

COLOR LIGHTNESS AND INTER-ITEM HIERARCHY: WHEN PEOPLE ASSOCIATE  
DARKER COLORS WITH HIGHER HIERARCHICAL ITEMS AND LIGHTER COLORS  
WITH LOWER HIERARCHICAL ITEMS

by

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Dissertation

Submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy in Marketing at  
The University of Texas at Arlington  
August, 2019

Arlington, Texas

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## ABSTRACT

# COLOR LIGHTNESS AND INTER-ITEM HIERARCHY: WHEN PEOPLE ASSOCIATE DARKER COLORS WITH HIGHER HIERARCHICAL ITEMS AND LIGHTER COLORS WITH LOWER HIERARCHICAL ITEMS

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The University of Texas at Arlington, 2019

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While a rich collection of literature demonstrates the influence of packaging color on consumer decision making, little is known about how packaging color affects consumer behavior for bundled products. Bundled products are defined as two or more items in a single package for a special price. Often bundles consist of items with varying hierarchy: a higher-hierarchical product paired with a lower-hierarchical product (e.g., a fabric detergent and a fabric softener). I argue and show that there is a universal association between color lightness of the products' packages and the perceived inter-item hierarchy, with darker packaging signifying a higher hierarchical product (e.g., a fabric detergent) and a lighter packaging signifying a lower hierarchical one (e.g., a fabric softener). I also posit that there is a positive congruence effect when color lightness of the products in bundle matches this inter-item hierarchy. The aim of this research is not only to establish this congruence effect, but also to investigate its key drivers and moderators. Across nine studies, I demonstrate that consumers prefer congruent (vs. incongruent) product bundles where a higher hierarchical product is in darker packaging and a lower

hierarchical product is in lighter packaging. Delving deeper into the process, I argue that structure-seeking tendency induces greater preference toward congruent bundles. Consumers who are situationally provoked to structure-seek, or those who are chronically high in need-for-structure display greater color congruency effects.

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# CHAPTER 1

## INTRODUCTION

“Colors speak all languages.”

-Joseph Addison (1672 – 1719)

It is impossible to live a life colorlessly. Everything we see has color. However, colors are not only affecting our eyes, but also our minds. Given that we are surrounded by colors, color has been studied as an important tool in marketing and shown to affect consumer psychology. For example, blue and red influences consumers on brand personality perceptions differently. However, what is surprising is little academic research has investigated the role that color lightness plays in marketing. For example, consumers may perceive a product colored in dark-blue differently from the one colored in light-blue. In this dissertation I examine the importance of color lightness in marketing.

### 1.1 Brief Overview of Color

Color demands light and our eye. When waves strike the bananas, some are observed and some are reflected. We see the reflected waves and call them yellow. There are three dimensions of color: hue, saturation and value (Hagtvedt and Brasel 2016; Labrecque, Patrick and Milne 2013). Hue is any single color on the spectrum (e.g., red, orange, yellow, green, and blue). Saturation is the intensity of a color meaning that highly saturated colors appear to advance and dull saturated colors appear to recede (Hagtvedt and Brasel 2017). Color lightness, or *value*, is the

relative lightness of a color. High value colors are lighter and low value colors are darker (Hagtvedt and Brasel 2017).

*Color Psychology.* Researchers have demonstrated how different color hue affect consumers' psychology through the lens of wavelength and arousal (Elliot and Maier 2013). For example, red and orange which have longer wavelength are demonstrated to be perceived as warm, whereas green and blue which have shorter wavelength are demonstrated to be perceived as cool (Nakashian 1964). Also, Frank and Gilovich (1988), posit that black are thought to be associated with negative concepts such as evil which result in more aggressive behavior toward others. Also, previous research has demonstrated that red is associated with happiness while blue is associated with sadness, and that these perceptual association leads people to process information differently (Soldat et al. 1997). Table 1 describes a comprehensive overview about various color hues and their perceived meanings.

