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Unmentionable: Socio-Structural Discrimination of Incontinence; Engendering Dignity by Design

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UNMENTIONABLE
Socio-Structural Discrimination of Incontinence;
Engendering Dignity by Design

by

Brendan Charles Gordon

A Thesis
in Partial Fulfillment of Requirements for the Degree of
Master of Fine Arts
School of Design, Department of Industrial Design
College of Imaging Arts and Sciences

Rochester Institute of Technology
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ABSTRACT

Although present in medical and historical texts for millennia, urinary incontinence remains a somewhat taboo topic, with both affected individuals and remedies for the condition—such as adult diapers—subject to ridicule, embarrassment, status loss, discrimination, and even exile. Reinforcing this discriminatory behavior, the adult diaper—a spur from the baby diaper invention—tracks a parallel path to incontinence. With diapers and adult incontinence rooted in a misunderstood cross-pollination with infant incontinence, individuals must struggle against known stereotypes and stigmas liable to label them as incompetent, impotent, or unclean. The stigma of incontinence is thus aligned with the diaper, reinforcing social ignorance and discriminating structural environments. Establishments of structural discrimination, such as medical providers and architectural policy, are instrumental in perpetuating the stigma of urinary incontinence through their unimpeachable status and concomitant power.

Product, social structure, power systems and architecture are inevitably linked in the case of systemic disenfranchisement. In this study, the adult diaper is seen as one key to crippling such mechanisms and inspire new direction and greater dignity within incontinent populations. Synthesizing qualitative and quantitative research on product history, product function, market trends, material trends, user needs, and product testing, a case is made for a reusable incontinence garment...at first hybridized with disposable technology and later envisioned to connect with emerging trends in wearable technology, urine collection and agricultural systems. Enabling such synapses between seemingly disparate parts, argues that dignity may be engendered in populations upon establishing multidimensional strategies within product research and design, with the intent of transcending personal and cultural bias.
# CONTENTS

Introduction ........................................................................................................... 1

Part I – Diorama .................................................................................................... 4

1. What is Urinary Incontinence? ........................................................................ 4

2. History of Urinary Incontinence and its Treatment ...................................... 6

3. Stigma ............................................................................................................. 17

   3.1 Cultural Dichotomies .................................................................................. 17

   3.2 The Early Days .......................................................................................... 19

   3.3 Microaggressions ....................................................................................... 21

   3.4 Medical .................................................................................................... 22

   3.5 Social ........................................................................................................ 24

   3.6 Gender and Ethnicity ............................................................................... 27

   3.7 Environment ............................................................................................. 28

   3.8 Quality of Life and Socioeconomics ....................................................... 29

   3.9 Barriers to Care ....................................................................................... 31

Part II – Exploration: Adult Incontinence Product Study ................................. 33

4. Research Methodology .................................................................................... 33

5. Product Testing ............................................................................................... 35

   5.1 Kimberly-Clark Depend Real Fit ............................................................... 36

   5.2 Leg Bag ..................................................................................................... 36

   5.3 Walmart Men’s Assurance Guards ........................................................... 37

   5.4 Product Test: Final Thoughts .................................................................. 37

6. Product Purchasing – Buyer’s Embarrassment ............................................. 38

   6.1 Grocery/Pharmacy .................................................................................... 39

   6.2 Medical Supply ........................................................................................ 40

   6.3 Conclusion – Purchasing ......................................................................... 40

7. User Solicitation .............................................................................................. 41

   7.1 Survey Findings ........................................................................................ 37

   7.2 Survey Question 10 .................................................................................. 39

8. User Breakdown and Concept Explorations ................................................ 47

   8.1 Exploration ............................................................................................... 50

Unmentionable iv
8.2 Synthesis .......................................................... 51
8.3 Settling on the Diaper ........................................... 52

Part III – Seeking Systemic Change ................................... 55

9. Redesigning the Common Diaper – Product Concept .................. 55
  9.1 Product Expectations ............................................. 57
  9.2 Materials Used .................................................... 58
  9.3 The Product ....................................................... 61
  9.4 Takeaway .......................................................... 66

10. Urine’s Nutritional Potential ........................................ 67
  10.1 Closing the Loop ............................................... 69
  10.2 Infrastructure .................................................... 71
  10.3 Further Development ........................................... 73

Conclusion ............................................................. 74

Bibliography ............................................................ 78

Appendix 1 .................................................................. 84

Appendix 2 .................................................................. 87

**FIGURES**

Figure 1 – Ebers Papyrus writings on incontinence ........................................ 6
Figure 2 - pig bladder and penile clamp ............................................................... 7
Figure 3 – Perineal compression of male bulbar .................................................. 7
Figure 4 - Chux Diaper Advertisement c. 1957 ................................................... 9
Figure 5 – Marion Donovan .............................................................................. 10
Figure 6 - 19th c. Diapers and Drawers ............................................................. 11
Figure 7 – Superabsorbent Polymers ................................................................. 13
Figure 8 – panty liner ..................................................................................... 14
Figure 9 – Fitted Brief ..................................................................................... 14
Figure 10 – Guards for Men ........................................................................... 14
Figure 11 – AlphaDry ..................................................................................... 15
Figure 13 – Bottom ......................................................................................... 17
Figure 12 – Top ................................................................................................. 17
Figure 14 - Women pantomiming micturition ..................................................... 18
Figure 15 - Young men playing with hose ......................................................... 18
Figure 17 - David, Millennium Park, Chicago ................................................... 18
Figure 16 - Woman Peeing ............................................................................ 18
Figure 18 - Leg Bag ......................................................................................... 36
Figure 19 - Condom Catheter ........................................................................... 37

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Image sources in Appendix 1
Figure 20 - Certainty Advertisement, courtesy of Y&R Bangkok Thailand ................................................. 38
Figure 21 - Walmart Hygiene Aisle ......................................................................................................... 39
Figure 22 - Participants' Age .................................................................................................................. 42
Figure 23 - Participants’ Leakage .......................................................................................................... 43
Figure 24 - Participants' Treatment ....................................................................................................... 44
Figure 25 - The Great Escape ............................................................................................................... 50
Figure 26 - Changing the visual establishment ..................................................................................... 51
Figure 27 - UI Management .................................................................................................................. 52
Figure 28 - Kimberly-Clark, "Underwareness" ...................................................................................... 53
Figure 29 – superkat, removal of insert ............................................................................................... 57
Figure 30 – Merino Wool ..................................................................................................................... 58
Figure 31 - Microfiber ............................................................................................................................ 59
Figure 32 - Superabsorbent Polymers .................................................................................................... 60
Figure 33- superkat ............................................................................................................................... 61
Figure 34 - Superkatt, Giggle Comics .................................................................................................... 62
Figure 35 - Product breakdown .............................................................................................................. 63
Figure 36 - superkat, access point ......................................................................................................... 65
Figure 37 - Phosphorous mine, Morocco ............................................................................................... 69
Figure 38 - Urine Life-Cycle .................................................................................................................. 72

TABLES

Table 1: User Profiles ............................................................................................................................ 48
Table 2: Conceptual Exploration ............................................................................................................ 49
Table 3: User Profiles: UI Management ................................................................................................ 64
INTRODUCTION

Disease challenges medical providers on a daily basis, threatening patients’ quality of life in more ways than simply presenting impending mortality. Over the millennia, disease has morphed from an unidentifiable demon into identifiable, scientifically categorized, pathogens, genetic mutations, susceptibilities, and physiological degradations. However, urinary incontinence—the loss of bladder control—is not a disease, rather the result of disease, unfortunate paralysis, cognitive impairment, mobility impairment, etc., and has been documented since the pharaohs of Egypt rose to prominence. The adult diaper, on the other hand, is a recent innovation, derived from advancements made in baby diapers, and is the most culturally familiar aspect of adult urinary incontinence. Utilizing this product’s familiarity and unchanged template as the derivative of this study, the following seeks to engender empathy within incontinence product design, and in doing so, present further considerations for empowering members of society without diminishing their dignity.

This paper delves into urinary incontinence as not just a medical problem, but a long-neglected physiological and societal scourge that has undoubtedly impacted the quality of patients’ lives. It attempts to amalgamate previous research on social stigma, quality of life, socioeconomics, product design, marketing, material trends, resource management, and systemic disenfranchisement through the built environment. From this comprehensive approach, a greater understanding of the problem can be gleaned, and the expectation of which to consider approaching solutions from a human-centered vantage.

To this day, for reasons relating to stigma, medical pedagogy, and health prioritizations, researchers struggle to estimate the number of individuals who suffer from urinary incontinence. One source suggests over 25 million Americans experience momentary or chronic urinary incontinence.² And according to a recent Center for Disease Control report, 43.8% of non-

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institutionalized persons 65 and older reported urinary leakage. While inpatient products (catheters, urine bags) tend to assist the bed-ridden and are bolstered by antimicrobial treatments, current outpatient products (e.g. Depend, Attends, Nu-Fit) continue to exist within the stigmatized realm of the diaper and are known instigators of epidermis degradation and urinary tract infections (UTI). Outpatient products used to treat incontinence impede mobility, come at high cost, increase the risk of infection, and may often give rise to embarrassment. Taken as a whole, products found on shelves today leave much room for improvement.

The inception of this project was inspired by the simple need to micturate. I should mention that as a young, healthy, capable, man, this need amounted to locating a bathroom in an unfamiliar area, and had nothing to do with incontinence. What transpired over many months, sequentially deepened my inquiry. A project that initially sought a solution to travelers’ micturition needs, steadily pivoted onto divergent tracks of urinary incontinence, elder care, paralysis, medical patriarchy, and the simultaneously overwhelming, but unheard, demand for stigma mitigation through social awareness.

Considered a somewhat taboo subject, certain areas of research on incontinence stigma and history encountered somewhat expected information scarcity. For instance, the history of the adult diaper is largely hidden, scattered within a limited swatch of corporate information sites, non-woven consultants, and cultural essays. It seems while websites abound with variations of history behind infantile bum swaddling, adult incontinence is left without clear cultural roots. Instead its story is bound within dense, often standardized, medical texts calculating statistics, procedures, and defining incontinence types. This scarcity corroborates one study’s results estimating that awareness indicators about incontinence (e.g. number of publications, therapeutic tools, or knowledge within medical institutions), illustrate that “the perception of incontinence…has not changed…” and the gap between “…patient needs and supply in terms of care…is still large.”

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Attempting to blend a breadth of ideas and research, the first part of this study takes a step back from the adult brief and considers what is known about incontinence. Beginning with present knowledge, how this information evolved over time, and the evolutions of corresponding treatments, urinary incontinence becomes timeless, seemingly forever attached to the human experience. Within this a paradox emerges, in that as long as the condition has been recognized, it has never been accepted. Stigma, embarrassment, medical ignorance, microaggressions, and womanhood are then analyzed. Understanding the socioeconomic consequences of urinary incontinence are imperative to understanding the intended user of any incontinence product. I acknowledge that products must do more than collect or disperse fluid, furthermore, they do not exist within a closed ecosystem. Rather the built environment is ultimately factored into considerations for systemic change.

Once versed in the overwhelming nuances of urinary incontinence, part two encapsulates more ethnographic research around current incontinence products, with the adult brief signposting opportunities for design advancement. By attending to the seemingly innocuous adult brief and its imbued social derision, I acknowledge that although the science of incontinence product technology has evolved dramatically, the design and its impact on quality of life has not appropriately or empathetically been considered.

This leads the project into conceptualizing how to affect environmental change through both product and system considerations in part three. Introducing how research and surveys affected product knowledge and development, speculates whether concepts such as reusable diapers are merited, or whether they idiomatically re-create a wheel. Such doubt drives the conversation to holistically analyze diapers and waste, and argue the case for urine having a pivotal role in translating conversations about incontinence into conversations around environmental sustainability and empowering systems.

