Can Timelessness through Prototypicality Support Sustainability? A Strategy for Product Designers

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Abstract: ‘Timelessness’ in design has been linked to environmental sustainability through an increased product lifetime-of-use. However, timelessness may be difficult for product designers to achieve. One approach to creating aesthetic timelessness is visual simplicity—yet ‘simple’ can be a challenge to define, let alone to create. Underutilized concepts from the field of cognitive psychology such as categorization levels and prototype effects shed light on the way our minds process visual meaning in everyday objects, and the cognitive efficiency found in these concepts may be interpreted as a type of simplicity. If designers apply these concepts to product designs to prolong positive aesthetic experience, product lifetime can potentially be extended. Products and contexts that are potentially suitable or unsuitable for this approach are identified and discussed.

Keywords: Aesthetics, Prototype Effects, Basic Level, Design, Emotional Sustainability

1. Introduction

In order to create environmentally sustainable products, designers must also consider the wider definition of sustainability. Familiar methods like wise materials selection, design for repair or reuse, and design for recycling are among the strategies that designers use to improve environmental sustainability (Ashby & Johnson, 2014). However, at the end of the product’s life cycle, the actual level of environmental sustainability that a product achieves may be determined by consumers’ willingness and initiative to fulfil the designer’s end of life intention for the design (Shim, 1995). Products that are also emotionally sustainable can motivate consumers to keep them longer, independent of conscious, environmentally driven decisions. Aesthetic experience strongly informs users’ emotional experience of a product, contributing to an overall positive user experience (McDonagh, 2017; McDonagh, 2016). Life stages also impact the value of particular belongings; as individuals we tend to acquire possessions in the earlier stages of our life and then begin to downsize towards the ‘autumn’ of our lives. Designers must ensure that products offer meaning and emotional connection for the user for a long as possible. Consumers buy meaning rather than function alone.
long lasting, or timeless, aesthetic experience that is insulated against changing styling trends is therefore critical to improving the emotional durability of products, environments, and experiences, and may lead to longer lifetimes-of-use.

Creating timeless aesthetics is not a straightforward task for the typical designer. Yet, while timeless aesthetics may be frequently associated with great beauty, this is not the only path to a prolonged positive aesthetic experience. Visual simplicity is another method of achieving timelessness that has been found in traditional Japanese aesthetics, as exemplified commercially by Muji, as well as in the work of other contemporary designers (e.g. Dieter Rams and Jonathan Ive). This type of visual sustainability finds the essence of the object—the point of abstraction that still represents the object’s nature, without excess. This essential level of abstraction in form can be contrasted with minimalism, which may reduce visual or functional features, but may not result in the assumed cognitive simplicity that can support a more positive user experience.

Finding simplicity remains elusive for many practicing designers—‘simple’ is actually quite difficult. However, research from cognitive psychology holds potential to aid designers in creating forms that are simple for our minds to interpret. Design for the goal of cognitive economy may be effective for creating the type of durable visual simplicity that can help to increase sustainability. Although there are different ways to achieve timelessness and simplicity, design for cognitive economy is the focus of this paper (figure 1).

![Figure 1. The path from cognitive economy to prolonged positive aesthetic experience that leads to increased sustainability.](image)

2. Timelessness as a Sustainability Strategy

Lifetime extension can mitigate some of the challenges associated with end-of-life scenarios in consumer products by reducing the frequency at which products are replaced and discarded. This is an underexploited but difficult strategy for sustainability, because there are multiple variables that affect consumer decisions to keep or discard products (Van Nes & Cramer, 2006). ‘Timeless’ qualities in designed products have been suggested as one positive influence that may contribute to lifetime extension; Lobos suggests four aspects to timelessness: appearance, efficiency, materials selection, and user experience (2014).

Aesthetic timelessness is not a common primary strategy to achieve a sustainable product outcome, despite the acknowledged role of changing fashion trends on consumption patterns by consumers (Parsons, 2016). Part of the reason why designers may not fully embrace aesthetics as critical to extending product lifetime is that it can be difficult to reliably create aesthetically timeless work.
Timeless appearance can potentially be achieved through several methods, but with varying levels of success.

