2006). As a result, a person who is blind can effectively shop online similar to sighted consumers unless the web site has graphics or images that do not have necessary accessibility features, such as informative alt tags. In that case, the screen reader may speak strings of unintelligible letters and numbers rather than meaningful text, rendering a shopper powerless and vulnerable (Baker et al., 2005). Analogously, a web site that provides certain information only by sound, such as a downloadable recording of a lecture, may disable a person with a hearing impairment, especially if no written information is provided. Finally, a web site whose features depend primarily on using a mouse can disable someone who has physical limitations such as arthritis. In effect, the web site design rather than their own physical conditions disables such individuals.

Using the social model to examine the online disabled community in China, Guo et al. (2005) find that the Internet allows persons with disabilities to “alleviate the physical, geographical, and attitudinal barriers to social interaction (p.51).” However, in its present form, the “Internet does not appear to be a miraculous technology that can universally compensate the ‘deficit’ facing people with disabilities (p. 58).”

3. Online retail shopping and disability

The present study examines the online retail shopping experiences of persons with disabilities. Are they vulnerable or do they experience consumer normalcy? Do they shop online for the same reasons that others do? Are they able to shop effectively and make purchases online? Furthermore, how do their experiences compare with those of persons without disabilities? This paper will address the following questions: (1) Do persons with disabilities shop online with the same frequencies and spend similar amounts as do persons without disabilities? (2) If disabled persons shop online, why do they do so? Do they perceive similar or different benefits than persons who are not disabled? What online features enable them to feel like a normal consumer? (3) Do persons with specific disabilities report overall patterns of Internet retail shopping that are unique to their disability, or do all persons with disabilities report similar experiences, regardless of their disability?

Quite simply, mere access to the Internet is different from meaningful use of the Internet to achieve desired shopping goals. When assistive technologies fail, when web sites fail to provide equivalent information to persons with disabilities, or when only part of any product's information is available to persons with disabilities, these conditions disable the individuals, compromising their decision process quality (Schaefer, 2003). In fact, according to a recent study by Ritchie and Blanck (2003), people who are disabled are more likely to give up part way through an online activity due to failure of the technology. Unfortunately, few researchers have examined online shopping, plus its motivations, usage patterns, and actual purchases, from the point of view of customers with disabilities. The present study addresses this gap by providing a baseline overview of online shopping by persons with disabilities in comparison to persons who are not disabled. In addition, the study examines whether online shopping differs across persons who have one of six specific types of disabilities.

4. Method

4.1. Survey and sample

Data for the study were collected through a telephone survey conducted by the Survey Research Center of a major university. Adults age 18 and older were chosen randomly for the study. The survey sample consisted of households randomly selected from all exchanges

within this southeastern state using random digit sampling and excluded known business numbers.

Selection of the respondents occurred in two stages. First, a household was randomly selected, and secondly, a person was randomly selected from within the household. The selection of the person within the household was performed by using the most recent birthday selection method. The selection procedures increased the likelihood that every household in the sample with a working telephone had an equal chance to be included in the survey, and that once the household was sampled every adult had an equal chance to be included. There were 1053 participants in the computer-aided telephone survey, with 28% indicating an impairment versus 72% not indicating an impairment.

4.2. Measures

Questions from the September 2001 U.S. Census Bureau's Current Population Survey (National Telecommunications and Information Administration, 2002) determined the assessment of disability status. Respondents could self-classify into one or a combination of six long-lasting severe impairments for vision, hearing, speech, mobility, reading, and manual dexterity. Another set of questions included topics related to place of access (e.g., home versus work, or library), broadband availability (e.g., DSL, cable modem), a series of eight online activities occurring in the past six months (e.g., sent an email or searched for a job), frequency of Internet use, and length of Internet use. Questions related to online purchase behavior included whether the respondents had purchased products or services through the Internet, the frequency of online shopping, amount in dollars spent online, whether they had bought online from a list of 15 products during the past six months (e.g., software, flowers, or toys), and reasons for online shopping (e.g., convenience, cheaper prices, or better product selections). A final set of questions consisted of demographic characteristics for each responding household (see Tables 1 and 2 for additional descriptions of questions). Unless reported differently, statistical tests of significance were conducted using the chi-square test.