Conceptualizing a higher-performance garment and concomitant system, this project attempts to at once facilitate human dignity, active lifestyles and closed-loop waste streams, and consider the highly unsustainable, disenfranchising, and trash-hemorrhaging life-cycle of urinary incontinence. In doing so, a product may stand as a potential coupling, marrying patient to dignity, product to system, and present to future.
PART I - DIORAMA

1 What is Urinary Incontinence?

Incontinence relates to urinary and fecal retention abilities. Urinary incontinence (UI), indicated by unintentional or uncontrollable voiding of the bladder and/or urethra, is an incredibly common problem, with incident rates increasing proportionate to age.\(^5\) Existing as subsets to urinary incontinence, conditions can be broken into two main (sometimes non-exclusive) categories: stress and urge.\(^6\) Additional types include overflow incontinence, mixed incontinence, and functional incontinence.\(^7\)

Earlier estimates placed the prevalence of urinary incontinence in the United States at 15 million, however those with “the related condition of overactive bladder (OAB)—urinary urgency, with or without UI and frequency and nocturia—[amount to] as many as 33 million Americans.”\(^8\) It can be difficult to contextualize what these numbers mean, especially when one isn’t familiar with the discourse surrounding the topic. Consider this: “UI and OAB are more common than diabetes and are similar in prevalence to asthma.”\(^9\) To say the least, prevalence is high, and rates increase in populations of older adults.\(^10\) The Center for Disease Control’s 2014 study on “the prevalence of incontinence among older adults” concluded that over half of non-


\(^6\) For the purpose of expediting comprehension, in this paper, incontinence will refer only to urinary complications. Altaf, Mangera and Christopher R. Chapple, “Urinary incontinence in adults,” *Surgery (Oxford)* 29, 6 (2011): 254, 257.


institutionalized women and over one quarter non-institutionalized men 65 and older reported some form of urinary leakage.\textsuperscript{11} Thirty-seven percent of short-term nursing home residents, and 70.3\% of long-term residents reported not having complete control over their bladder.\textsuperscript{12}

The problem may seem restricted to older populations, and by common practice, that assumption would only reinforce the institutionalized ignorance in contemporary society. However, UI is present within younger groups as well. It is estimated that 7.5\% - 15\% of men and 21\% - 34\% of women, aged 18-64, exhibit some form of urinary incontinence. Men with overactive bladders make up 10\% - 25\% of individuals between 18 and 64.\textsuperscript{13} OAB rates in men are generally higher than women due to the benign enlargement of prostates, however stress incontinence is markedly more prevalent in women.\textsuperscript{14}

By in large, women, more than men, confront urinary incontinence on a daily basis. And as populations age, incidence rates are almost guaranteed to increase. Risk of incontinence has been correlated with causes such as urinary tract infections (UTIs), depression, and environmental factors limiting toilet access through physical or social constraints.\textsuperscript{15} With the percentage of people over the age of 65 to increase from 12.8\% in 1996 to 30\% in 2030, this increase will be either boom or bust to the incontinence care industry.\textsuperscript{16}

Although a plethora of data on incontinent populations exists in some conclusory capacity, there has yet to be any consensus on appropriate methodologies with which to categorize and define urinary incontinence in accordance with target populations, sampling

\textsuperscript{13} Diane Kaschak Newman and Alan J. Wein, \textit{Managing and Treating Urinary Incontinence} (Baltimore: Health Professions Press, 2009), 15 – 16.
\textsuperscript{15} Diane Kaschak Newman and Alan J. Wein, \textit{Managing and Treating Urinary Incontinence} (Baltimore: Health Professions Press, 2009), 18.
\textsuperscript{16} Diane Kaschak Newman and Alan J. Wein, \textit{Managing and Treating Urinary Incontinence} (Baltimore: Health Professions Press, 2009), 17.
techniques, and study designs. Additionally, due to societal stigma (to be addressed later), many are discouraged from openly admitting incontinence to themselves, their families, friends, and medical practitioners. Those elderly who do mention the issue of UI to a medical provider may simply be told that the incontinence is a result of old age, is not life-threatening, and subsequently administered drugs or advised to try a variety of incontinence products. As a result, what has remained problematic is determining reliable and representative prevalence rates among the general population. This relates both to social stigma and general education failures, both of which will be considered in designing for comprehensive systemic overhaul and prevalence of visibility.

2 History of Urinary Incontinence and its Treatment

![Ebers Papyrus writings on incontinence.](image)

Do (this) for a child suffering from urinary incontinence: you boil faïence beads until they form a pellet. If he be an older child, he should swallow it in a gulp, (but) if he be in swaddling clothes, one should rub (it) together for him in the milk, just as it flows forth from his nurse for four days.

Urinary incontinence has been tended to and written about as far back as the Ebers Papyrus in the second millennium B.C.E., the most complete ancient Egyptian medical text in existence. Another, the Papyrus Smith, documents incontinence resulting from a spinal injury, a common occurrence even to this day. These documents go on to describe tools with which to

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attend to the collection of urine in men and women. Aside from the two papyrus sources, incontinence is referenced by Hippocrates in the fourth century B.C.E., and again by Roman medical practitioners until the subsequent collapse of the Roman Empire. From there, the works of Greek and Roman scientists were preserved by Arabian intellectuals until their rediscovery by enlightened Renaissance scientists.21

The 16th century C.E. saw the first documentation of incontinence and micturition devices, including urinals for incontinent men and “artificial yards” for those who suffered the loss of their penis during battle or accident.22 In the event of complete urinary incontinence, a glass bottle or pig bladder was attached to the body by straps, illustrated by Fabricius Hildanus in 1683.23 Further research was completed by German scientist, Lorenz Heister, who dedicated two chapters in his book, *Chirurgie*, to male and female urinary incontinence,

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attributing male incontinence to bladder stones and paralysis.\textsuperscript{24} His advised treatments were lithotomy, “nerve-strengthening drugs,” or a penile clamp composed of leather and metal and worn when not urinating. While having at least three preferable treatments for male urinary incontinence, Heister produced no sound treatment for women, a common medical slight that persists, to a smaller degree, in contemporary culture to this day. To be fair, he did suggest using a vaginal pessary to compress the female urethra.\textsuperscript{25} This idea—that of perineal compression—was revisited as recently as 1960 by S.A. Vincent and looks, quite frankly, barbaric.\textsuperscript{26}

Much of the process of discovering or contriving treatments for medical conditions in antiquity seems archaic in relation to contemporary standards of medical procedure experimentation and device design. Methods devised in the 19th and 20th centuries, such as complete closure of the vagina by way of sutures, electrostimulation of the pelvic floor, surgical manipulation of the bladder, and insertion of pneumatic pistons in men, would eventually give rise to modern surgical procedures.\textsuperscript{27} Yet even factoring in new drugs and physical therapy (Kegel Exercises) urinary incontinence persists, treatment for which can be costly and for many, unaffordable.\textsuperscript{28} Many have since turned to diapers—at first fabric, then disposable—as palliative rather than curative measures.\textsuperscript{29}

Coinciding with 19th century developments in urology and in tandem with the industrial revolution (creating ample cotton textiles), the method of attending to babies’ incontinence using absorbent fabric was just beginning to gain popularity—a direct result of textile affordability and Maria Allen’s diaper invention.\textsuperscript{30} Beginning in the mid-19th century, infants in cooler climates—once bound in swaddling animal skins, stuffed with grass, moss, or milkweed—and those in warmer areas—uncovered and given the world over to defecate and micturate—were

\textsuperscript{24} Lorenz Heister, \textit{Chirurgie}, (G.N. Raspe: Nürnberg, ed 5, 1747).
\textsuperscript{29} Newman, Diane Kaschak, and Alan J. Wein, Managing and Treating Urinary Incontinence (Baltimore: Health Professions Press, 2009), 266.
attended to with commercially available cloth diapers. Yet this basic cotton diaper changed very little over the next few decades as its relative low cost, versatility, absorptive, washable, and reusable qualities were hard to outperform. Even so, as cotton diapers gained in popularity, so too were inventors looking to make improvements to remedy issues like leakage, infection, rash, and messy cleanup. Innovations began to crop up: disposable paper linings, rubberized underpants with medicated surfaces, disposable cellulose inserts, and moisture-proof attachments.

Even with inventors and entrepreneurs rapidly developing new features to the diaper, it wasn’t until the 1930s that commercial organizations began to take interest. In 1938, CHUX gauze disposable diapers, produced by Chicopee Manufacturing Company, a subsidiary of Johnson & Johnson, were put on the market; however sales were never more than modest.

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34 Dong Zhang, Developments in Nonwovens for Personal Care (Surrey, United Kingdom: Pira International Ltd.: 2006), 77.

In the late 1940s Chicopee began introducing a number of cellulose-based products intended for hospitals and consumers. These included “bed coverings, absorbent pads, feminine protection pads, adult incontinence products, and baby products.”\textsuperscript{36} This is the first reference found for adult incontinence products at such an early date.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure5.png}
\caption{Marion Donovan}
\end{figure}

In 1947, Marion Donovan, through a stroke of shower-curtain inspiration, began a quest to make her life as a mother a bit less messy. Her product, the Boater, was a reusable diaper cover composed of nylon parachute cloth and became an immediate favorite.\textsuperscript{37} In addition, she

\begin{thebibliography}{99}
\end{thebibliography}
replaced the safety pin (invented in the 1840s) with plastic snaps, thereby giving every mother the chance to avoid the [unintended] pain of accidentally skewering their child.\(^{38}\)

Abreast with news of Marion Donovan’s innovations, companies in Europe—such as Mölnlycke/Paulistrom, a Swedish textile maker—were making headway in catering to the post-World War II population boom by producing cellulose tissue diapers.\(^{39}\) Beginning in 1957, disposable diapers in the US and Europe began to diversify with the recognition of new market segments and products such as pear-shaped inserts, two-piece disposables, absorbent inserts, and entirely disposable diapers.\(^{40}\) By the end of the decade, 80% of households raising children had some form of disposable diaper on hand.\(^{41}\) However, due to their cost, disposables were

\[\text{Figure 6 - 19th c. Diapers and Drawers}\]


\(^{41}\) Dong Zhang, Developments in Nonwovens for Personal Care (Surrey, United Kingdom: Pira International Ltd.: 2006), 77.


While diaper technology and design was being revolutionized, it wasn’t until the late 1970s that concepts for retaining waste in infants began to be reapplied to products for individuals’ incontinence management. In 1978, Kimberly-Clark began test-marketing Depend, but few retailers were excited to carry the products. A former Depend brand spokesperson stated that even “the AARP wouldn’t accept advertising in its magazine because the subject was
‘negative.’“ Acquiring a female celebrity spokesperson and implementing a $100 million dollar advertising campaign, Depend quickly became the leading incontinence product.48

In years since, adult diapers have been respectfully and euphemistically referred to as adult briefs, and have gone through a number of iterations.49 Once manufactured to be a simple pull-up, new inroads were made by offering different sizes, changing the outer shell from plastic

Figure 7 – Superabsorbent Polymers

to a breathable material, substituting absorbent fibers with SAPs, and offering a variety of products to market segments. Many advancements came about in the marketing category as companies realized that customers were using other absorbent products to fulfil their incontinence needs (e.g. 20% feminine care pads were being used for other leakage). As a result, various brands began targeting men with a history of prostate surgery and incorporating colors, prints, and eventually protective underwear. Today, brands and styles abound. Pantiliners, pads, guards for men, undergarments, protective underwear, re-fastenable underwear, and fitted briefs are but a few products offered on stores’ shelves.


Aside from adult briefs, other treatment options exist in outpatient care, but mainly for male populations. Products such as leg bags and condom catheters rely more on synthetic plumbing and reservoirs to drain and contain urine around the thigh as opposed to collecting it in absorbent material around the groin.\textsuperscript{52} AlphaDry is a reservoir of a different kind that expands and contracts with urine loads and is carried at the end of a user’s penis. This gives the user the ability to manage overflow while still making use of traditional male micturition strategies (standing at urinals, over toilets, and controlling flow from the penis shaft).\textsuperscript{53} Aside from internal urethral inserts (e.g. Fem Soft) and suprapubic catheterization, which entail invasive and penetrating strategies (one goes just below the umbilicus) options for women are few in number when compared to those for men.\textsuperscript{54} This of course has much to do with the location of the urethra as it does the ease to which the penis becomes a sort of biological plumbing spur, conveniently allowing the attachment of synthetic tubing.\textsuperscript{55}

\textsuperscript{53} Diane Kaschak Newman and Alan J. Wein, \textit{Managing and Treating Urinary Incontinence} (Baltimore: Health Professions Press, 2009), 436.
\textsuperscript{54} Diane Kaschak Newman and Alan J. Wein, \textit{Managing and Treating Urinary Incontinence} (Baltimore: Health Professions Press, 2009), 422, 460.
\textsuperscript{55} Efforts by the National Aeronautics and Space Administration to develop a female collection device have for the most part ended unsuccessfully, not without expending millions of dollars on development: Rebecca Chalker and Kristene E. Whitmore, \textit{Overcoming Bladder Disorders: Compassionate, Authoritative Medical and Self-help Solutions for Incontinence, Cystitis, Interstitial Cystitis, Prostate Problems and Bladder Cancer} (New York, N.Y: Harper & Row: 1990), 265.
Aside from the obvious drawbacks, non-absorptive products such as leg bags can offer a somewhat more reliable remedy to sustained incontinence...outside of undergoing surgery (if that is an option). Not only is a “diaper” not being worn, but users can continue disposing urine in a somewhat traditional fashion. But like adult briefs, these incontinence products present issues, including skin degradation, rash, urinary tract infections, and other bacterial dilemmas related to urine exposure and moisture retention.

With the dawn of the disposable diaper and the innovation of prosthetic urine reservoirs, the incontinence industry has grown rapidly since its early days. The processes by which diapers are efficiently produced contributed to the ultimate reduction of price, thus increasing affordability and making “space-age” materials more ubiquitous. In fact, SAPs were initially patented in diapers in 1966 and first used by astronauts in space launches, which required astronauts to remain suited for hours at a time. Although these product advancements have been heralded next to the cell-phone as one of the major business revolutions of the 20th century, and benefited countless families in freeing up time, once occupied by diaper washing, the benefit to incontinent adults has been somewhat muffled. This is due in large part to an external component, societal stigma, but relates in some way to the cross-pollination of diaper technology with adult briefs. Adult briefs were born from diaper innovations and with the conversation around incontinence commonly related to infant bowel care, the two product lines have yet to be culturally divorced. As a result, adults suffer from infantilizing perceptions from continent and incontinent populations alike when it comes to wearing diapers.