‘Beautiful’ forms are one possible method of achieving timelessness. The Panton chair and Philippe Starck’s Alessi Juicy Salif citrus squeezer (figure 4) are examples product forms that may evoke a dramatic emotional response that is based on pleasure. Such an experience of form may partially isolate the formal beauty from the conceptual identity of the product, rendering it more sculptural than functional. These experiences of beauty may vary across individuals according to their personal tastes. The probability of achieving timelessness through this approach can be estimated as very low: compared to the sheer number of designs created and manufactured over the history of product design, such designs are relatively rare occurrences.

Nostalgia and other extrinsic values can also greatly influence aesthetic perception. Products that would not have been considered extremely beautiful at the time they were first produced can benefit from the influence of nostalgia on their aesthetic appraisal if they were historically innovative or otherwise culturally important. The Eames lounge chair (figure 4) is a significant design not only because of its form, but also because of the innovation of the plywood bending manufacturing technique that enabled it to be created (Eames, 1946). Values such as fine craft, innovation, and historical context can all contribute to aesthetic timelessness. However, it may not be possible for designers to routinely find ways to apply these insights to the design of new mass-produced products.

A more promising path to timelessness may be found by seeking simplicity, and this approach may be of more direct use to designers. Simplicity in aesthetic experience can influence sustainable everyday behaviour; this can be seen in some cultures, transcending individual aesthetic tastes. Everyday Aesthetics philosopher Yuriko Saito highlights the simplicity found in the Japanese aesthetic tradition, bringing it from the philosophical and ceremonial realm of the tea ceremony into the context of the everyday experience that is most relevant to designers:

“The Japanese aesthetic tradition is noted for its sensitivity to, respect for, and appreciation of the quintessential character of the object. This attitude gives rise to a guiding principle of design that articulates the essence of the object.” (2007, p.85)

Saito’s explanation of traditional Japanese aesthetic values shares similarities with the philosophies of some notable contemporary industrial designers who have been achieved aesthetic timelessness though simplicity, including Dieter Rams, Naoto Fukasawa, and Jonathan Ive. Although the cultural context may vary, these designers have found the essential character of the object in their work.

### 3. Simplicity versus Minimalism

Dieter Rams’ designs for Braun and Vitsoe achieve a visual simplicity that corresponds to the essential nature of the products, contributing to their timeless aesthetic (figure 4). In his ten principles for good design, Rams champions unobtrusive, long lasting design that is “as little design as possible” (2016). However, this simplicity is not the result of minimalism.

When design is framed within the classic dichotomy of form and function, some designers have sought a balance using minimalism. This results in either a reduction in the underlying functional complexity of a product to allow a simplified form, or abstraction of the form independent of underlying functionality. In some cases this occurs to an extreme, where the essence of the product and its intended interaction can be lost. Examples of minimalist designs based on reduced
functionality include the original Muji wall-mounted CD player (figure 4), where the primary functional interaction was a pull cord to turn the player on or off. The iPod Shuffle (figure 4) is another case of minimalism borne of reduced functionality. The device has reduced visual feedback about the operation and track navigation status. In both examples, the minimalism of the functional interactivity enables the resulting minimalist aesthetic.

In an alternate type of minimalism, the form of the product is visually abstracted to the point of disconnection with the representation of the product’s function, overall conceptual category, or both. In such cases, the form of the object fails to communicate some or all information about the nature of the product. The Phillips Wakeup Light (figure 4) is an example of this type of aesthetically driven minimalism. The form of the product, a disc, is abstracted to the point where its visual identity as an alarm clock is not apparent.

Extreme reductions in either form or function may be acceptable or even desirable for some types of products, but other products require more sophisticated interactions and interfaces to be preserved. Designing simple aesthetics for these products remains a challenge. The designs that Dieter Rams produced, such as the PC, SK, and T series audio players, incorporated several control features, yet still maintained a simple aesthetic that was true to the essence of the product (figure 4). The simplicity in Rams’ style is not the result of a reduction in the underlying functionality of the product, nor is it an extreme abstraction of the concept’s representation. Instead, the products achieve a level of abstraction that meets the basic expectations of the beholder, without excess. Rams balances form versus expectation.

If product forms exist on a spectrum between highly abstracted minimalism and highly decorative complexity, at some point along that spectrum is a level of form abstraction that conveys the basic essence of the object, without excess (figure 2). Designs that have achieved this type of essential, timeless simplicity include the 2016 Lensvelt and Space Encounters “Boring Collection” that was self-described as “archetypal, straightforward, and discreet” (“Boring Collection by Space Encounters”, n.d.). MacBook laptops designed by Apple (figure 4) also achieve a level of conceptual abstraction that is simple, but again, not as the result of minimalism (Shelley, 2015).