5. Results

5.1. Internet access and disability

Individuals with disabilities report lower overall Internet access than those without disabilities (49% disabled versus 75% non-disabled, $p < .05$, Table 1), although access has increased during the past five years for all consumers. In 2001, only 30.3% of those with disabilities aged 25–60 used the Internet from any location versus 63% of the non-disabled (National Telecommunications and Information Administration, 2002). Looking more closely, Internet access from home is essentially equal for disabled versus non-disabled; however, differences arise due to access from the workplace (Table 1).

When comparing persons with versus without disabilities, several differences in Internet access also exist in terms of their demographic characteristics. Among these differences is age ($p < .05$); those with disabilities are older than individuals without a disability. Education is also a factor with individuals with disabilities more likely to have less education ($p < .05$). Those with disabilities are also more likely to be unemployed or retired ($p < .05$). Income is also a factor with lower incomes more likely for individuals with disabilities ($p < .05$).

When considering Internet access from home, broadband usage is lower for those with disabilities (31% versus 40%, $p < .10$). Among those with disabilities, 29% have reported that one of the major obstacles to their Internet use is the speed of their connection (National Center for the Dissemination of Disability Research, 2001). Although differences are slight, but significant ($p < .05$), those with disabilities use the Internet less frequently (see Table 1).

Table 1
Internet access by disability status

Characteristic	Disabled (n = 291)	Non-disabled (n = 756)
Access to Internet	49%*	75%
Home	24	26
Work	3*	13
Home and work	13*	34
Broadband access at home	31%**	40%
Frequency of Internet use		
Every day	53%*	59%
Few days a week	18	19
Once a week	5	7
Less than once a week	16	12
Never – volunteered	8	4
Length of Internet use		
Less than 1 year	18%*	9%
1 to 3 years	31	27
4 to 6 years	30	33
More than 6 years	22	31
Gender – male	39%	39%
Age		
18 to 44	38%*	60%
45 to 64	46	34
65 and greater	17	5
Education		
High school or less	42%*	32%
Some college	37	30
College degree or higher	21	38
Employment		
Full-time	32%*	66%
Part-time	11	11
Unemployed/retired	57	22
Income		
Less than \$25,000	34%*	16%
\$25,000 to \$70,000	31	42
\$70,000 and higher	36	43
Race		
Caucasian	92%	92%
African American, Hispanic, other races	8	8
Marital status – married	61%	67%
Household composition		
Married – no children under 18	35%	29%
Married – children under 18	26	38
Single – no children under 18	11	13
Single – children under 18	28	19

* $p < .05$, ** $p < .10$.

5.2. Online purchasing behavior and disability

Individuals with disabilities are less likely to have purchased goods or services through the Internet (53% versus 68% for disability and no disability, respectively; $p < .05$, Table 2). This is consistent with other studies, in which 42% of those with disabilities report making purchases online versus 50% of those without disabilities (Nation Online 2001). Differences in online purchasing are also related to several demographic characteristics. As with access, those with disabilities that purchase online are older than individuals without disabilities ($p < .05$). Persons with disabilities who purchase online also are less educated than their non-disabled counterparts. ($p < .05$). They are also less likely to be employed full time ($p < .05$) and are more likely to have lower incomes ($p < .05$, Table 2).

Those with disabilities also report lower frequencies of shopping during the past six months ($p < .05$), although the differences appear to be greater at lower levels of shopping frequency (once a month or less, 38% versus 56% for disability versus non-disability, respectively, $p < .05$, Table 2). In addition, individuals with disabilities purchased fewer products online during the same time period (means = 1.9 versus 2.5, $p < .05$, Table 2). In contrast, the two groups did not differ in terms of the dollar amount they have spent online during the past six months. In terms of reasons for shopping online, persons with disabilities were less likely to shop online to save time (5%) than those

with no disability (12%), respectively ($p < .10$, Table 2). However, those with disabilities shop online to a greater degree to obtain better or cheaper prices (39% versus 27% for disability and no disability, respectively; $p < .05$, Table 2).

5.3. Type of disability and Internet usage

The study design groups individuals by type of disability in order to explore differences in Internet usage (see Table 3). Only groups with samples sizes of approximately 50 or greater are eligible for the analysis. All statistical comparisons consider contrasts between the specific disability group and those not reporting a disability.