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Unmentionable 16
3 Stigma

3.1 Cultural Dichotomies

Urinary incontinence remains a deeply hidden problem, and yet urination, especially among men, seems to have an almost playfully accepted relationship to western culture. In several artworks and images, artists have depicted, for one reason or many others, male and female micturition—not as culturally unacceptable acts, but instead as harmless jokes. The added use of running water to represent the act of micturition in these portrayals goes beyond art to find its way in everyday images. Commonly associated with youthful play, pranks, or social rebuff, the depiction of such behavior is universally relatable, especially among those who spend time with children and young adults. As individual gets older, however, this behavior is less common, so its presence becomes a joke to observe, but not one in which to partake. Control is central to these depictions of micturition. Those who create such images suggest that the figures micturating—whether in the form of wielding a hose, or generally breaking social codes—all exert control over their actions. In this particular image [Fig. 12] the artist intentionally depicts men intentionally micturating. In
another [Fig. 13] the artist intentionally depicts a girl expressing the utmost contentment as she squats above her pedestal. Young men and women, caught in a state between childhood and the gravity of adulthood, express a playful level of control over their ability to micturate in these depictions, breaking form to spray water, or otherwise pantomime what is culturally considered a more private and publicly discouraged act.

Apart from the jovial acts adolescents, there are the effects of alcohol and its inherent ability to impair judgment and behavioral expectations. With less inhibited judgment, inebriated individuals feel at more liberty to urinate in public. And because alcohol is a legal substance, actions associated with it are less likely to be seen as deserving of ridicule, especially when those in the company of the individual doing the micturating are participating in similar actions. All in all, the aforementioned visualizations and representations of micturition are associated with breaking rules, yes, but also more importantly, with some expression of control, social and
urological. Even in instances of temporary impairment, potentially negative judgment is assuaged in the understanding that such actions are but outliers to an otherwise assumed control of bodily functions.

Exercising control, social and urological, is cherished and considered the prerogative of any competent human. But what happens to those who lose even the slightest of control? This next chapter focuses on what the label of incontinence means in contemporary culture, how that labeling affects the psychology of male and female individuals, how stigmas are institutionalized through medical pedagogy, and the unseen microaggressions that occur daily as a result of individuals and the built environment. In highlighting the power dynamics and nuances within such an opaque word as “stigma” and delineating how stigma is either engendered or assuaged by individuals and institutions, it is hoped that a more comprehensive understanding of incontinence will emerge and guide subsequent design decisions.

3.2 The Early Days

...stigma exists when the following interrelated components converge. In the first component, people distinguish and label human differences. In the second, dominant cultural beliefs link labeled persons to undesirable characteristics—to negative stereotypes. In the third, labeled persons are placed in distinct categories so as to accomplish some degree of separation of “us” from “them.” In the fourth, labeled persons experience status loss and discrimination that lead to unequal outcomes.58

Prior to the 20th century, the ramifications of incontinence were far greater for women than they were men. Expected to manage roles as traditional wives and mothers and submit to a patriarchal and hierarchical system, women who became incontinent were deemed contaminated, undesirable, and excluded from social rituals.59 The true predicament came in the expectation of women to bear children, as childbirth often results in postpartum gynecological problems leading

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to incontinence, which at that time could forever limit a woman’s ability to engage, as she had previously, with her family and social circles.\(^6\)

Going back even further, and revisiting the Egyptian Ebers Papyrus, remedies for female urinary incontinence suggested banishing affected women, “warning physicians not to treat their hopelessly ‘irksome’ uteri because ‘[they] will be like this forever.’” It wasn’t until the 11th century that a Persian physician first recognized that female UI was the outcome of extended and difficult child birthing. And yet his suggested remedy merely entailed utilizing contraception to prevent pregnancy at an early age.\(^6\)

Medical practitioners continued to display their ignorance and unwillingness to interact with urinary incontinence in women over the centuries, commonly pairing urinary incontinence with excessive and impure sexuality.\(^6\) In 1597, physician Luiz de Mercado of Spain remarked, “what an empty and tragic life led by the affected victims and how great are their embarrassments.” In the 1830s, physician Johann Dieffenbach of Prussia described women with urinary incontinence as “hopeless, incurable, and ‘condemned,’” going on to state that “the air of the room of the unfortunate woman nauseates the visitor, and drives him off. The husband has an aversion for his own wife; a tender mother is exiled from the circle of her own children.”\(^6\) In 1884, an American practitioner opined a woman was better off dead than living with incontinence.\(^6\)

It would take a major war to change the attitudes physicians exhibited toward incontinence, as the aftermath of World War II left many soldiers with issues of incontinence due to spinal cord injuries. Physicians began to realize that deeming an individual immoral, contaminated, and disgusting was “unprofessional, disrespectful, and irrelevant.”\(^6\) As surgery

\(6\) Rebecca Chalker and Kristene E. Whitmore, *Overcoming Bladder Disorders: Compassionate, Authoritative Medical and Self-help Solutions for Incontinence, Cystitis, Interstitial Cystitis, Prostate Problems and Bladder Cancer* (New York, N.Y.: Harper & Row: 1990), 44.
techniques of the 20th century improved, the number of prolonged and difficult labors decreased, as did uterine prolapse and subsequent incontinence. Even with such advancements in the medical industry, women today still err on the side of privacy, choosing to keep their incontinence hidden.66

### 3.3 Microaggressions

To those unfamiliar, hiding incontinence may seem like an easy act, buoyed by copious incontinence care products, drugs and therapies. And from others’ expectation of managing one’s own problems, especially in American culture, stems the inability to comprehend events that suggest control has not been attained.67 Those who must frequently attend restrooms may be subjected to criticism for the social interruption visits may have caused.68 Such criticisms may in turn morph into behavioral slights wherein insidious acts of aggression are directed to make a person feel inferior.69

Two documented types of microaggressions emerge, those of isolation and silence. Isolation is generally perpetuated by social groups and can involve the individual and their families, while silence is generally a tactic used by medical providers who might choose to avoid the topic of UI or disregard female patients’ complaints of leakage.70 In either case, the argument can be made that, contrary to how we choose to perceive our society’s acceptance of

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disability, there are clear differences that make up the terrain of social stigma depending on
gender, race, ethnicity, and economic status.

3.4 Medical

...stigmatization is entirely contingent on access to social, economic, and political power that
allows the identification of differentness, the construction of stereotypes, the separation of
labeled persons into distinct categories, and the full execution of disapproval, rejection,
exclusion, and discrimination.71

Urinary incontinence is not just an affliction remedied by procedures, drugs, and
absorbent products. Documented for millennia, incontinence is as common, prevalent, and
timeless as society itself and at once bears a legacy of scientific attention and ignorance, societal
shame and ostracism. As a condition of such prevalence, it is a wonder it is not more widely
understood. But perhaps this is not such a puzzling occurrence when considering the
juxtaposition of specialist literature and views held by the majority of health professionals and
laypeople.72

For the most part, in specialist literature, urinary incontinence is considered a treatable
condition, however among non-specialists, incontinence, especially in old age is viewed as
inevitable deterioration.73 This relationship of medical practitioners to the conditions they deem
worthy of attention is related to both preconceived notions of patients’ needs and practitioners’
understanding of the possibilities within urological care.74 In addition, being in a position of
power, medical practitioners, whether through passive obliviousness, or active disengagement
with patients’ incontinence, possess incredible agency to either detract from or contribute to the
conversation of incontinence and its acceptance within society.

72 Linda S. Mitteness and Judith C. Barker, “Stigmatizing a ‘Normal’ Condition: Urinary Incontinence in Late Life.”
73 Linda S. Mitteness and Judith C. Barker, “Stigmatizing a ‘Normal’ Condition: Urinary Incontinence in Late Life.”
74 Diane Kaschak Newman and Alan J. Wein, Managing and Treating Urinary Incontinence (Baltimore: Health
Professions Press, 2009), 3.
In writing *Conceptualizing Stigma*, Bruce Link and Jo Phelan make an important correlation between power and stigma, arguing that the obvious nature of power dynamics can often leave relationships between individuals overlooked or rendered inconsequential when looking at society as a whole. Recognizing the importance of power in delineating and perpetuating labels, actively or passively, can enlighten discussions about the relevance and role of medical providers in mitigating stigma of urinary incontinence.

The approach to generate more understanding and acceptance of individuals labeled as deviants or outcasts often entails education and tools for increasing awareness among unaffected and affected individual alike (e.g. Kimberly-Clark’s “Underewareness” advertising campaign). Yet even though medical information on urinary incontinence is readily available, “professional education on incontinence and related disorders remains only a small or non-existent part of the basic training of doctors, nurses, and allied health professionals.”

Even with incontinence rates more prevalent than those of diabetes, many providers do not screen for it and consider it unworthy of treatment. The issues with providers don’t end there.

Further research by Diane Newman in 2007 showed that over half the women discussing OAB (overactive bladder) with their healthcare provider had waited longer than a year to seek treatment. Corroborating this Hägglund and Wadensten found many were too ashamed to mention their incontinence to providers, suggesting practitioners would be better off initiating those discussions. Additional federally funded research has indicated that urinary incontinence is “never normal,” and assures that UI is treatable, can be cured, and can always be managed.

Yet a survey by the National Association for Continence revealed that on average, women wait 6.5 years and men 4.2 years before seeking diagnosis. This is a marked improvement from a

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1987 report suggesting individuals waited roughly nine years before seeking help, but hardly close to an acceptable time frame.\textsuperscript{80}

While on the one hand medical research shows that UI can be effectively treated, on the other, those same studies inappropriately indicated that UI is not a normal condition. In the medical field, physiological processes failing to respond to typical stimuli may be seen as abnormal, but listing something as abnormal in a cultural context creates an “us” and “them” separation, laying the groundwork (regardless of intention) for stigma propagation. On top of this, given that patients with incontinence issues are failing to discuss their conditions with their healthcare providers, suggests a certain schism between what the patients think and what the healthcare industry deems as “normal” and treatable.

3.5 Social

Using indirect indicators of awareness of incontinence in the (scientific) community such as the...specific knowledge of health care institutions about patients with incontinence, we estimate that the perception of incontinence, in and by society has not changed very much, that the gap between the patient needs and supply in terms of care for those suffering from incontinence is still large...\textsuperscript{81}

Social stigma is more complicated than the mere discrediting of a person based on perceived normalcy. To further expound on earlier statements, stigma emerges “when elements of labeling, stereotyping, separation, status loss, and discrimination co-occur in a power situation that allows the components of stigma to unfold.” The stance on whether incontinence is normal or abnormal may seem insignificant. And yet depending on the source, these two labels vary in reference to patient age. For instance, incontinence in a young individual may be deemed abnormal, while incontinence in someone older is seen as normal. So these natural physiological lapses of control and their normalcy are entirely relative. But put in relation to old age, the


\textsuperscript{81} Horst Dieter Becker, \textit{Urinary and fecal incontinence: An Interdisciplinary Approach} (New York; Berlin: Springer, 2005), 38.
condition is treated by medical providers as being less serious. Exit the examining room, however, and indications of incontinence have far reaching effects that can alter a person’s perceived social status, credibility, and competence, as those with “controllable stigmas” become less liked and more rejected than those with “uncontrollable stigmas.”

Mitteness and Barker, whose research focuses on the stigmatization of urinary incontinence in older populations, present some poignant correlations between the actions of medical providers and social stigma, related to urinary incontinence. Drawing on similar observations where continence connotes self-restraint, temperance, moderation, and self-control, they argue that the loss of continence (specifically in the US) goes “far beyond physiological impairment to cast strong doubt on a person’s social competence.” Therefore, incontinence and incompetence become inherently linked in old age, whereby the “social imagination” connects incontinence to frailty, degeneration, incompetence and overall discrediting of age. Such concomitant associations of incontinence within elderly individuals may eventually lead to shame, institutionalization, depression, social isolation, the loss of housing, friends, and even family.

Further research indicates that when asked to explain the causes of their incontinence, over half of respondents considered normal aging to be the cause of their symptoms. And yet when asked to explain why they had not consulted with a physician, the typical answer was that the issue was not important enough and that treatment was intended more for younger people. Of those who did mention their condition to a physician, 48% reported the individual did not respond to their concerns or “provided a dismissive explanation.” Such responses within the

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85 And of those who were treated, one in three received appropriate therapy: Rebecca Chalker and Kristene E. Whitmore, *Overcoming Bladder Disorders: Compassionate, Authoritative Medical and Self-help Solutions for Incontinence, Cystitis, Interstitial Cystitis, Prostate Problems and Bladder Cancer* (New York, N.Y: Harper & Row: Unmentionable 25
context of the examining room reinforce the idea that incontinence is normal as age advances. Additionally, they merely reaffirm what most elderly individuals already believe—that incontinence is irreversible and ought to be accepted.