Color	Color Psychology
Red	Warm. Stimulating. Intense. Outward focus
Blue	Cool. Relaxing. Inward focus. Calm. Stable
Green	Balanced. Growth. Luck. Cool. Relaxing.
Yellow	Cheerful. Joy. Femininity. Warm. Lively.
White	Purity. Peace. Youth. Truth. Absence
Black	Evil. Darkness. Sorrow. Sad. Death.
Gray	Wisdom. Boredom. Dullness. Respect
Orange	Happy. Enthusiastic. Warning. Desire
Brown	Earthy. Environmental. Tradition. Natural.
Pink	Femininity. Innocence. Flirtatiousness. Sweet.

Purple	Royalty. Humility. Wisdom. Pride
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Table 1. Overview of Color and its associations.

Previous researchers have explored the different impact of one color hue as compare to other color hue (red vs. blue). For example, Elliot and colleagues (2007) proposed that individuals who viewed red performed worse than those who viewed green in math tasks. Also, it was suggested that blue is more beneficial for tasks that require creativity than red (Mehta and Zhu 2009). Akers et al. (2012) have demonstrated that individuals who viewed green during a cycling task perceived less exertion than those who viewed red.

Extant research has suggested that color is an important marketing tool to affect consumer perceptions (Labrecque and Milne 2012). Color has been shown to have an impact on consumers' advertising perceptions (Gorn et al. 1997), on consumers' perceived website loading time (Gorn et al. 2004), and on brand perceptions such as brand personality (Labrecque and Milne 2012). Also, it was demonstrated that color is an important component in package design (Garber, Burke and Jones 2000), and logos (Bottomley and Doyle 2006).

## 1.2 Importance of Color Lightness

Research has established that perception of lightness is a fundamental variable in visual perception and stimulus interpretation (Grady 1993; Woods and Wilcox 2006). Woods and Wilcox (2006) suggest at birth infants can process objects' color lightness (but not hue) information and identify shapes accordingly. Although, color lightness play a vital role in stimulus interpretation (Grady 1993), most color research focuses on the effects of hue (Bagchi and Cheema 2012; Mehta and Zhu 2009).

Researchers have consequently begun to investigate the influence of color lightness on various perceptions. One such line of inquiry has demonstrated the relationship between color lightness and perceived physical properties such as weight and size (Labrecque, Patrick, and Milne 2013; Nakatani 1989; Walker, Francis, and Walker 2010). According to Walker et al. (2010), for example, consumers perceived darker colored objects to be heavier than lighter colored objects. Darker colors have also been shown to be associated with masculine names, while female names were associated with feminine names (Semin and Palma 2014). In terms of emotional reactions, dark colors were shown to be positively related with ruggedness and dominance (Valdez and Mehrabian 1994) negatively correlated with sophistication. Table 2 describes a comprehensive overview about research on color lightness.

Color Lightness	Associations (as color gets lighter)
Lightest	<ul style="list-style-type: none"> <li>• Good (vs. bad)</li> <li>• Lighter weight (vs. heavier weight)</li> </ul>
Light	<ul style="list-style-type: none"> <li>• Perceive room to be larger (vs. smaller)</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• Perceive greater calming effect</li> <li>• Perceive greater sophistication</li> </ul>
Dark	<ul style="list-style-type: none"> <li>• Link with female names (vs. masculine names)</li> </ul>
Darkest	<ul style="list-style-type: none"> <li>• Elicit more positive in-the-moment emotional response</li> </ul>

Table 2. Overview of the findings



### 1.3. Contributions

The current dissertation is grounded in the previous finding that the darker (less light) colors induce feelings of dominance and strength (Valdez and Mehrabian 1994), but shifts the concentration to examine the role of comparative color lightness (darker vs lighter) of the two products within the bundle, which is uncharted area in marketing literature. Specifically, this research demonstrates on how color lightness of a product package in a bundle can act as a cue of inter-item hierarchy to consumers. Because darker colors elicit feelings of dominance, this paper seeks to show that darker-colored (vs. lighter colored) product in a bundle leads to inferences of higher (vs. lower) hierarchy.