Housewares brand Muji is particularly successful at finding this point of essential abstraction. On the company website, Muji describes the products as,

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1 This is a design created by Naoto Fukasawa that utilizes minimalism, in contrast to many of his other designs, which are simple but not minimalist.
“...succinct, but they are not in the minimalist style. That is, they are like empty vessels. Simplicity and emptiness yield the ultimate universality, embracing the feelings and thoughts of all people.” (“What is MUJI?”, n.d.)

Notable designs include the toaster and rice cooker appliance designs by Fukasawa; the difference in approach to simplicity in these designs can be seen when contrasted with his minimalist CD player design (figure 4). Though Fukasawa employs different approaches to aesthetics, he has often embraced a “Super Normal” philosophy, stating, “I believe that representations of decorativeness or ornateness for the sake of appreciation are far-removed and separate from useful beauty” (Fukasawa & Morrison, 2007, pp. 106-107). Fukasawa’s Deja-vu table and chair designs for Magis (figure 4) embody the ‘essential’ level of abstraction that eschews excess decorative elements.

Dieter Rams, Naoto Fukasawa, and others have been able to create products that embody timeless simplicity by designing to an essential level of abstraction. An understanding of this essential level of abstraction in timeless forms may help practicing designers to better achieve aesthetic sustainability in new product designs. Theories from cognitive psychology that describe how people mentally categorize objects can assist designers in understanding use of abstraction in their own work, leading to designs that are easier for users to interpret visually.

4. Essential Abstraction: Basic Level and Prototype Effects

Psychological research about categorization can help product designers to understand the role of abstraction in the minds of users, and how this can translate to visual simplicity and cognitive economy. In the 1970s, psychologist Eleanor Rosch and others advanced our understanding of how people organize mental concepts into hierarchies based on levels of abstraction. This work demonstrated that some types of conceptual categories are more efficient, or simple, for the mind to interpret than others, and that this is true regardless of the how people actually mentally encode the concepts (Rosch, 1978).

4.1 Basic Level Categories

Rosch identified three levels of hierarchy in mental conceptual categories: superordinate, basic, and subordinate (Rosch, 1978) (Figure 3). Basic level categories are the most mentally “economical” of the three, meaning that they require fewer cognitive resources to process.

At the basic level of categorical abstraction, one mental image can serve to represent a whole category of objects (Ibid.). For example, the conceptual category of ‘chair’ can be easily imagined. In contrast, the superordinate level is too broad, or abstract, to be represented by a single mental image. An example would be the category ‘furniture’; many shapes, sizes, and functions of forms belong within this category, and many objects or groups of objects must be imagined. Lastly, the subordinate level of abstraction is more specific and detailed than the basic level. “Kitchen chair” and “rocking chair” are examples of subordinate levels of abstraction (Rosch et al., 1976; Lakoff, 1987).

We all have some intuitive understanding of “basic” objects; members of a basic level category have similar shapes. Rosch found that when the outlines of member forms are averaged, basic level categories are still identifiable by subjects in experiments (Rosch, 1978). This is also the level of abstraction where people react most quickly when asked to identify an object’s membership within a category; children first learn basic level categories as they gather knowledge about the world (Rosch et al., 1976).
4.2 Prototype Effects

Within categories of objects, there are some members that are ‘better’ examples than others. Best examples within a given category are called prototypes. Prototypes hold cognitive privileges over worse examples in a category—these privileges include faster processing times and a greater likelihood of being recalled from memory (Rosch et al., 1976), suggesting that interpreting these examples is a simpler process for users. Prototypes are preferred over less prototypical members of a category, partly because they are related to fluency, or speed and efficiency in mental processing that is due to familiarity (Winkielman et al., 2006).

**Superordinate category:** Furniture

![Image of furniture categories]

**Basic category:** Chair

![Image of chair categories]

**Subordinate categories:** Specific types of chairs

![Image of specific chair types]

*Figure 3. Levels of abstraction in categorization as defined by Rosch et al. 1976*

Prototypes act as “cognitive reference points” (Rosch, 1975); designers may be able to employ these reference points when developing their own work. Prototypes are not a specific type of mental representation or encoding of a concept, but are instead, according to Rosch, “just those members of a category that most reflect the redundancy structure of the category as a whole” (Rosch, 1978, p. 37). According to Rosch,

“...the more prototypical a category a member is rated, the more attributes it has in common with other members of the category, and the fewer attributes it has in common with members of contrasting categories.” (Ibid.)