In either case, the recurrence of “normal” bodily functions and disagreements on the appropriateness of the use of such terminology in relation to incontinence, suggests there is no clear idea of when incontinence goes from not normal to normal. Urinary issues at a younger age may be deemed abnormal, because a person of such age is expected to otherwise be healthy. And urinary issues at an older age are deemed normal as the person is expected to present age-related medical issues of greater abnormality (i.e. life threatening). In either case, this confusion within the medical field, along with practitioners apparent unwillingness to attend to the problem, transcends the barriers of examining rooms and presents itself as a quotidian though hidden and abnormal condition within societies preferring to disassociate with such normally or abnormally affected individuals. Puzzled?

To say the least, such methodological denotations are confusing and senseless, and merely perpetuate the labelling of a very large population of people into subcategories of more or less “appropriate” levels of urinary incontinence, which can have dramatic consequences on their quality of life. In labeling a person’s severity of incontinence co-dependent on stage of life, a discriminatory act of preordained stereotyping exists, wherein certain groups of people are presented with more or less opportunity to access professional opinions, specialist options, and some inkling of institutional empathy. In other words, those with incontinence are likely to suffer from individual discrimination. As a final unexpected observance, individuals who experience incontinence and concomitant stigma are just as willing to express negative opinions of others with similar urinary conditions. Such incontinent individuals might comment on the other person’s apparent inability to manage their condition. This illustration of the stigmatized

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becoming the oppressor suggests a subconscious bias toward the condition, regardless of self-identification.87

### 3.6 Gender and Ethnicity

The cementation of a cultural stereotype can affect individuals in ways that don’t require the presence of another person exhibiting discriminatory behavior. People might develop ideas of what a labeled stereotype means very early in life as part of their societal integration, at which point, those conceptions become a “lay theory” of what it means to have, in this case, urinary incontinence. Therefore, if individuals expect others or themselves to reject, avoid, or question the competence of individuals with incontinence, then those same individuals will fear similar consequences in the occasion they begin to experience OAB or UI.88 This phenomenon has recently been called “stigma consciousness.”89

Men and women who exhibit the characteristics of urinary frequency, urge, or incontinence tend to think differently in regards to feared stigmatizing responses. While men feared their behaviors might be associated with infertility or impotence, women indicated that incontinence implied uncleanliness or bodily pollution. In addition, Hispanic men and women worried more about being stigmatized and were more likely to revert to methods of secrecy.90 Behavioral changes in expectation or fear of negative reactions or unwanted attention from others can have dramatic effects on a person’s lifestyle and pose serious consequences to their psychological health.91

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90 Emily A. Elstad, Simone P. Taubenberger, Elizabeth M. Botelho, and Sharon L. Tennstedt, “Beyond Incontinence: The Stigma of Other Urinary Symptoms.” Journal of Advanced Nursing, 66, 11 (2010): 7 – 8; Although in western culture, incontinence is considered a highly personal problem, in Korean culture, which values collective well-being, it is seen as a family issue. In instances where the incontinent member were to lose control in public, both individual and family would experience social stigmatization. Heintz, Phyllis A., Cheryl M. DeMucha, Maryann M. Deguzman, and Ridhima Softa, “Stigma and Microaggressions Experienced by Older Women With Urinary Incontinence: A Literature Review,” Urologic Nursing 33, 6 (2013): 304.
3.7 Environment

There are other instances wherein discrimination does not entail one person acting in direct opposition to another. Passive discrimination may be institutionalized within the human environment and create “barriers to participation.” In this sense, the needs of those who experience incontinence may be excluded from the organization of our physical and social structures.92

Handicap accessibility is gradually becoming more ubiquitous in architecture, but how architecture has been required to serve those with other disabilities is being challenged.93 In the case of bathrooms, handicap accessibility doesn’t include larger changing facilities for paralyzed incontinent users, nor does it take into consideration the needs of those whose incontinence alters the manner in which they use such facilities. Merely building a larger toilet stall or adding a bench are disingenuous half-steps toward a more dignified inclusion of incontinent user needs. In addition, public restrooms are not ubiquitous, with the majority of those spaces residing in residences, businesses, and buildings with limited public access.94 The Changing Places Consortium in the United Kingdom represents the only campaign found thus far advocating for fully accessible toilets in public spaces, but even there, the drive is more to facilitate the needs of those with paralysis, not necessarily mitigate the social taboo of mobile incontinent individuals.95

Physical accessibility through architectural amendments may not go far enough in appropriately managing structural stigma, as these architectural changes do not take into account the social relationships that may further contextualize the interpretation of those accessibilities, or how they are perceived and used. But there is agency in architecture and design that offers an

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opportunity for small variations within built environments to lend credibility, visibility, and
dignity to those who may have outlying needs.

3.8 Quality of Life (QoL) and Socioeconomics

Stigma has affected the structure around the person, leading the person to be exposed to a host of untoward circumstances.\(^96\)

Stigma would be a non-issue if quality of life were not affected, but both are inherently intertwined, often becoming indistinguishable. It has been important to define the parameters of stigma as it relates to individuals with urinary incontinence, so those individuals are not primarily victimized by a simplistic plotting of their lives against a backdrop of readers’ predefined notions of stigma. In doing so, this paper thus far has sought to establish an historical perspective as it relates to incontinence and the stigmas brought upon those who live with the condition today. It has also striven to illuminate the significance of stigma within past and present society to set up a more nuanced comprehension of the impact stigma has on quality of life.

In previous studies, quality of life has been measured from a somewhat broader perspective.\(^97\) Factors such as patients’ age, gender, duration of incontinence, frequency of episodes, degree of incontinence, impaired sexual life, and need for incontinence pads were measured for statistical significance.\(^98\) All except gender and duration were found to directly correlate with quality of life. Additionally, as a patient’s age and level of education increased, so too did their life satisfaction.\(^99\)

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\(^97\) Horst Dieter Becker, Urinary and fecal incontinence: An Interdisciplinary Approach (New York; Berlin: Springer, 2005), 420.
From a traditional medical perspective, it makes sense to extract quantitative data from a population of incontinent individuals to get a better understanding of how UI relates to such factors as age and gender. Without this approach, understanding that stress incontinence is more bothersome to women and post-void dribbling to men, would not be possible. But often in medical studies a very specific question is being asked; and often that degree of specificity can be hard to contextualize, because it breaks an issue down into such finer points that the larger picture becomes subject to “tunnel vision.” Studies on quality of life tend to mention other issues, such as social stigma, but never as a part of the research. Rather, it is merely mentioned in conclusory statements.

Measurements such as “degree of incontinence” or “frequency of episodes” are often left as a cold statistics, which is fine for a broad overview of quality of life. But it is also necessary to see how such terms play out in a qualitative field of research and comprehend what a higher or lower coincidence of quality of life entails in those who manage UI on a daily basis.

How individuals manage their incontinence can be directly related to their perception of how they think others will respond. Maintaining some outward facade of control becomes paramount to sustaining social position and self-esteem. As discussed previously, men and women of different ethnicities have varying ideas of what their incontinence will inspire in those around them. So this, in addition to age, suggests there are myriad strategies for maintaining social composure. Physiological control and environmental strategizing are employed in combination to achieve the desired level of comfort for certain individuals.

For instance, those with UI may begin devising mental maps of publicly accessible toilets, scheduling activities around toilet proximity, or exercising “hypervigilance so as not to be caught in public” without easy toilet access. In an effort to gain more physiological control,
therapies such as Kegel Exercises, and preventative urinating may also be employed. Finally, the site of the problem may be attended to in an effort to contain moisture and odor. Individuals have been known to use numerous urine collection devices such as adult diapers, absorbent sheets, pads, rags, and even kitchen towels.

Overall, the time, energy, and money involved in managing urinary incontinence weigh heavily on the individual. Depending on the severity or frequency of episodes, some individuals are known to adapt by doing laundry 2-3 times a day, while others will lay towels around the bathroom floor preemptively, keep buckets on hand or bathe several times a day. Still others may shut themselves indoors and become more hesitant to welcome guests. These strategies are all related to socioeconomics as well as psychological well-being. The individual’s ability to cope with their incontinence can come to depend not so much on perseverance, but on social status, medical inquiry, financial stability, education, age, and cognition.

3.9 Barriers to Care

Both primary and secondary sources document a saying among medical practitioners, “incontinence never kills anyone,” as reason for its perception as a medical problem of lesser importance. However, between a combination of social stigma and reduced quality of life, individuals with UI are having to adapt to a new reality that often levies a considerable socioeconomic and psychological toll, in turn creating barriers to medical care, causing further

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108 Diane Kaschak Newman and Alan J. Wein, Managing and Treating Urinary Incontinence (Baltimore: Health Professions Press, 2009), 18; Jean Joseph, Professor of Urology and Oncology, Director at Center for Robotic Surgery and Innovation, University of Rochester Medical Center, interview with author, October 5, 2013.
damage to an individual’s quality of life and social support network. This may have ramifications well beyond a matter of mortality, as those who are incontinent have their humanity supplanted by a stigmatizing label, and therefore deemed “less able, less competent, less attractive, less desirable companions.”  

Social competence, medical attention, classifications of abnormality or normality, age, discrimination...all are but mere footnotes in a legacy of social distortion of facts, based on rigid codes of normalcy, sexuality, patriarchal power and control. Medical and social perceptions of difference and stigma go hand in hand, dating back centuries, engendered anew as each child removes their last diaper and claims greater physiological and social control. Control and power co-direct the relationship society and medicine exert in labeling incontinence as either normal or not, but more importantly, unmentionable. Furthermore, the diaper industry, in co-opting the technology and design of baby products and marketing them to hospitals, elder and palliative care facilities, recognizes health care providers as their primary stakeholder and customer, ceding power to business’ budgetary needs while neglecting the needs of the primary user.

“We apply the term stigma when elements of labeling, stereotyping, separation, status loss, and discrimination co-occur in a power situation that allows the components of stigma to unfold.”

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PART II – EXPLORATION
Adult Incontinence Product Study

In considering a multifaceted multilevel response to stigma, one should choose interventions that either produce fundamental changes in attitudes and beliefs or change the power relations that underlie the ability of dominant groups to act on their attitudes and beliefs.\textsuperscript{112}

4 Research Methodology

This project, in essence, seeks to strategize a product that not only facilitates the needs of those with urinary incontinence, but establishes an organic, paradigm shift in how society comes to label those with the condition. In its approach, it considers whose needs are truly at stake, individuals and stakeholders’ socioeconomic and historical interrelationships within structural environments, and the methods and products employed in mitigating moisture and odor.

For years, simple functionality has remained the focus of incontinence product design, and for good reason. As a matter of functionality, both in infants and adults, incontinence as an outpatient condition continues to come back to a singular strategy—that of catch and hold. However no single product considers individual or structural discrimination as elements of the issue. Those concepts are instead tackled by corporate branding strategies, using advertising and celebrity spokespeople to create awareness and acceptability.\textsuperscript{113}

This one-dimensional focus on functionality and acceptability continues to this day, with the adult diaper industry looking to capture larger market shares guaranteed to balloon as “baby

\textsuperscript{112} Bruce G. Link and Jo C. Phelan, “Conceptualizing stigma,” Annual Review of Sociology 27, 1 (2001): 381.
boomers” retire.\textsuperscript{114} Ad campaigns such as “Underawareness” for Kimberly-Clark’s Depend line encourages customers to learn more about incontinence and “show off a pair of Depend, because wearing a different kind of underwear is no big deal.”\textsuperscript{115} What this strategy ignores is that while creating awareness is an appealing approach, it is also inevitably inadequate, as “the intense focus on one specific behavior in one specific group leaves the broader context untouched.”\textsuperscript{116} Leaving larger issues unaddressed, positive outcomes of awareness campaigns are eventually eroded if mechanisms linking beliefs of “dominant groups to an array of untoward outcomes for stigmatized persons” are not appropriately dismantled.\textsuperscript{117} Instead, to facilitate lasting change, a multifaceted, multi-level strategy must be researched and developed that appropriately considers the dynamic, ever-evolving complexity of user psychology, discriminations, social and environmental systems.

Perhaps 40 years ago, an adult diaper was a marvelous innovation, finally allowing individuals some dependable bladder security. But in an age of wearable technology, stem cell research, cloning, nanotechnology, and sustainability management—to mention a few—diapers, leg bags, catheters, and pads all seem somewhat archaic, not to mention expensive and wasteful.

In an effort to better understand these products and those who live with incontinence, a research method was devised in which product testing would be conducted in both private and public settings. Additionally, product purchasing and its effect on comfort was documented from a personal standpoint, but cross-analyzed using research on customer purchasing related to “embarrassing” products. In considering stakeholders, those within the medical industry were consulted, online forums mined, and surveys administered to individuals who wear adult diapers. This initial line of inquiry’s purpose was twofold: to establish product and market understanding and experience social stigma from a limited perspective.