This dissertation also builds upon congruence effect frameworks. Specifically, previous research has demonstrated that people perceive congruent stimuli to be more favorable than incongruent stimuli. This work proposes that bundles that include a higher hierarchical item (e.g., a shampoo) colored darker and a lower hierarchical item (e.g., a conditioner) colored lighter are preferred by consumers.

Furthermore, this research shows that the proposed association between color lightness and perceptions of hierarchy is mainly driven by consumers' desire to seek structure. Specifically, this work suggests that consumers who are highly motivated to seek structure make stronger associations between color lightness and perceptions of hierarchy. Because of this enhanced association, people with high desire to seek structure will prefer the congruent bundles more than people with low desire to seek structure.

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## CHAPTER 2

### **COLOR LIGHTNESS AND INTER-ITEM HIERARCHY: WHEN PEOPLE ASSOCIATE DARKER COLORS WITH HIGHER HIERARCHICAL ITEMS AND LIGHTER COLORS WITH LOWER HIERARCHICAL ITEMS**

Imagine that you are taking a shower, having water coming out of a shower head and getting your hair all wet. You know there is a shampoo and a conditioner near you; one is in a darker packaging and the other one is in a lighter packaging. In the steamy haze of falling water you cannot read the label of the packages. Without knowing which product is what color, we conjecture that you will probably reach out for the darker bottle, assuming it to be the shampoo. Why?

Packaging color plays a major role in attracting consumer attention, influencing choice and post-purchase satisfaction (Ares and Deliza 2010; Deliza and FacFie 1996). Numerous studies confirm the effect of packaging color on consumer expectations (Ares and Deliza 2010; Ares, Piquera-Fiszman and Varela 2011; Cheskin 1957; Deliza, Macfie and Hedderley 2003; Marshall, Stuart and Bell 2006; Piqueras-Fiszman, B., and Spence, C. 2011). Hurried consumers often ignore the information written on packages (Charters, Lockshin and Unwin 1999; Lith 2015). Instead, they draw inferences about the product and its attributes from the visual cues associated with the packaging itself (Becker, van Rompay, Schifferstein and Galetzka 2011). Packaging color conveys important cues about product attributes (Piqueras-Fiszman, B., and Spence, C. 2011). For instance, Deliza and MacFie (2001) showed that consumers determine sweetness of product solely based on packaging color.

While a rich collection of literature demonstrates the influence of packaging color on consumer decision making, little is known about how packaging color affects consumer behavior for bundled products. Bundled products are defined as two or more items in a single package for

a special price (Guiltinan 1987; Janiszewski and Cunha 2004). Specifically, we are interested in the bundled products which consist of two specific items: a primary product paired with a secondary product. A number of examples of this marketing practice can be easily found. For example, there are bundled products such as a shampoo paired with a conditioner, or a detergent paired with a fabric softener (Sinitsym 2012). When primary and secondary products are presented together to consumers, the company's choice of color combinations is a crucial product decision. Color combinations include more than one color stimulus being perceived simultaneously – a topic which has not been studied widely and intensively.

We examine the role of comparative color lightness (darker vs lighter) of the two products within the bundle where one of the products is more primary (e.g., fabric detergent) while the other is secondary (e.g., fabric softener). We argue and show that there is a universal association between color lightness of the products' packages and the perceived inter-item hierarchy, with a darker packaging is associated with a higher hierarchical product (e.g., fabric detergent) and a lighter packaging is associated with a lower hierarchical product (e.g., fabric softener). We also posit that there is a positive congruence effect when color lightness of the products in bundle matches this inter-item hierarchy. The aim of this research is not only to establish this congruence effect, but also to investigate its key drivers. Across 9 studies, we show that people prefer congruent (vs. incongruent) product bundles where a higher hierarchical product is in a darker packaging and a lower hierarchical product is in a lighter packaging. Delving deeper into the process, we demonstrate that people's desire to seek structure induces greater preference toward congruent bundles.