The idea of the prototype as a cognitive reference point for the essence of a product is illustrated via an anecdote from artist Jasper Johns when he was creating the sculpture *Flashlight*(1960) during a key period in the proliferation of mass-produced objects:

“I had a particular idea in my mind what a flashlight looked like and I wanted to go and buy one as a model. I looked for a week for what I thought looked like an ordinary flashlight, and I found all kinds of flashlights with red plastic shields, wings...
on the sides ... and this made me very suspect of my idea, because it was so difficult to find this thing I had thought was so common.” (Sylvester, 2001, p. 152)

Prototypes are not the same as archetypes, a term sometimes used in design; rather than an embedded, innate, or universal concept, prototypes are developed as a combination of examples that people encounter over time, and may change as new examples are encountered. This suggests that designers seeking prototypicality in their designs for the purpose of increasing aesthetic sustainability should reference examples of a given product category within the cultural context of the intended market, emphasizing the most redundant traits that have existed over a long period of time.

4.3 Preferences for Prototypes in Products

Research into the relationship of prototypicality to product preferences has found that prototypicality exerts an influence on aesthetic liking, at least in initial product experience. Whitfield & Slatter (1979) conducted a furniture selection experiment with Georgian, modern, and art nouveau furniture and found that aesthetic preferences for furniture styles were dependent on mental categorization and prototypicality. In a follow up experiment, prototypicality was found to be more influential on aesthetic preference than the level of arousal from visual complexity (Whitfield, 1983). Veryzer & Hutchinson (1998) found that when products were perceived as less typical, they were also less preferred.

Support for preferences for prototypes have been found in other experiments, although the relationship is less straightforward. Hekkert et al. studied the relationship between novelty and prototypicality in products and found that while both factors contribute to aesthetic preference, each mitigated the other’s effect (2003). The experimenters also found that the level of expertise in form evaluation (i.e. designers versus non-designers) did not change the effects of prototypicality or novelty on preferences (Ibid.). Other experimenters found an aesthetic preference for a mid-level of prototypicality, and a lower preference for extreme prototypicality; this was attributed to a lack of opportunity for problem solving by users in new products (Blijlevens et al., 2012). This is notable for the possibility that over a longer period of time, the effects of any initial preferences for novelty or problem solving opportunities might attenuate, which has implications for the goal of sustainability.

The effects of prototypicality on aesthetic preference in products over time are not well explored in experimental research. Experiments that consider the nature of user aesthetic experience over an entire product lifetime could help better understand the relationship of prototypicality, timelessness, and sustainable behaviour that is implied by the experience of designers and existing experimental research.

5. Limitations and Discussion

It is unlikely that any one method will solve all the challenges that practicing product designers face in creating environmentally sustainable products, and this is particularly true of using prototypicality as a design goal. While designing for timeless, simple aesthetics can help contribute to sustainable products, there are also limitations to this approach.

Products are introduced to the market at an increasingly faster rate than previous product generations. New, novel examples of forms, or even functional shifts in a product category, may change and influence the cognitive reference point for a product type. In this way, prototypes are to some extent dynamic (Schmid et al., 2013). The best-case scenario for an extension of product lifetime through prototypical form simplicity might be very long, indeed, but it is also possible that in
a case where a novel and highly influential design shifts the prototype or creates a new category, the hypothetical lifetime extension may be a shorter period. The introduction of the Dyson cyclone cleaner, with transparent dust collection, constituted such a paradigm shift for the more traditional upright product category (figure 4).

There are some situations where the use of prototypicality is a moot exercise entirely. For product categories where a brand or an individual design is dominantly iconic, the central tendency of the category may be strongly skewed toward that product’s aesthetic. Designing to a prototype would mean copying the iconic design. The Kitchen-aid stand mixer (figure 4) in the U.S. market is an example here. This form is so strongly identified with the product category that it holds greater weight than other examples on the market.

Alternatively, product categories may be so new that there are no other exemplars of a product type, making this approach impossible for a designer. However, designers may consider making use of visual metaphor when designing new product categories, using typical attributes from existing categories to suggest meaning and interaction.