\textsuperscript{116} Bruce G. Link and Jo C. Phelan, “Conceptualizing stigma,” \textit{Annual Review of Sociology} 27, 1 (2001): 381.
\textsuperscript{117} Bruce G. Link and Jo C. Phelan, “Conceptualizing stigma,” \textit{Annual Review of Sociology} 27, 1 (2001): 381.
5 Product Testing

In this stage, three products were tested: Depend Real Fit Briefs for Men, leg bag, and Walmart Men’s Assurance Pad insert. Although all three aren’t absorbents, they were still assessed in terms of their comfort, absorbency (rate), longevity (volumetric capacity), style and cost (FIG.1). Style took into consideration how the product changed my silhouette, for better or for worse. Absorbency measured how quickly the garment could consume moisture. Longevity measured product turnover (e.g. how long a pad lasted, or how often the leg bag had to be emptied). Cost was considered simply: cheaper is rated higher. Each category was rated out of five achievable points. Products with the highest accumulated points were deemed more wearable.
5.1 Kimberly-Clark Depend Real Fit

The brief was certainly slimmer than I had imagined it being, and somewhat easy to don. However, due to its disposable quality, it didn’t feel as secure as underwear...as though any extra weight would drop it to my ankles. Because the “brief” replaced any underwear I would otherwise have worn, I felt as if that piece of clothing would be missed...unceremoniously replaced by a grey, papery, loosely fitting, disposable. Wearing jeans over the brief certainly slimmed it out, but also made it fit differently, causing concern for how well the brief would work once needed. Upon using, I was surprised by how heavy it quickly became, and how immediately unclean I felt, even though I was still fairly dry.

5.2 Leg Bag

The leg bag comes in three parts: Leg bag, condom catheter, extension tubing. Testing commenced in a social setting which was unfortunate for one main reason...the bag had a leak. Upon micturating, it quickly became evident that I was indeed wetting my pants in the middle of a kitchen at a dinner party, and was immediately ushered outside to contain the issue. As it turned out, I had not properly closed the leg bag valve, which accounted for the disaster, but aside from a basic understanding of “lefty-loosie” the product contained no helpful details indicating the product was open or closed. In addition, the valve itself was difficult to manipulate. Even after the bag was closed and filled, I realized it bulged like a balloon against my thigh, an obviously embarrassing detail to explain to anyone.
5.3 Walmart Men’s Assurance Guards

The inserts were the easiest product to wear. Having no mechanics like the leg bag, and allowing underwear still to be worn, they were overall more comfortable and inconspicuous. Although, with an insert comes less longevity, so they must be disposed of more frequently, requiring the use of a bathroom stall for privacy.

5.4 Product Test: Final Thoughts

This basic product test was not intended to cover all products on shelves, rather to illuminate thoughts and worries an incontinent user might feel. In looking at inserts, leg bags and diapers, it was considered that the main incontinence product categories would be represented. Between the three products, the insert had the least impact and made me feel as though nothing were too different. But what it lacked was providing a sense of security. This was in large part due to the fact that because I am not incontinent, I cannot “lose just a little.” So when I did go, I struggled to not completely inundate pad, underwear, and pants. Regardless of the unfortunate start to my leg bag experience, once figuring out how to be sure the bag was closed, I was almost positive I’d never have to worry about leaking (outside the product) again. That security alone was worth the extra cost associated with buying catheters (nearly $5/each) which are only worn once. The downside to the condom catheter is its extreme adhesion and moisture retention. Last drops of urine
tended to consolidate around the tip which can lead to skin sensitivity, and the adhesive feels as though it strips a layer of epidermis with each removal.

In the end, a few things remained clear. While I appreciated the briefs’ all-encompassing embrace (even as a slimmer diaper than most), it was still too much mass around the groin, which only increased upon micturition. The expected security of the leg bag still left me wanting more in regards to maintaining a friendlier silhouette. And the insert, while providing the least amount of psychological stress in terms of feeling incontinent, also left me paranoid about what could happen should urine flow get out of hand.

6 Purchasing – Buyer’s Embarrassment

In purchasing the three products, I became a patron at two types of establishments: grocery/pharmacy for absorbencies and medical supply shops for condom catheters and leg bags. In both cases, it was understood that I was purchasing as the primary user for the product. To all others present, regardless of my condition or lack thereof, I was incontinent at the age of 29.
6.1 Grocery/Pharmacy

In the case of purchasing absorbencies, I found myself incredibly hesitant and embarrassed to even be found in the same aisle as them (such products are often placed around the feminine hygiene aisle). Because I did not know exactly which style, size or absorbency amount I needed, extra time had to be spent analyzing price and appropriateness. In the case someone was already in the vicinity, I found myself opting to come back after a few minutes when the person had left. Even in selecting the product alone, I still felt watched, a documented emotion referred to by specialists as “imagined social audience,” which can impact embarrassment.\textsuperscript{118}

Once a product was selected, I would feel compelled to select other, perhaps unnecessary, products to purchase in conjunction and reduce embarrassment surrounding a singular

incontinence product purchase.\textsuperscript{119} I would then try to find a cashier without a line, so as to expedite the purchase and my exit from the store without being observed buying the items. Stores with “self-checkout” counters were preferable for this reason, as privacy was ensured. But often, pharmacies are more intimate and do not offer self-check-out, which left me occasionally open for spectators, or so I thought.

6.2 Medical Supply

The medical supply retailers were far more cognizant of preferred privacy. Their very nature, existing to supply outpatient products to customers in need, made me feel more comfortable purchasing. In addition, the staff was on hand to assist with any questions, of which I had many. At first, I was handed a circumference gauge and led to a private room to determine the appropriate size of condom catheter. Following this, I was taken to a private aisle from which to select a preferred leg bag size and extension tubing. In this case, I experienced no imagined social audience. Upon checking out, however, I was asked if I had a prescription for the products I was purchasing, for which I did not. This led the cashier to consider me oddly and consult her supervisor for permission to complete the sale. This process alone, although probably not an every-day occasion, certainly increased discomfort and embarrassment.

6.3 Conclusion – Purchasing

In retrospect, both product purchases occurred when I was not entirely familiar with what I was looking to buy, outside of the actual product name. This lack of familiarity with a situation can in turn drive embarrassment, but as purchase familiarity increases, so too should the speed at which purchases are executed.\textsuperscript{120} In other words, were I to buy incontinence products on a weekly basis, the act would become more habitual, resulting in a “reduction in cognitive effort


Unmentionable 40
and an increase in automaticity during purchase." Had such a routine been set up, the feelings of embarrassment I felt in purchasing might have subsided, although I find that hard to imagine.

7 User Solicitation

Although considerably limited, purchasing and self-testing products had an immediate impact on my ability to empathize with those who live with incontinence. Clearly, what I experienced was but a moment in what for many can be a lifetime, each day bringing new challenges, labeling, depression, and lost income. In an effort to identify more of these voices, online forums were used, which ultimately inspired a survey of a virtual community of individuals with incontinence. The findings were astounding, humbling, honest, and sometimes saddening.

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7.1 Survey Findings

Of 98 survey respondents—83 men and 15 women—an astonishing 67% were between the ages of 18 and 44, with 89% registering younger than 55.¹²² The ratio of men to women is also of interest as urinary incontinence is more prevalent among women. Reasons for a greater number of male and younger respondents may be related to the particular forum surveyed and the administration method (online). Had a greater variety of forums, both virtual and physical, been surveyed, the statistical significance of such findings would arguably be far more relevant. Although, considering the general vagaries associated with adult incontinence statistics, perhaps it’s too soon to tell.

¹²² See Appendix 2 for survey questions.
Half of respondents admitted to leaking continuously, while 26.5% admitted to only occasionally leaking. Ten respondents categorized their incontinence as a rare event. This information, when taken with the fact that 95 individuals wear diapers—some in combination with medication, leg bags, inserts, and even Foley catheters (a urethral insert)—suggests that users with moderate to extreme levels of incontinence are seeking full coverage. The two most popular diaper brands mentioned were Depend and Attend, with outliers in imports and plastic pants.

Based on personal experience, it comes as no surprise that only 41% believed their product choice was highly effective. Over half admitted to moderate ineffectiveness or some effectiveness. In terms of how their preferred product made them feel, 30% mentioned feelings of discomfort, anxiety, anger, embarrassment, or isolation. The majority of respondents fell somewhere in the categories of confident, proud, or comfortable and content.

While most individuals admitted to some level of difficulty managing their incontinence with their current product choice, the most revealing information came forth in the final question: “What is your favorite attribute to your product? If you could have your way, what would you change about the product or cultural response to incontinence?” Of 98 responses, only 15 abstained or admitted they were happy with what they used. An incredible 85% of
individuals suggested improvements could be made to the product and/or stigma elicited by the condition. Considering that initially only 41% believed their product choice was highly effective, this solicitation confirms that regardless of whether the product works, there are still aspects of the product that do not attend to social acceptance and could be made more functional. Those that do attend to social acceptance, such as slimmer incontinent briefs, were seen as being prone to leaking. Below are some of the more poignant responses from surveyed individuals. A complete list of survey questions can be found in the appendices.
7.2 Survey Question 10

What is your favorite attribute to your product? If you could have your way, what would you change about the product or cultural response to incontinence? (e.g. visibility, social acceptance, product design, health monitoring “smart” diapers, reusable product)\textsuperscript{123}

I wish people would just accept some of us will always need to wear protection

Social acceptance

being able to buy them without embarassment

Unnoticable, keeps me dry most of the time. Easy to use.

My favorite attribute is that my diapers are absorbant enough that I can stop TRYING to make it to the restroom. Incontinence isn't going away for me, I dont want the stress of having to try to make it. I also like they're thick enough that I feel protected. As for cultural response... I refuse to be [embarrassed about] wearing diapers. People in my life encourage me to be ultra discreet. I don't want to be. There is no reason I should be [embarrassed] taking a [f]resh diaper to a restroom to change instead of [lugg]ing my whole back pack in, and I should not be told to avoid clothes I like because you can tell i have a diaper on! Nor should I be told I should wear something thinner. No, I'm not going to be more discreet with a thin diaper at the expense of feeling wetter and less protected. I have nothing to be ashamed about, damn it!

Not to get a rash between your legs

I would like the diapers to have plastic backing again because that makes them less prone to leak.

Comfortable, absorbency it makes me feel unique, and not visible under my clothes

I wish that i could wear my diapers inn public ...just diapers and nothing else

My favorite attribute is the absorbency, most products are going to "thin and discreet", I'd rather have a good bit of bulk than leaks. I think incontinence should be more socially acceptable, people have no problem with people using wheelchairs, hearing aids or eye glasses. Why are diapers any different?

Better sealing around the legs

Looks more like underwear than other products do.

\textsuperscript{123} Listed examples—save minor formatting for clarity—are unedited.
Worry free I can add more layers if needed for longer wear times

low profile under clothing holds quite a bit even at night comfortable against skin plastic backing doesn't bunch the garment up like cloth

A diaper is just a tool to manage a medical condition. We should be more open about wearing diapers

Should be less visible, but providing the same security of a maximum absorbancy product. Social acceptance would be a dream, because then the fear of being seen with a "diaper but[t]" would be much less, and I think it would be easier to stay self confident

Tapes that hold in place, 8-10 between changes. Wider absorbent material in the wings. Pricing needs to be less expensive. I currently spend about $200.00 per month.

Social acceptance. The toilet isn't for everyone and people shouldn't be embarrassed just because they wear diapers.

... I am incontinent and not in a fetish. But it would be nice to have diapers that have designs like underwear. They still need tapes so you can change without taking off your clothes.

As they are not air permeable, the warm air inside the brief causes perspiration and a sweaty clammy plastic abrasion area even before the brief is soiled by incontinence. A combination of Spandex, diaper cover, compression pants, control top, slimming, cover-up shirt, or body stocking are used to prevent skin break down and allow absorbent products to work effectively. 7 needs of support garments: Wetness Barrier...prevent migrating pads...snug leg fit...snug waist fit...support wet weight...prevent tapes or pads from getting caught in bedding...

I would rather use plastic pants and cloth diapers

not so much noise when u walk

adult reusable diapers

Make more adult cloth diapers available in a variety of colours

It looks like underwear

As much as this survey tells us, question 10 presents a very wide range of voices, from those who simply want social acceptance, to those who—in an ideal world—would redesign the diaper themselves. Even with such limited study, question 10 grants a representative depth and collective user voice not found in scholarly articles or medical texts. Enriching findings with
user surveys allowed a breadth of opportunities to emerge, based on known types of incontinence and some of the user needs in survey results. A process of determining a future concept direction came down to a basic matter of defining those users, outlining initial concepts to attend to the various aforementioned user needs and negative experiences, and of course determining whether those concepts fell within the scope of this project. This next section presents a brief jaunt into where those thoughts led, and how they served as a navigator for later outcomes.