## **THEORETICAL BACKGROUND**

## Color lightness

There are three dimensions of color: hue, saturation and value (Hagtvedt and Brasel 2016; Labrecque, Patrick and Milne 2013). Hue is any single color on the spectrum (e.g., red, orange, yellow, green, and blue). Saturation is the intensity of a color meaning that highly saturated colors appear to advance and dull saturated colors appear to recede (Hagtvedt and Brasel 2017). Color lightness, or *value*, is the relative lightness of a color. High value colors are lighter and low value colors are darker (Hagtvedt and Brasel 2017). Despite the importance of color lightness, much of consumer research on color has focused on the effects of specific hues or hue categories. However, color lightness has an equally important or even greater influence on perceptions and behavior compared to color hues (Madzharov, Ramanathan and Block 2016).

Previous research has demonstrated the impact of color lightness on the perception of physical properties such as weight and size (Gundlach and Macoubrey 1931; Labrecque, Patrick and Milne 2013; Nakatani 1989; Tom, Barnett, Lew and Selman 1987; Walker, Francis and Walker 2010). For instance, pastel-colored vacuum cleaners were perceived as weighing less than darker-colored vacuum cleaners because people have a tendency to relate lighter color with lighter weight (Tom et al., 1987). According to Valdez and Mehrabian (1994), darker colors induce greater feelings of dominance in viewers. Labrecque and Milne (2012) demonstrated that darker colors are positively correlated with the ruggedness dimension of brand personality. In their study, participants who viewed the darker brand logo rated the brand to be more rugged than participants who viewed the lighter brand logo. Not only that, people processed male names faster with darker typeface and female names faster with lighter typeface (Semin and Palma 2014).

Thus, given that prior research has documented that consumers find darker-colored objects heavier, dominant, rugged, and masculine than lighter-colored objects, we argue that consumers are going to associate color lightness with inter-item hierarchy. More formally:

**H1:** People will associate a higher hierarchical item with darker colors and a lower hierarchical item with lighter colors.

### Congruency Effect

Previous research has demonstrated that people perceive congruent stimuli to be more favorable than incongruent stimuli (Lith 2015; Van Rompay and Pruyn 2011; Van Rompay, Pruyn and Tieke 2009; Veryzer 1993). When visual stimuli are perceived as congruent, consumers process it more easily. Research suggest that fast and effortless processing of information is experienced as more pleasant and positive (Lee and Labroo 2004; Reber, Schwarz and Winkielman 2004). For instance, congruent bottles (for both shape and typeface connoting masculinity) were liked more and valued higher than incongruent bottles (shape connoting masculinity and typeface connoting femininity or vice versa) (Van Rompay and Pruyn, in press). Van Rompay et al., (2010) found that participants evaluated the hotel more positively when hotel picture and hotel description were both about coziness or modernity rather than one say coziness and the other say modernity. Similarly, consumers evaluated the product more positively when the shape of a bottle (natural vs artificial) and slogan of the product (natural vs artificial) were congruent than incongruent (Van Rompay, Pruyn and Tieke 2009). Hekkert (2006) established the importance of congruence among visual design elements in product design. In previous work, Van Rompay and Pruyn (2011) propose that congruent stimuli also facilitate processing and

contribute to positive evaluations of products and their corresponding brands. According to Reber et al., (2004), packages are seen as true and more credible when they are perceived as congruent. Furthermore, Van Rompay and Pruyn (2011) found that people expect congruent stimuli to be more expensive and exclusive, because they are seen as more attractive.

Consumers confronted with products are supposed to integrate meanings represented across product elements and make an overall judgment. When visual stimuli are perceived ambiguous due to mixed signals, consumers get confused resulting in negative product evaluations (Hekkert 2006). Also, Cardello and Sawyer (1992) showed that a mismatch between the expected and actual attributes of the product can result in a negative disconfirmation of expectation. Given this high regard for congruency in consumer preference formation, and our previous proposition that darker color is associated with higher hierarchy(H1), we formally hypothesize:

**H2:** People will prefer a congruent bundle, where a higher hierarchical item is darker than a lower hierarchical item, over an incongruent bundle where a higher hierarchical item is lighter than a lower hierarchical item.