A number of other factors may override the effects of prototypicality when it comes to personal keeping or discarding behaviour. Anything with a very short intended life cycle would likely see reduced effects for prototypicality on sustainable behaviour. This includes disposable products. Similarly, cellular phones and other electronics are created on a cycle of planned obsolescence, where the product users no longer have full functionality if they do not upgrade. Thus personal electronics would probably not be good targets for prototypical aesthetics from an environmental sustainability perspective; technical obsolescence is likely a much stronger factor than prototypicality.

If a product is in functional disrepair, or is otherwise not meeting user needs, it is still prone to discarding. It is possible that the tendency toward a preference for prototypes could contribute toward a willingness to repair or upgrade a product, but whether this is the case is unknown. Emotional attachment and personal value systems about objects would likely interfere with the effects of prototypicality in these scenarios.

Products need to satisfy not only functional needs (e.g. help complete a specific task) but also satisfy supra-functional needs. These include cultural, social, emotional and spiritual. An example of a disconnect, from a supra-functional perspective, would be an unwanted Christmas gift/present that might be an extremely effective warm piece of clothing. However, the potential consumer is repelled from ever wearing it because it is does not reflect their image of themselves that they are trying to communicate to others. Emotional attachment is a significant influence in personal behaviour when it comes to objects, and keeping and discarding behaviour varies over a spectrum from extreme hoarding to extreme discarding. Good or bad personal associations with objects may also change keeping or discarding decisions. Some personal philosophies of simplicity, such as that of popular author Marie Kondo, advocate discarding objects that do not “spark joy” in the owner (Kondo & Hirano, 2014). Artefacts that represent a moment in time, a lost relative, or a personal achievement become some of the hardest objects to discard, regardless of their functionality. Yet, as our relationships may change over time, we can discard that once precious wedding ring as the process towards divorce begins.

The ultimate quest for the designer is to create objects that last the lifetime of the user, accommodating their changing needs over many life spans. Consider the relatively small group of possessions we begin life with and end life with. It would be remarkable if our consumption were limited a handful of truly precious and long lasting objects.
6. Conclusions

There are many examples of timelessness simplicity, from Japanese traditional aesthetics, to Braun, Muji, and Apple products. Though minimalism may be one way to characterize these designs, their simplicity might be better explained as the level of abstraction where the basic representation of the product category is maintained in its form. Concepts from cognitive psychology like basic level effects and prototype effects can help designers understand where that level of abstraction occurs. Designing to the prototype, or best example of a product category, is one way to find simplicity without losing the essence of the product.

Prototypes are based on the integration of many encountered examples of a category over time into a cognitive reference point. Prototypes are easy for people to mentally process, and people show aesthetic preferences for prototypes, partly because they are so easy to interpret. While experimental methods have not yet validated the role of prototypicality in sustainable behaviour, designers can reference the idea of prototypicality as a tool to create timeless aesthetics in functional objects.

Prototypicality as a sustainability strategy must be applied judiciously. There are some product categories or contexts that are unlikely to benefit from this approach to aesthetics. There are also practical and emotional influences that might mitigate the positive behavioural effects of timelessness in design. However, there are scenarios where timelessness could create positive impact. Using prototypicality as a reference to create timeless design is one available strategy to positively influence consumer behaviour toward sustainable behaviour, and to create more meaningful and longer lasting consumer-product relationships.
Figure 4. Top Row: Panton chair, left, Juicy Salif Citrus Squeezer, centre, Eames lounge chair, right; Second Row: MUJI CD Player, left, Apple iPod Shuffle, centre, and Philips Wake Up Light, Right; Third row: MUJI Toaster, left, Apple MacBook Pro, centre, Braun SK-6, right; Bottom row: Magis Deja-vu stool, left, Dyson DC-07 Vacuum, center, Kitchen Aid Artisan mixer, right.

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References

Ashby, M. F., & Johnson, K. (2014). Materials and design: the art and science of material selection in product design. Oxford, UK: Butterworth-Heinemann.

Boring Collection by Space Encounters (n.d.). Retrieved December 02, 2016, from http://space-encounters.eu/work/boring-collection/

Blijlevens, J., Carbon, C. C., Mugge, R., & Schoormans, J. P. (2012). Aesthetic appraisal of product designs: Independent effects of typicality and arousal. British Journal of Psychology, 103(1), 44-57. doi:10.1111/j.2044-8295.2011.02038.x

Eames, C. (1946). U.S. Patent No. 2,395,468. Washington, DC: U.S. Patent and Trademark Office.