8 User Breakdown and Concept Explorations

There is no urinary incontinent person. Simplifying an individual’s condition to a single label and defining them first as incontinent and second as a person or human, strips a portion of dignity away from that individual. In doing so, it may leave the individual perpetually preordained by a societal perception of incontinence, rather than a more truthful set of details. In so many words, humanity is never a single, collected experience, and so the singularity of “incontinence” must be delineated by building user profile understanding.

Just as we know more women suffer from incontinence than men, so too do we know those who are younger have a much different experience than those who are older. Although there is no singular category of users (and no single category of incontinence products), various user experiences were modeled into a somewhat limited range of profiles [Table1] to establish a visual idea of where these user differences lay and how they might affect subsequent design concepts [Table 2].
<table>
<thead>
<tr>
<th>User/Mobility</th>
<th>Degree of UI</th>
<th>UI Management</th>
<th>Potential Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older man, mobile.</td>
<td>Urge Incontinence. Diabetes has affected neural connections, causing urine leakages.</td>
<td>Incontinence pad inserts, restroom locating strategies, and urine leak tracking. Documenting urine leaks enables timing future restroom visits.</td>
<td>Bathrooms may be too few and far between in public spaces. Leaks that do occur may potentially degrade a fully functional man in the eyes of others around. Awareness, more public facilities, biofeedback devices.</td>
</tr>
<tr>
<td>Idea</td>
<td>Concept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable user to go anywhere without need of restrooms or diapers</td>
<td>There are some who care where they micturate...others who do not. Extending the urethra to the ground may enable users to “go” in lawns, streets, and into water.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce fluid load of diapers.</td>
<td>Determine dissipation methods: vacuum extract, water vaporization...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shapewear - form-fit, reusable, diaper coverings</td>
<td>Attend to streamlining products currently on the market to make them friendlier to individuals’ silhouettes and presentation preferences. Enable diapers to be worn in public.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase absorbancy of current products.</td>
<td>Superabsorbent polymers can absorb nearly twice as much fresh water as salt water. Reducing salinity of urine by way of filters or chemical enhancement could increase product absorption.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom imagery amendments</td>
<td>Bathroom imagery speaks to three users: women, men, and handicapped. Creating visualizations of those who use bathrooms for other reasons, legitimizes their use and existence within structures.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom functional amendments</td>
<td>Restrooms should become less about waste removal and more about personal attendance. Alterations could be made to increase occupancy, dynamism of space, diversity of “embarrassing prod-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change diaper material to be less noisy</td>
<td>Make diapers from material that does not rustle. Remove noisy paper and plastics and replace with fabrics or other modern materials to mitigate sound and increase social comfort.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change diaper fit to secure fluid and user.</td>
<td>Establish various body types and address needs depending on urethra location, weight, height, urine volume, age, mobility, etc..</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change absorbency pattern to benefit sleeping patterns</td>
<td>Establish various sleeping pattern moisture mitigation needs. Translate human factors into modularized, modifiable, sleeping garments separate from current diaper products.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change diaper placement in stores, or change store design around the concept that “embarrassing products” do exist.</td>
<td>Create sections for embarrassing products (e.g. diapers, condoms, laxatives) to increase buyer cohesion and comfort. Labeling of such sections could create visual awareness of experiences or acknowledge buyer embarrassment. Potential room for exclusive payment methods.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generate more informative product packaging.</td>
<td>Product packaging is currently designed for intended users. Create packaging that informs caretakers, family, and friends of individuals with UI...creates an informal awareness campaign.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.1 Exploration

Having established exploratory research, surveys, user profiles, and initial concepts, it became clear that design alterations were highly dependent on specific human factors and environmental changes. The mere locational difference between the male and female urethras is enough to warrant two product lines. Factor in the accessibility of bathrooms, and two product lines may become five products. Increase the user base to individuals with handicaps, and potential product differentiations expand even further. Above all, contextualize product ideas within social and structural environments and suddenly no single incontinence remedy addressed the vast array of user needs. Yet attempts were still made in attending to user subgroups.

A simple experiment in shirking both bathroom and diapers led to a brief mock-up of what I called, “the great escape.” This concept was prototyped quite early in the research stage with the notion that if one could increase the allure of incontinence products to both incontinent and continent populations, social acceptance might increase. Such a simple—albeit sophomoric—idea entailed connecting condom catheters to latex tubing extensions, which in turn were fused to large-diameter corrugated tubing that could be extended and directed from the base of a user’s leg. The mock-up was intended to be worn within trousers. Five models were made and tested on five men (myself included) and proved somewhat functional, but nevertheless doomed as the product could only be (a) worn by men, (b) used discretely outdoors, and (c) worn in conjunction with tights or leg straps. A somewhat final detail is the product would often wet the users’ shoes if not directed appropriately.
While “the great escape” provided some limited relief and could perhaps be developed further, it was deemed to have too limited a scope and fail to address deeply rooted issues within a larger population. Attending to bathroom design, incorporating incontinent users into the visual establishment [Fig.15], creating diaper covers, and modeling sleep products, were all certainly valid, but still seemed to avoid tackling primary user needs and the indignity of disposable products…or so I once thought.

8.2 Synthesis

As it were, the line between user needs and user wants began to appear arbitrary. After all, we seem to live in a society where every non-stigmatized user is afforded ample product diversity and structural integrity without regard for dated and less-attuned notions of Maslow-ian theory.124 “Needs are not hierarchical,” and shouldn’t be categorized thusly.125 To achieve transformative product design: social connections, psychological needs, structural environments, visual culture, and marketing trends must become mandatory considerations. Referencing centuries of incontinence history, product design, and societal stigma, the adult diaper—indistinguishable from the future of incontinence management as ever—needed to be addressed. With Proctor & Gamble scheduled to re-enter the diaper industry on a marketing budget of 150 million dollars (a fraction of the incontinence market, listed at $1.4 billion and growing faster than all other personal-care and household products), corporations were once again illustrating a clear intent to define incontinence by way of absorbent disposables.126

125 Ibid.
There is certainly value to positive deviance and community input, as there is to concept exploration and user profiles. The survey was one of many efforts made seeking advice, both from experts and laypeople, with equal effort profiling needs and investigating concepts such as vacuum extracting urine, form-fitting wear, discrete fabrics, and sleep-wear. But with an affinity for positive deviance it came as no surprise that among the experts—i.e. urologists, family medicine physician, nurses, medical product suppliers, and biomedical engineers—only the nurses had one clear solution. “Design a better diaper.” According to one, the most recurring issue with incontinence was urinary tract infection (UTI). In their opinion, they could not believe that inpatient products were imbued with antimicrobial qualities, but outpatient products were not, and left as cheap, absorbent, diapers. “We discuss this all the time in the nursing staff lounge...why hasn’t anyone designed a better diaper!”

As stated, diapers are no recent invention, rather a concept that, in one form or another, has coincided with incontinence as long as written history. Yet when put in perspective, the disposable diaper is fairly new. What for years was a bulky combination of pulp and plastic, is quickly becoming a spectrum of breathable, gender-specific, products of absorbent polymers, re-

\[127\] Jonathan Soffer, Nurse Practitioner, Mid-Columbia Medical Center, interview with author, January 10, 2013.
adhesive tapes, elastic, and paper. With P&G’s entry and Kimberly-Clark leading the diaper market with Depend and Poise and rolling out awareness campaigns for urinary incontinence, their bet is firmly placed on the market only getting bigger.128 In fact, Kimberly Clark’s hope is that increased awareness will positively affect market growth in making diapers more acceptable to purchase.

Although the market is indeed predicted to grow, Kimberly-Clark continues doubling-down on the aforementioned Moore’s Law, that producing slimmer, brief-like, disposable products with SAPs exhibits no trade-off in performance, let alone environmental benefit. Arguing their campaign and brief-like products restore dignity is certainly pushing in the right direction to devising solutions. But what some simple, albeit preliminary, methods of research have yielded, suggest the opposite. Between personal and surveyed user experiences, diaper products are trending toward paper-backed, low-profile, and underwear-like. While this brings welcome comfort and fewer instances of “diaper butt,” it doesn’t necessarily mean more protection. Many argue that paper backed actually increases the chance of leaks and demand performance over discretion. While there are certainly users who benefit from and prefer the

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smaller-is-better trend in the diaper industry, the question must be asked: is the future of incontinence management in disposables?

For thirty years, the diaper industry has relied on superabsorbent polymers as their breakthrough technology, increasing its content in products as it became ubiquitous and cheaper. But to further reduce costs, diaper size, environmental impact, and stigma without compromising performance—disposable materials may have reached a limit. The future of incontinence management and stigma mitigation will instead come in policy changes, resource management, and synthesizing systems that interrelate with higher performing products and stimulate other sectors of the economy. Efforts to substantiate this argument will be made as this project envisions a reusable diaper design to initiate discussions on what could actually provide increased performance, sanitation, maneuverability, security and comfort. Furthermore, by looking to reusable garments as both increasing performance and reducing cost, a larger, more sustainable system can be considered, involving architecture and agriculture.

In truth, the basic premise of this project is changing how incontinence is perceived, as that perception affects everything—from diapers to stigma. If an individual’s urinary system or physiology is troubled, then remedies must incorporate a similar level of bio-mimicking complexity to replace, if not enhance that which is struggling. This complexity can come in many forms and shouldn’t be imbued within one product. For the sake of this exercise however—designing a reusable incontinence product—the diaper was viewed as a physiological addition to the anatomy, acting almost like an organ, filtering and readying urine for evacuation.
9 REdesigning the Common Diaper—Product Concept

To err is human; to diaper is not? Au contraire! In fact this reading should have led viewers to grasp that in addition to being a culture wherein labeling seems almost akin to “human nature,” so too is urinary incontinence akin to humankind. As hard as we try to mature beyond infantile incontinence, many of us are just as likely to find ourselves grabbing packs of diapers as we settle down to retire. The adult diaper—in whatever “primitive” or polished state—has persisted, been reinvented, and is on the cusp of even greater innovations. What today is still considered taboo (UI)—pending foresight and empathetic vision—will tomorrow bring bio-mimicking membranous suits…in turn spelling greater functionality for diaper wearers, greater acceptance for their condition, and greater effort for their inclusion.¹²⁹

This next chapter discusses a product concept devised to remedy concerns about current adult diapers, as well as tackle issues of economics, dignity, and accessibility. Having both tested existing products myself and polled those who use such products on a daily basis, it became clear that some basic needs (e.g. form fitting, leaks, comfort, and security) are not being addressed. And to address these needs, a product designed to be disposable would in no way pass muster on any cost-benefit analysis or even life-cycle analysis. An appropriate adult diaper must have more embodied value, culturally and physically. Such a product would also have to work just as well, if not better than what currently exists, attending to odor control, leaks, body types, gender, age, cost, breathability, infection mitigation, toilet accessibility, mobility, etc.. With superabsorbent polymers being the last major absorbency innovation added to adult diapers

nearly 50 years ago, a reusable diaper looking toward wearable technology was considered the most promising path for future innovation.

Preserving the value of SAPs, but discarding the cellulose and plastic, the product concept discussed over the course of the next chapter was eventually deemed somewhat stunted by its own limited perspective. Who cares if there’s a new diaper design…how does it change what already exists? Even in designing a reusable diaper (described presently), one should ask: is that even relevant? Why would people who have benefitted from superabsorbent polymers and greater diaper affordability want to give that up, or would that happen? What is being gained by moving to a reusable product outside more laundry cycles and less waste? In truth, these weren’t the easiest answers to process. Would a reusable product consisting of more valuable material realistically assuage placed stigma?

From the beginning, mitigating stigma remained an element to be considered in any final product design, otherwise the product would be considered no more capable of engendering change than those which reside on shelves today. In an effort to tackle this dilemma, further steps were taken following the product’s design finalization to revisit what the product was doing—that of collecting urine to be disposed intermittently, as bladders do otherwise. It was in this stage, in analyzing the urine as being one of many inanimate stakeholders (Ch. 10), that a higher and multifaceted systemic solution became clear. Revealing urine’s nutritional potential and historical relevance to sustainable societies, naturally inspired thoughts on how both diaper and urine, now married as “waste,” could be re-envisioned as co-equal partners in a larger collection system.

This is not to argue these are the only solutions, but to present the two elements, that of reusable incontinence garments and urine, and their interrelationship, as being an integral step in the process of devising more complex strategies to including urinary incontinent populations in structural environments.
9.1 Product Expectations

Challenging the definition of “diaper” and the euphemism of “adult brief,” involved defining the expectations of the garment.

**Disperse and Comfort:** Catching and holding urine in the groin, as diapers currently do, can be cumbersome, elevate moisture levels, and inspire a general feeling of wearing one’s own waste. A reusable garment must increase functionality over current disposables and remove excess bulk around the users’ groin without compromising the silhouette of the human form. In looking to form-fitting material, leaks can be eliminated without infringing on user comfort.

**Affordability:** Adult incontinence management relates directly to income. With a percentage of the lower-income population continuing to develop personal materials and methods for coping, it is important to recognize that value is as much a part of the product design as is product function.