## Structure Seeking

People live in an indiscernibly complex world experiencing excessive information every day (Neuberg and Newsom 1993). As a result, there is a ubiquitous tendency to look for ways to reduce the information load in order to act effectively (Heine, Proulx, and Vohs 2006; Neuberg and Newsome 1993; Schaller, Yohannes and Obrien 1995). As individuals, however, some of us are more dispositionally motivated to cognitively structure and order our environment than others



(Kim, Hahn and Yoon 2015; Neuberg and Newsome 1993; Schaller, Yohannes and Obrien 1995). These chronic, personality-based differences constitute a distinct personality trait labeled as the personal need for structure (PNS) (Thompson, Naccarato and Parker 1989; Thompson, Naccarato, Parker and Moskowitz 2001).

PNS is a dispositional variable that signifies the extent to which people are inclined to cognitively structure their environment in a clear, simple, and unambiguous way (Neuberg and Newsom 1993; Pundt and Venz 2017). PNS construct consists of two subfactors including the desire for structure (DFS) and the response to the lack of structure (RLS) (Crowson, DeBacker and Davis 2008; Neuberg and Newsome 1993; Ruiselova, Prokopcakova and Kresanek 2012). The example items designed to capture DFS are “I like to have a place for everything and everything in its place” and “I hate to change my plans at the last minute”. Example items from the RLS measure include “It upsets me to go into a situation without knowing what I can expect from it” and “I don’t like situations that are uncertain”. Table 1 describes the previous findings to date in terms of: author(s) and publication year, an independent variable and the dependent variables. As can be seen in Table 1, individual differences in the desire for simple structure are key components to the integration of emotion, cognition, personality, motivation, and consumer behavior (Proulx, Heine and Vohs 2010). For instance, Neuberg and Newsome (1993) found that people with high chronic needs for structure are strongly aversive to amorphous or unstructured situations and more likely to use previously acquired categories to new situations. Rietzschel, Slijkhuis and Yperen (2014) demonstrated that people scoring high on PNS preferred structured situations to unstructured ones. In the marketing domain, it has been established that, under low perceived control situations, high PNS consumers are more likely to reject poor-fitting brand extensions than their low PNS counterparts (Cutright, Bettman and Fitzsimons 2013). Also, it was found that consumers with high structure seeking tendency value congruence between product shape and advertising slogan more (Van Rompay, Pruyn, & Tieke 2009).

Authors	Year	PNS	Dependent variables
Taylor and Fiske	1978	High PNS	Use “top-of-the-head” more in forming the categories
Diener, Larsen and Emmons	1984	High PNS	Less likely to seek out novel situations
Neuberg and Fiske	1987	High PNS	Apply stereotypes more readily and extensively
Jamieson, Naccarato and Zanna	1989	High PNS	More let social attitudes guide judgments in a mock jury
E. Thopmson, Roman, Moskowitz, Bargh and Chaiken	1992	High PNS	More assimilate judgments of a target actor to recently activated constructs
Moskowitz	1992	High PNS	Positive correlation with the formation of spontaneous trait inferences
Neuberg and Newsom	1993	High PNS	Positive correlation with classifying items according to more simplistic categorical structures and dogmatism
Neuberg and Newsom	1993	High RLS subfactor	Positive correlation with neuroticism