All disability groups report significantly less access to the Internet, except those with physical disabilities. However, persons with physical disabilities were the only group to report a significantly lower percentage of broadband access (25% with physical disability versus 39% non-disabled, $p < .05$). In terms of online activities, all individuals with specific disabilities, except those with a visual impairment, are less likely to report having sent an email during the last six months (Table 3). Individuals reporting a hearing or speech impairment are also significantly less likely to have visited a newspaper web site during this period (hearing – 19%, $p < .05$; speech – 20%, $p < .05$; versus non-disabled – 42%).

Table 2
Online purchasing by disability status

Characteristic	Disabled (n = 131)	Non-disabled (n = 545)
Purchased online	53%*	68%
Frequency of online shopping		
More than once a month	23%*	19%
Once a month or less	38	56
Hardly ever/never	39	26
Amount spent online		
Less than \$100	48%	41%
\$100 to \$300	19	30
\$300 to \$500	15	14
More than \$500	18	15
Mean number of products purchased	1.9*	2.5
Reasons for shopping online		
Availability of information from vendors	7%	6%
Saving time	5%**	12
To obtain better or cheaper prices	39%*	27
To get better product selections	14	16
Convenience	53	61
Gender – male	34%	41%
Age		
18 to 44	39%*	60%
45 to 64	53	36
65 and greater	8	5
Education		
High school or less	30%*	23%
Some college	43	31
College degree or higher	27	46
Employment		
Full-time	37%*	68%
Part-time	14	12
Unemployed/retired	8	17
Income		
Less than \$25,000	26%*	10%
\$25,000 to \$70,000	35	43
\$70,000 and higher	39	48
Race		
Caucasian	92%	93%
African American, Hispanic, other races	8	7
Marital status – married	69%	67%
Household composition		
Married – no children under 18	35%	28%
Married – children under 18	34	29
Single – no children under 18	5	13
Single – children under 18	26	20

* $p < .05$, ** $p < .10$.

Table 3
Online characteristics by type of disability

Topic	Visually impaired (n = 77)	Reading (n = 68)	Hearing (n = 53)	Physical (n = 138)	Manual (n = 63)	Speech (n = 48)	Non-disabled (n = 756)
General Internet							
Access to Internet	58%**	38%*	51%*	48%	41%*	42%*	69%
Broadband	28	20	30	25**	31	23	39
Activities							
Sent an email	62	31*	30*	42*	39*	25*	62
Visited newspaper web site	42	27	19*	33	39	20*	42
Online shopping							
Purchase online	69	45*	44*	49*	50**	35*	69
Mean # products purchased	2.5	1.2*	1.4*	2.1	2.2	1.5	2.5
Reasons for online shopping							
Availability of information from vendors	0	0	9	10	9	0	7
Saving time	0	0	9	0*	0	17	12
Better or cheaper prices	41	44	64*	43**	46	33	28
Better product selections	14	11	9	20	9	17	16
Convenience	48	56	36	47	55	50	60

* $p < .05$, ** $p < .10$.

Persons with a visual impairment purchase online to the same degree as those without a disability, while purchasing activity for all other disability types is significantly lower than the level of non-disabled purchase behavior. In contrast, only individuals with reading or hearing impairments purchased a significantly smaller average number of products online during the past six months (1.2 – reading, $p < .05$; 1.4 – hearing, $p < .05$; 2.5 – non-disabled).

Reasons for online shopping differed from those without disabilities and across disability types. For instance, individuals with a physical disability are significantly less likely to indicate they engage in online shopping to save time (0% – physical, $p < .05$ versus 12% – non-disabled). Those with a hearing (64%, $p < .05$) or physical disability (43%, $p < .05$) were more likely to engage in online shopping to obtain better or cheaper prices (non-disabled – 28% – Table 3). No significant differences occur between the disability types and non-disabled individuals in online shopping due to availability of information from vendors, better product selections, or convenience reasons.

5.4. Predicting online shopping behavior

A logistic regression related the disability status dependent variable (1 = disabled; 0 = non-disabled) to the number of activities engaged in during the past six months, the number of products purchased online during the past six months, the number of reasons for purchasing online, and whether individuals had broadband access from home (1 = broadband). The Wald test was significant overall (Wald = 150.8, $p < .01$). In the equation, the number of activities ($b = .220$, Wald = 7.0, $p < .01$) and the availability of broadband ($b = .619$, $p < .05$) were both positively related to disability status.