**Sanitary:** Looking to silver as an antimicrobial agent will not only reduce risk of skin and urinary tract infections, but increase the longevity of the product.
**Dignifying**: A final product should never suggest to a user: “This is why you can’t have nice things.” In seeking inspiration from anatomical details and physiological systems this product sought solace in material versatility, longevity, micro-complexity, sustainability, and sanitation. Additionally, the product was imagined as a system in and of itself, at once buttressing that of the human while encouraging higher systemic relationships.

### 9.2 Materials Used

*Wool* - An extremely flexible and natural material, wool has hydrophobic properties (wax coating of cuticle cells) and is still used in diaper covers. Although at once water repelling, the cortical cells of wool have a spring-like structure (lending wool its elasticity), of which the sulfur proteins attract and retain moisture. For this reason, wool can absorb up to 30% its weight in liquid without feeling wet. In addition, these same structures give wool a certain odor scrubbing quality.\(^{130}\)

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Silver - Silver has received renewed attention for its antimicrobial qualities and has been used in hygiene clothing, medical sutures, cardiac devices, and even footwear. New processes of atomic silver coating have progressed to create homogenous coating of textiles with ionisable silver, achieved during initial spinning or finishing processes of yarn and fabrics.\textsuperscript{131} These methods of silver infusing have brought about great expectations of antibiotic fabrics, however silver as a universal antimicrobial element has yet to be tested, as only known pathogens have been subjected to the material.\textsuperscript{132} Even so, a silver-bonded, wool-poly blend is advised for one layer of the incontinence garment.\textsuperscript{133}

Microfiber - Microfibers, a blend of polyester and polyamide, are 100 times thinner than a human hair, and when woven, increase surface area over 40 times that of a cotton fiber. This gives microfiber a unique advantage as it can absorb 8 times its weight in liquid and increases...

capillary action. Microfiber can be very elastic and is often used in performance garments to increase moisture wicking.

Superabsorbent polymers - SAPs as they’re otherwise known can absorb 200 times their weight in fresh water (absorption decreases with increased salt concentrations) and once hydrated will not release liquid, even under applied pressure. These polymers have a number of applications, including but not limited to irrigation, firefighting, and industrial sealants. Incorporated in diapers since the 1980s, SAPs are the primary reason disposable diapers have seen such a drastic reduction in size.

![Figure 32 - Superabsorbent Polymers](image)

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136 Dong Zhang, Developments in Nonwovens for Personal Care (Surrey, United Kingdom: Pira International Ltd.: 2006), 23.
9.3 The Product

Users overwhelmingly demanded both social acceptance and improved product function, imploring for plastic backed diapers, less noticeable diapers, better fitting diapers, and diapers that mimicked the role of underwear. Attempting to embody all these demands and more with a
reusable wearable undergarment, **superkat**, was conceived, a multi-layered, form-fitting, hyper-wicking, physiological supplement.\(^{138}\)

![Figure 34 - Superkatt, Giggle Comics](image)

The concept behind superkat is simple: for greater comfort in the groin, urine must be drawn away from the urethra and stored outside the groin’s vicinity. Capillary action, the “intermolecular attraction within liquid and solid materials” creates a tendency of liquid to be drawn into openings between fibers and other solid material without the assistance of, or in opposition to, the force of gravity.\(^{139}\) Relying heavily on this force, urine is captured at the source by antimicrobial, suedecloth, a highly absorbent polyester. Incorporating another level of moisture wicking and capillary action, silver-infused (antimicrobial), polypropylene microfibers and microfleece are layered behind the suedecloth, and continue to draw the urine away from the groin, spreading the urine over a larger surface area, yet sandwiched within layers of elastic, hydrophobic wool-poly fabric, thus containing the moisture within specific regions of the garment. Further down the leg trunk of the garment, a hydrophilic insert can be utilized (accessed from the exterior) to continuously draw moisture through the microfibers to be stored

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\(^{138}\) A nod to the author’s great-grandfather, Dan Gordon, creator of the diaper-clad, Superkatt comic series.  
within the absorbent polymers of the pad. The pad is composed of an ultra-thin SAP layer, but can be supplemented with inserts found on store shelves today.

The rest of the garment is comprised of hydrophobic, breathable, moisture-wicking, odor-absorbing, wool-polyester spandex layered around the fluid channels. This enables the garment a snug fit to the user’s form, creating both the functionality and feel of security in supporting excreted urine weight and containing potential leaks. The garment’s wicking action further enables skin to remain dry. As was mentioned, this is a reusable garment; with the insert being the only disposable element, the rest of the garment can be washed on a gentle cycle.

A range of users are envisioned for such a product. A form-fitting garment welcomes individuals who may otherwise fall between diaper sizes, as well as those who wear compression shorts over diapers. In addition, by creating room for inserts, the garment supports a variety of
Unmentionable incontinence types. Those who might leak small amounts during exercise routines may benefit from wearing the garment alone, while those who fall into urge or functional incontinence categories can make use of inserts of a variety of sizes. This range in absorbency embodies similar ranges found within several product lines in stores today, and the garment even affords

### Table 3

<table>
<thead>
<tr>
<th>User/Mobility</th>
<th>Degree of UI</th>
<th>Potential Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young woman, mobile</td>
<td>Stress Incontinence Post-natal weakening of pelvic floor muscles results in minor momentary leakage during exercise.</td>
<td>Bathrooms that accept incontinent users via visual language, extra space, privacy, comfort. Disposable inserts could be supplied by public restrooms. Exercise wear with absorptive qualities. Kegel’s exercises still necessary, but light leakage will be absorbed by garment. Low-volume pads may be carried in purse.</td>
</tr>
<tr>
<td>Older man, mobile</td>
<td>Urge Incontinence. Diabetes has affected neural connections, causing urine leakages.</td>
<td>Bathrooms may be too few and far between in public spaces. Leaks that do occur may potentially degrade a fully functional man in the eyes of others around. Awareness, more public facilities, biofeedback devices. Inserts may be carried within garment and on person. Garment will hold urine overflow.</td>
</tr>
<tr>
<td>Physically Handicapped, young woman. Limited mobility.</td>
<td>Urogenic bladder leads to large volume leakages in the form of overflow incontinence.</td>
<td>An absorbancy product enabling self-care for individuals with lower spinal injuries. Restrooms that accommodate more than one person in a private space. Unhindered access to business restrooms. Informative incontinence product packaging for purchasing by non-intended users. Caretaker can access and change inserts from garment without requiring removal of clothes. If not fully paralyzed, user may attend to pad replacement themselves.</td>
</tr>
<tr>
<td>Older man, mobile</td>
<td>Arthritis impedes urgency in micturition. Difficulty unbuckoning pants leads to accidental self-wetting, and thus: functional incontinence.</td>
<td>Hands-free toilet. Arthritis-friendly incontinence garment. Education on current absorptive products. Education on urinary incontinence. Accessible cleaning facilities, methods, products. Saperkat attends to minor leaks. In the case of difficult buttons, the product will handle all initial leaks before button may finally come undone.</td>
</tr>
</tbody>
</table>
the use of commercially available inserts (in addition to those designed specifically for the product).

Exterior accessibility of absorptive inserts is hardly an option among current products. This forces users and caretakers to invade private spaces to make necessary garment/pad changes. Offering an external option, accessed from the lower façade, makes changing pads quicker, easier, and more discrete…all the while preserving the dignity of individuals by not breaching the integrity of private regions. As inserts absorb urine, the weight of the garment serves as a gravitational queue, suggesting the user attend a restroom and replace the used insert.

On a final note, crafting a higher-quality garment, embedding volumetric versatility, breathability, prioritizing material contortion to form, and changing the point of access, turns the diaper into a legitimate clothing item. Such a garment could very easily be exposed to the world, worn as a jogging or exercise short in tandem with more discrete preferences. In doing so, Superkat would not be found in the feminine hygiene and incontinence product aisle, rather placed among other clothing items—perhaps sports apparel—adorning both garment and user with a more dignified shopping and living experience.

Figure 36 - superkat, access point.
9.4 Takeaway

This exercise was an effort to prove that a functional reusable garment could be composed of both modern and traditional materials and eliminate the disposable diaper as a template for sustaining the incontinence industry. In thinking about the garment as a physiological supplement—to be applied as somewhat of an exterior organ—conceptualizing how wearable products should interact with users and serve as extensions of those users’ bodies becomes markedly different than merely damming urine flow with a diaper. While urine has traditionally been stopped and stored within the groin, as is easiest to do, it is not the most comfortable nor hygienic location. Continually ushering urine away from the groin using capillary action, and storing urine in layers apart from the skin not only reduces moisture—thus mitigating epidermal breakdown—but ensures bacterial infections are kept at bay.

Even though an SAP insert is still incorporated in this product example, using one component of disposable technology will nonetheless enable a reduction in diaper waste by 50%. Waste reduction is a positive outcome on two levels: reducing waste eliminates a number of related environmental insults (e.g. higher embodied energy, greenhouse gases), and enables the user to wear an emotionally connected undergarment, as opposed to their garment becoming a mass of SAPs and paper trash propped betwixt their legs. But in eliminating the disposable diaper as the majority of the waste, leaving urine to bear that addendum, it certainly inspires consideration of what urine is and whether it truly constitutes waste.

Taking into account the life-cycle of the product must also entail considering the life-cycle of the user and bodily waste. If a reduction of physical waste is being listed as one metric of evaluation for the efficacy of the product, so too should urinary waste be analyzed for its latent potential. This thorough consideration of all elements of incontinence, including that which may traditionally be overlooked as waste, seeks to establish further opportunities within the study of urological conditions, as well as apply nontraditional viewpoints lending dynamic suggestions for attending to structural and social stigma. Attempting to change the habitual
stigmatizing of incontinent populations cannot merely be left up to developing new, slimmer, or even reusable products, but must seek new connections within existing systemic structures.

10 Urine’s Nutritional Potential

Focusing on visualizing these systemic structural connections, I posit one such physical structure that engenders exclusion, the restroom, could yet again become the site for social advancement. In their current form, restrooms are depositories for human excreta. And since the advent of sanitation systems, human waste collection and its subsequent elimination from our daily lives has led to healthier communities, removing the physical proximity of dangerous microbes via wastewater treatment facilities in developed countries, and latrines and basic downstream techniques in developing countries. But this is a recent maturation in the handling of human excreta. For thousands of years, human waste was a valuable trade commodity in the Far East and fed directly into agriculture, enabling drinking water to remain unpolluted. In Yemen, urine is still drained and evaporated outside buildings, leaving dried excrement to be used as fuel. Aside from feces, urine has been used in a number of capacities; diluted and administered as fertilizer, laundry detergent, wound ointment, the tanning of hides, gunpowder production, and even as a therapeutic drink.

As it turns out, both food and human waste contain a highly valuable nutrient: Phosphorus. In addition to being “essential to life and serve[ing] multiple roles that sustain cellular vitality” phosphorus has a dirty side effect when released in concentrated amounts,
leading to excessive algae growth, thereby decreasing the oxygen content in water. The current approach for mitigating phosphorus concentrations in wastewater treatment and mining phosphorus for agricultural applications is likely to change with the acknowledgement that the supply of mined phosphorus is not unlimited; and the amount currently being flushed is wholly wasteful. In this modern era, a paradigm shift is arguably in motion, wherein the byproduct of humans’ urological process is no longer without value.

Looking to human urinary waste for phosphorus extraction poses an interesting thought. Perhaps creating a connection between an incontinence product—which already collects a seemingly valuable source of phosphorus—and agriculture would give both user and society pause from the worn-out notion that those with incontinence are “broken.” Such a union between systems could incidentally enable design considerations for urine collection, and effectively dispel conversations around normal or abnormal by changing the conversation entirely to reflect individual and resource value.

Outlining urine’s potential, it can be seen that urine has had more immediate applications than feces due to its relative sterility. But as somewhat of an environmental insult, it’s also been shown that urine possesses the majority of nutrients found in present domestic wastewater “80% of the nitrogen, 55% of the phosphorous and 60% of the potassium.” And yet, even with this nutritional value, it has been estimated only 20% of urban and 70% of rural human waste are actually returned to food production through waste management, the remainder being treated or dumped directly into the environment.