Fukasawa, N., & Morrison, J. (2007). Super normal: Sensations of the ordinary. Baden: Lars Müller.

Hekkert, P., Snelders, D., & Wieringen, P. C. (2003). ‘Most advanced, yet acceptable’: Typicality and novelty as joint predictors of aesthetic preference in industrial design. British journal of psychology, 94(1), 111-124. doi:10.1348/000712603762842147

Kondo, M., & Cathy Hirano. (2014). The life-changing magic of tidying up: The Japanese art of decluttering and organizing. Berkeley, Calif: Ten Speed Press.

Lakoff, G. (1987). Women, fire, and dangerous things: What categories reveal about the mind. [Kindle version]. Retrieved from http://amazon.com

Lobos, A. (2014, October) Timelessness in sustainable product design. In J. Salamanca, P. Desmet, A. Burbano, G. Ludden, J. Maya. Proceedings of the Colors of Care: The 9th International Conference on Design & Emotion. Paper presented at Design & Emotion 2014: 9th International Conference, Bogota, Colombia (169-176). Bogota, Colombia: Ediciones Uniandes.

McDonagh, D. (2017). Emotional sustainability. In Jonathan Chapman, Sustainable Design, Ablington, UK: Routledge. (in print)

McDonagh, D. (2016). “How Products Satisfy Needs Beyond the Functional: Empathy Supporting Consumer-Product Relationships.” In Penny Sparke and Fiona Fisher, The Routledge Companion to Design Studies, 282-290. Ablington, UK: Routledge.

Parsons, G. (2016). The philosophy of design. Cambridge, UK: Polity Press.

Rams, D. (2016). Good design | About Vitsoe | Vitsoe. Retrieved December 02, 2016, from https://www.vitsoe.com/gb/about/good-design
Rosch, E. (1975). Cognitive reference points. *Cognitive Psychology, 7*(4), 532–547. http://dx.doi.org/10.1016/0010-0285(75)90021-3

Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology, 8*(3), 382–439. http://dx.doi.org/10.1016/0010-0285(76)90013-X

Rosch, E. (1978). Principles of categorization. In E. Rosch & B. B. Lloyd (Eds.), *Cognition and categorization* (pp 27–48). Hillsdale, NJ : Lawrence Erlbaum Associates, Publishers.

Saito, Y. (2007). The moral dimension of Japanese aesthetics. *The Journal of Aesthetics and Art Criticism, 65*(1), 85-97. doi:10.1111/j.1540-594X.2007.00240.x

Schmid, U., Siebers, M., Folger, J., Schnellner, S., Seuβ, D., Raab, M., Carbon, C.C, & Faerber, S. J. (2013). A cognitive model for predicting esthetical judgements as similarity to dynamic prototypes. *Cognitive Systems Research, 24*, 72-79. http://dx.doi.org/10.1016/j.cogsys.2012.12.002

Shelley, C. (2015). The nature of simplicity in Apple design. *The Design Journal, 18*(3), 439-456. http://dx.doi.org/10.1080/14606925.2015.1059609

Shim, S. (1995). Environmentalism and consumers' clothing disposal patterns: an exploratory study. *Clothing and Textiles Research Journal, 13*(1), 38-48.

Sylvester, D. (2001). *Interviews with American artists*. New Haven: Yale University Press.

Van Nes, N., & Cramer, J. (2006). Product lifetime optimization: a challenging strategy towards more sustainable consumption patterns. *Journal of Cleaner Production, 14*(15), 1307-1318. http://dx.doi.org/10.1016/j.jclepro.2005.04.006

What is MUJI. (n.d.). Retrieved November 26, 2016, from http://www.muji.com/us/about/

Whitfield, T. W. A., & Slatter, P. E. (1979). The effects of categorization and prototypicality on aesthetic choice in a furniture selection task. *British Journal of Psychology, 70*(1), 65–75. doi:10.1111/j.2044-8295.1979.tb02144.x

Whitfield, T. W. A. (1983). Predicting preference for familiar, everyday objects: An experimental confrontation between two theories of aesthetic behaviour. *Journal of Environmental Psychology, 3*(3), 221–237. http://doi.org/10.1016/S0272-4944(83)80002-4

Veryzer, R. W., & Hutchinson, J. W. (1998). The influence of unity and prototypicality on aesthetic responses to new product designs. *Journal of Consumer Research, 24*(4), 374–394. http://doi.org/10.1086/209516

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