Given the co-occurrence of demographic factors with disability status, a second logistic regression included the above variables while controlling for the influence of age, education, employment status, and income. Both predictors from the first equation remained significant (activities – $b = .282$, Wald = 8.6, $p < .01$; broadband $b = .695$, Wald = 4.1, $p < .05$). In the second equation, the control variables age ($b = -.841$, Wald = 7.0, $p < .01$), employment status ($b = .758$, Wald = 5.0, $p < .05$), and income ($b = 1.2$, Wald = 8.6, $p < .01$) were all statistically significant. The data suggest that persons who are disabled are more active because they have broadband access and also, in turn, use the web for a greater variety of activities. This implies that if retailers eliminated barriers to access, persons with disabilities would be likely to use the Internet more and they would likely use the web for shopping more.

6. Research implications and potential solutions

Results of this study relate to two underlying issues: access to technology and the accessibility of this technology to disabled consumers.

6.1. Access to technology

Consumers with disabilities have significantly less access to the Internet and lower access to broadband technology. Access was consistently lower across different types of disability, with the exception of those physically disabled, although the latter had lower broadband access. One reason for these differences lies in related demographic characteristics of the disabled, particularly, their age and lower income and education levels. The affordability of Internet access and more expensive broadband access represents a cost barrier consistent with recent research on other groups of disadvantaged consumers (Porter and Donthu, 2006). However, noteworthy in this present study is the finding that Internet access was essentially equal from home. Differences in overall access were largely due to differences in work access, which relates to lower levels of employment among the disabled. With similarities in access from home, aspects of technology related to its accessibility may well be stronger predictors of Internet use for disabled consumers.

6.2. Accessibility of the technology

One indication of the accessibility of the Internet in the current study relates to patterns of online purchase behavior. In the present study, persons with disabilities are less likely than the non-disabled to report ever having purchased products or services on the Internet. They also have purchased fewer products, on average, in the six months prior to their interview, and report shopping on the Internet less frequently than the non-disabled. However, when they do purchase, they spend the same amount online as their non-disabled counterparts. This finding suggests that some consumers with disabilities may experience barriers when attempting to make online purchases, although they may use the Internet to find and evaluate information. Further research is needed to determine whether persons with disabilities will shop just the same as non-disabled persons when they can get on the Internet and are enabled by the interface between their assistive technologies and a web site's accessibility options. Additional study is needed to learn what shoppers with disabilities do when some aspect of online shopping does not work as they would like. Forrester evaluated 375 consumer e-commerce oriented web sites and reported that only 25% of the sites passed their test for accessibility for the visually and hearing impaired, ranking this dimension last of the 25 characteristics employed in their usability assessment (Temkin and Belanger, 2004).

6.3. Difficulties with assistive technologies

Issues related to understanding accessibility in terms of the ease of using online shopping technology offer considerable opportunities for research to enhance the well-being of disabled consumers. One

avenue for future research concerns the interaction between devices that assist persons with disabilities online and web site design that impedes them from gathering the information needed to make informed purchase decisions, one of the most fundamental benefits of online shopping (Bakos, 1997). For instance, consider individuals with physical impairments. Mouse-based navigation is often problematic and requires mouse emulation through keyboard strokes. Kasday, Bryen, and Bohman (2003) note that keyboard navigation of Yahoo's home page could require 270 tabs to access a particular link and estimate it would take 6 min to reach a link at the bottom of the page.

Assistive devices for consumers with physical impairments also can create fatigue through complex maneuvers and cognitive processing load. For instance, accessible web design may include rollover menus that reduce visual clutter and are conducive to mouse manipulation. However, rollover menus require additional manual dexterity and may create excessive loads on the cognitive resources available to physically disabled consumers. Future research has not addressed how different assistive devices interface with different modalities of information presentation (e.g., pictures for non-visually impaired or audio for the non-hearing impaired).