As populations continue to grow worldwide, urban areas are expected to support the majority of this growth, increasing the demand for current waste treatment methods and future

wastewater system innovations. Although much of the world does not currently rely on modern waste management facilities, developed countries do, leading to extensive efforts to cleanse the wastewater of excess nutrients before it can be dumped into rivers and oceans. Even with these facilities extracting excesses from wastewater, the nutritional overload caused by agricultural runoff creates “dead zones,” areas of water that are so logged with algae growth from phosphorus that little else can survive in such oxygen depleted environments.147

10.1 Closing the Loop

The nutritional hemorrhaging of industrialized agricultural societies is in part related to an “open phosphorus loop,” wherein resources are discarded or washed away due to an information deficient market that no longer realizes the value of its resources. For thousands of years, food production was largely sustainable based on a closed-loop phosphorous cycle, wherein crop residues, human and animal excreta, and flooding returned necessary nutrients to the soil. But with urban populations growing, megacities booming, and expectations of land

Figure 37 - Phosphorous mine, Morocco.

yield at new heights, fertilizers are highly sought after, amounting to 80-90% of the worldwide demand for phosphate rock.\textsuperscript{148} Estimates for current phosphate production suggest—like other natural resources—that it could peak by 2030, if it hasn’t already done so, and be exhausted in the next 50–100 years, resulting in catastrophic agricultural collapse and famine.\textsuperscript{149}

Considerable efforts need to be made in the area of phosphorus conservation and human waste management. With soils losing nutrients around the world, causing farmers to rely more heavily on artificially produced fertilizers, whose production is increasingly jeopardized by limited resources…innovative solutions are needed, requiring the dispelling of old notions of waste separation and eradication. The nutritional value of urine is inarguable, and failing to embed new sanitation infrastructure to capture this resource is an unaffordable waste.\textsuperscript{150}

As nutritional resources become strained, importing fertilizers will only get more expensive in developed and developing countries. The United States already imports most of its phosphorus from Morocco.\textsuperscript{151} Given this dilemma, it’s possible to look to urine as a national—equally natural—renewable resource. Urine is not only unlimited, but readily available, and pending an informed public, infrastructure and policy changes, could very easily and expediently be put to good use.

Steps for urine utilization are currently underway in a number of countries. The Rich Earth Institute in Brattleboro, Vermont recently earned the financial support of the USDA and EPA to research and develop urine fertilizing methods to be employed by farmers.\textsuperscript{152} Sweden introduced urine separating toilets in the early 1990s, both flushing and waterless. In this case, urine is generally collected in cisterns beneath homes to be pumped out and transported to farms for later use. In 2002, the Swedish town of Tanum launched an initiative requiring homes to

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have urine separating toilets.\textsuperscript{153} Another organization, Sustainable Organic Integrated Livelihoods (SOIL), works in Haiti installing composting and separating toilets.\textsuperscript{154}

\section*{10.2 Infrastructure}

Urine diversion strategies are more easily implemented among populations without existing sanitation infrastructure, therefore it is important to recognize the opportunity in creating a closed loop system, building upon potentially existent value of human waste. In developed countries, the change from an open to closed phosphorous loop poses a more difficult challenge, beginning with the politics of waste management and the cultural perception of waste as a threat to public health.

Scandinavia is already taking the lead with implementing pilot studies, but researchers at the Swedish University for Agricultural Sciences doubt urine recycling will become a part of large-scale farming in the developed world, due to the necessary massive changes to plumbing and treatment facilities. However, as users of incontinence products are not already incorporated into building and restroom design, discussions of amending existing waste systems do not necessarily apply in a strict sense. Rather, an entirely novel, ubiquitous and egalitarian system could emerge, built anew upon the notion that those with incontinence can contribute to waste mitigation and sustainable agriculture.


Superkat
Factoring incontinent users into larger systems mandates structural and visual changes to each stage within interrelated cycles of human waste and agriculture. In doing so, superkat saves 200,000 trees, reducing diaper-induced deforestation by 100%, and creates a physical domain for those with incontinence.

Phosphorous
Capturing urine at its source removes 80% nitrogen, 55% phosphorous, and 60% potassium from wastewater. Set to peak in 2030, phosphorous recycling from urine poses the most sustainable alternative to mining phosphate rock.
10.3 Further Development

In developing next-generation garments, higher performance should not merely denote greater functionality, comfort, and aesthetics, but sustainability through systemic ecological development. Revisiting the concept that a reusable incontinence product should act as an exterior organ, or physiological supplement, gradually drawing urine away from the groin into outer regions of the garment...perhaps disposing of an absorptive pad is just an intermediary step in the absence of larger systemic inclusion. This is where connecting an incontinence garment to agriculture could transcend traditional social stigma, in disarming labels through changing the metrics of valuation and empowering the user through a system designed for them.

Where recognition of the needs and discriminations against those with incontinence is lagging, establishing higher systemic connections—although seemingly disparate—could incentivize all levels of society, propelling the rights of those with incontinence and the argument for urine-capturing, to new realms of acceptability. Efforts to implement such a system would in turn entail financially motivating some stakeholders to alter both the physical and social structural environments based on a new valuing of urine.

Such a system would require further research and design in determining how a reusable garment, as proposed, could “connect” to a urine collection system separate from toilets and urinals. But by using the aforementioned Superkat as a potential template, inserts could be replaced by higher quality materials that disperse fluid over more of the garment’s surface area. The urine itself could then be completely contained within the garment, extracted by vacuum pump kiosks within restrooms.\footnote{Looking back at an idea in Table 2, it might make sense to filter urine...given that urine is 95\% comprised of water. Or to go ever further, atomizers (used in e-cigarettes and fog machines) might suspend excess water weight merely by changing the state of matter from liquid to gas. This in turn would reduce costs and energy in transportation to processing centers. Although it may be worthy of consideration, the former suggestion of filtering urine is only found on the International Space Station and is years from being commercialized. Chris Wilson, “The Yellow Liquid Diet: Is it a Good Idea to Drink Urine When Water is Scarce?” Slate, May 21, 2008, accessed on November 30, 2014, http://www.slate.com/articles/news_and_politics/explainer/2008/05/the_yellow_liquid_diet.html.} This method might make it easier for those with incontinence to expel urine (potentially easier than those who are continent).

Investigating urine’s potential is just one example of how embedding more consideration and empathy within incontinence products could yield higher levels of functionality in moisture...
mitigation, infection prevention, and social inclusion. Without a doubt, were this research taken further, similarly disparate yet oddly relevant findings would emerge.

Conclusion

What began as a somewhat benighted quest for a closer toilet, found its triviality dashed against the insurmountable misunderstanding of adult incontinence. In a traditional model, diapers are for the incontinent, both infant and adult. That alone sounds familiar and true, and for the many who know nothing more, incontinence—in all its “benign” existence—is hardly a concern. Yet for millennia, incontinence has not only affected, but come to define the very humanity—or misconstrued lack thereof—of millions of people, cast out by families, humiliated by societies, ignored by doctors, and marginalized by architects.

What has typically been regarded as common has also been discussed in books and articles, in somewhat less-than-encouraging terms, analyzing cause and effect, treatment and remedy, stigma and sympathy. The subject of incontinence is seemingly so mundane, it inhabits the annals of urological quarterlies, medical tomes, and anthropological periodicals. Not until Kimberly-Clark decided to spend millions of dollars advertising awareness (and in doing so, their own Depend line), did a culturally relevant, although somewhat elusive, commentary emerge—not that stigma exists, but that we, the continent, are the perpetrators of ignorance, inequality, and inexcusable exclusivity. Perhaps there is something capitalistically fatalistic and self-serving about Kimberly-Clark, a major corporation, pushing their campaign for change. Be that as it may, the climate for incontinence and discussions on socio-structural acceptance is beginning to warm to the idea that what exists is not enough.

This paper sought to follow that lead, investigating whether a single product could resolve, or at least glimpse, a better future for those living with incontinence. Admittedly, it may have done neither, but perhaps what it has done—where there were once dispersed
microscopies—is promoted a broader, united narrative of who these people are, what they feel, and the dignity they deserve.

Being aware of incontinence and all who wear diapers, is not enough. Rather, dignity may be engendered by vigilantly pursuing and delivering paradigmatic and systemic change, based on empathetic research, design, and socio-economic accountability. Such efforts can be the root of unforeseen opportunities to establish a different brand of visual culture, the embodiment of human rights via positive environmental reinforcement.

A reusable incontinence product is one such opportunity, at once seeking greater comfort and less waste while predicting growth in textile design and wearable technology. With developers making headway utilizing vacuum pumps for urine extraction and chemical inserts for urine analysis and biofeedback, the traditional function of diapers is being challenged. Coupled with the arrival of nanotechnology, which is yielding innovations in antibacterial fabric, absorptive fibers, and filtering mesh, the era of single-function disposable diapers is drawing to a close, and perhaps for good reason.

The disposable diaper in its current form, while a manufacturing marvel, uses twenty times more raw materials (including 200,000 trees each year), takes 500 years to decompose, leaches volatile organic compounds into the ground, and contributes to greenhouse gases. In addition to high levels of embodied energy and little recyclability, disposables still struggle to meet the needs of those who have urinary incontinence, and their design does little to mitigate stigma and promote acceptance of users within typically discriminating structural environments.

Link and Phelan’s advice to change stigma, that of being multifaceted and multilevel, addressed the mechanisms that can lead to disadvantaged outcomes. With incontinence, these mechanisms are blatantly obvious, founded on medical patriarchy, driven by social exclusivity,

galvanized by the diaper industry, and cemented by social and structural architects. One product cannot change this, yet it is one product that remains fixed within the social contextualization of incontinence. In re-envisioning the diaper, new paths will emerge and agency recognized.

In doing so, the diaper—once the signpost of incontinence and failing competence—can become the site of both product and social experimentation. In embedding more valuable material within a typically value-less product, does that change felt stigma? In creating an insert that must be systematically disposed, does that positively reference lost micturition habits? How does not feeling urine as a mass of gel between the legs influence self-confidence and social cohesion? These are but a few of the many questions that remain unanswered. And then there are the massive opportunities this garment could reveal.

Realizing a more dignified product through material quality and system design, such direction may create future opportunities for the incorporation of nanofibers and smart technology. More importantly, striving for a higher-performance product envisions connecting that object to other, albeit not-yet-existent, systems. Restrooms have yet to appeal to those with spinal injuries, caregivers, and all others in need of extra changing room. In fact, restrooms are just as single-functioned as the current disposable diaper, catering to those who flush. A setup of toilets and urinals is built entirely for the continent, leaving little room—outside the wider handicapped stall—for caretakers and those with incontinence. Where the western world is merely flushing valuable nutrients, appropriate incontinent solutions can pilot a more sustainable system—changing perceptions and benefitting agro-business.

Recognizing urine’s nutritional potential creates an opportunity in connecting those who store urine in garments to a larger closed-loop ecosystem. A reusable incontinence product can be modified so instead of filling a disposable insert, it is drained by vacuum pump kiosks. Those who have no need for urinals can simply “plug in” for urine extraction, thus disengaging from the establishment of one system, and connecting to that of another. This places greater value on urinary “waste” of those who manage incontinence, therein codifying both garment and urine as integral components to a multifaceted, user-centric recycling system—denoting incontinence as equally normative, catered to, and designed for.

Historically ignored, silenced, evicted and derided, individuals with incontinence will never see true unhindered equality until myriad measures are taken across a range of professional
sectors. While suggesting a reusable product could lay track for further innovations and social acceptance, this paper in no way intends the argument to lie superficially within one product, as so many have done before. What it does intend is for current simplified discussions around diapering, age, incompetence, bodily waste, virility, normalcy and so on...to be discontinued.

True change must come in admitting how we have erred, basing our identifications of humanity and those who are different upon a strict social code, dependent on recognizable self-control, status, and hegemonic power. This admission alone can engender greater efforts to devise meaningful products, as opposed to meaningless advertisements. This alone can determine whether a product truly empowers, both the individual and a higher complex system. This alone can revise the worn-out hierarchies: needs before wants, power before dignity, comfort before happiness. In truth, this paper seeks a legacy in binding the findings of an often splintered field so as a whole, transdisciplinary amalgam, they ultimately present a new, more promising possibility.
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**APPENDIX 1**

**Figure Sources**


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APPENDIX 2

Survey
1. What is your gender?
   a. Male  b. Female
2. What is your age?
   a. 18 – 24  b. 25 – 34  c. 35 – 44  d. 45 – 54
   e. 55 – 64  f. 65 – 74  g. 75 or older
3. Do you experience any degree of adult urinary incontinence?
   a. Yes  b. No
4. On a given day, you tend to leak…
   a. Rarely
   b. Sometimes
   c. Occasionally
   d. Continuously
5. What products do you use to treat this condition? (Choose all that apply.)
   a. Medication
   b. Legbag
   c. Absorptive Insert
   d. Foley Catheter
   e. Other…(please specify)
6. If you wear diapers, which product do you use?
   a. (Fill in)
7. How effective is this product? 1 = ineffective, 4 = works like a charm!
   1 2 3 4
8. Your current product makes you feel…(choose all that apply)
   a. Confident, proud, happy, youthful
   b. Uncomfortable, anxious, dependent
   c. Angry, embarrassed, isolated
   d. Comfortable, content
   e. Desirable, attractive, human
   f. Other…(please specify)
9. Your product makes incontinence…
   a. Unbearable
   b. Bearable
   c. More manageable than others
   d. Easy to overcome
   e. An absolute delight
   f. Other…(please specify)
10. What is your favorite attribute to your product? If you could have your way, what would you change about the product or cultural response to incontinence? (e.g. visibility, social acceptance, product design, health monitoring “smart” diapers, reusable product)