6.4. Motivations for online shopping

As might be expected, respondents indicate that convenience is the primary motive for online shopping by disabled consumers. Researchers may conceptualize convenience as flexibility of when to shop (e.g., 24 h a day/7 days a week) as well as saving time and reducing shopping frustrations such as parking and travel in traffic (Hofacker, 2001). However, convenience may have additional meanings for consumers with disabilities that need to be examined and understood. Seemingly inconsistent is the finding that saving time through online shopping is rarely mentioned by disabled consumers as a reason for shopping online. One explanation for this difference can occur because the use of assistive technologies often requires considerably more time and effort by disabled consumers, even when the technologies are operating correctly. For example, listening to an entire homepage being read by a screen reader takes much longer than visually scanning it for information.

The physical shopping market defines normative movement as being able to drive and walk to shopping locations (Baker, 2006). However, this sense of convenience may have different nuances based on the specific disabilities that a person possesses. In terms of physical geography, individuals with more severe mobility constraints (i.e., blind, physical, and manual disabilities) may develop more of a dependence on online shopping and differ in their conception of convenience from individuals with less severe mobility constraints (i.e., reading, hearing, and speech disabilities). Convenience for those with a more severe mobility constraint may be driven more by their dependence on accessibility to online shopping rather than the time that can be saved by fulfilling their shopping needs online. In contrast, individuals with less severe mobility constraints may seek the more traditional form of convenience in terms of saving time and reducing the frustration of shopping in a physical retail environment. A closer examination indicates that if the data for these two groups (more versus less severe mobility constraints) are aggregated meaningful differences appear. The two groups differ only slightly in terms of Internet access (49% versus 44%, respectively), but vary much more in terms of online shopping both in its occurrence (56% versus 42% have purchased products, respectively) and intensity (2.3 versus 1.4 average products purchased, respectively). Perhaps more in-depth qualitative research is needed to better understand how these aspects of convenience translate into an advantage of online retail shopping for the disabled versus non-disabled and for different types of disabilities.

6.5. Usefulness of product information

Aside from factors related to ease of use, another determinant of technology adoption is the functional utility or usefulness of the

product information available online (Childers et al., 2001). Central to this issue are the ways in which web site characteristics that limit the effectiveness of assistive devices can impede web site usefulness. For example, screen readers to assist the visually impaired cannot describe images or graphics that lack "alt tags" (text based descriptions of pictures, Dorsey et al., 2003; Disability Rights Advocates, 2006 and Target lawsuit). Providing information online in picture format is one way in which to compensate for the lack of direct product experience conveyed through our senses when in a bricks and mortar environment (Peck and Childers, 2003). However, when pictures act as an impairment, as they do for the visually impaired, research needs to investigate how to succinctly translate sensory compensation information into alternative modalities, such as text or audio. For consumers with hearing impairments, these same audio files on the web will become as problematic as video files without captioning. For reading impairments, the opposite challenge is how to translate a text description into a meaningful graphical equivalent. An important fundamental issue for future research is how product information provided in different modalities can be integrated in order to facilitate use across different types of impairments.

6.6. Hedonic experiences from web sites

Aside from functional aspects of online shopping, consumers are motivated to utilize the Internet for hedonic reasons as well (Babin et al., 1994). However, if consumers with disabilities are constantly engaged in functional navigation challenges, the opportunity for hedonic gratification may likely be minimal. Adding features to enhance online shopping enjoyment like streaming video, animation, and interactive games may detract from the shopping experience for the disabled if the features interfere with the site's usefulness or are not accessible. Researchers have not empirically demonstrated just what features create enjoyment for persons who are disabled in some specific sensory capacity. It may be that consumers with disabilities consider the independent achievement of their shopping goals as a source of enjoyment and do not look to the Internet as a source of entertainment. Quite simply, retail web site design should simultaneously serve the consumption goals of multiple segments. The ability to customize a web site to serve both hedonic and utilitarian shopping goals across disabled versus non-disabled consumers needs to be addressed in future research.

As companies become increasingly sensitive to the needs of online disabled consumers and recognize their purchase potential, managers will need to adapt their strategies to serve this growing segment. Customer driven web sites will need to consider the online retail shopping needs of all disabled consumers as well as the unique challenges that each type of disability may pose. Managers who ignore such a significant part of the market are making a mistake; they are ill advised to treat these consumers as a homogeneous segment, as our research shows that different disabilities need to be served in different ways and what may increase the accessibility of a web site for one group may interfere with another group's online experience. Academic researchers should play a greater role in informing managers how these designs can best serve the purchase needs of all online consumers.

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