Kaplan, Wanshula and Zanna	1993	High PNS	More use of simplified thinking and stereotypes during stressful situations
Schaller, Boyd, Yohannes, O'Brien	1995	High PNS	Positive correlation with the formation of erroneous stereotypes and simplicity of the reasoning process when drawing inferences from group-relevant information
Schaller, Yohannes and O'Brien	1995	High PNS	More form erroneous group stereotypes
Sarmany- Schuller	1997	High PNS	Positive correlation with conscientiousness and heuristic orientation, and negative correlation with openness
Schultz, Searleman	1998	High PNS	Negative correlation with flexibility
Perreault and Bourhis	1999	High PNS	Positively correlated with degree of in-group identification and authoritarianism
Thompson, Naccarato, Parker and Moskowitz	2001	High PNS	Feel uncomfortable in situations where clarity and structure are missing

Ehrhart and Klein	2001	High PNS	Prefer task-oriented leadership
Van Den Berg and van Winsum-Westra	2003	High PNS	Prefer gardens over natural landscapes
Landau, Johns, Greenberg, Pyszczynski, Martens, Goldenberg et al.	2004	High PNS	Negatively correlated with the ability to change existing knowledge with the introduction of new information
Verplanken, Herabadi, Perry and Silvera	2005	High PNS	Less wisdom, mindfulness, sense of interdependence and more negative affectivity and anger aggression and less quiet ego
Colbert, Peters and Garety	2006	High PNS	High anxiety
Machunsky and Meiser	2006	High PNS	Prefer one's own group over other groups
Rietzschell, De Dreu and Nijstad	2007	High PNS	Negative correlation with creativity
Richetin, Perugini, Adjali and Hurling	2007	High PNS	Less intuitive

Gebauer, Riketta, Broemer and Maio	2008	People who are high in pressure based prosocial motivation	Exhibit High PNS
Crowson, DeBacker and Davis	2008	High PNS	High on dogmatism
Meiser and Machunsky	2008	High PNS	Positively correlated with neuroticism
Landau, Greenberg and Sullivan	2009	High PNS	When primed with death, people high in PNS are more likely to parse their future into clearly defined temporal intervals
Van Rompay, Pruyn, and Tieke	2009	High PNS	High PNS consumers value incongruencies significantly less than low PNS consumers
Vess, Routledge, Landau and Arndt	2009	High PNS	for ambiguity in everyday life.
Proulx, Heine and Vohs	2010	Low PNS	More tolerant of meaning violations and make only weak attempts to affirm alternative frameworks

Hodson, MacInnis and Rush	2010	High PNS	Low sense of humor
Stapel and Lindenberg	2011	High PNS	More stereotyping
Roets and Van Hiel	2011	High PNS	Positively correlated with perceptions of entitativity
De Dreu, Nijstad, Bechtoldt, Bass	2011	High PNS	Low epistemic motivation
Haigh, Moore, Kashdan and Fresco	2011	High PNS	Low mindfulness
Qureshi, Zeb and Saifullah	2011	High PNS	Low impulsive buying
Cutright	2011	High PNS	Higher desire for boundaries
Newheiser and Dovidio	2012	High PNS	More stereotyping
Ruiselova, Prokopcakova and Kresanek	2012	High PNS	1. Prefer application of already obtained social categories in new, uncertain situations, dominant use of simplified inference heuristics, relatively simple processes of thinking and judgment, strong emotive responses to events that

			<p>disturb adapted schemes and activities, to generalize the experience of failure into learned helplessness, and are prone to depression.</p> <p>2. Less wisdom</p>
Leicht, Crisp and Randsley de Moura	2014	High PNS	Prefer prototypical leaders
Cutright, Bettman and Fitzsimons	2013	High PNS	Prefer brand extensions that fit well with the parent brand
Chae and Hoegg	2013	High PNS	The effect of the horizontal position of images in an advertisement on product attitude is stronger
Friesen, Kay, Eibach and Galinsky	2014	High PNS	Prefer hierarchically structured organization
Rietzschel, Slijkhuis and van Yperen	2014	High PNS	Work better in clearly structured working tasks
Rietzschel, Slijkhuis and van Yperen	2014	High PNS	Less innovative and creative

Davidson and Laroche	2014	High PNS	Make more false consumer pattern perceptions
Kay, Laurin, Fitzsimons and Landau	2014	High PNS	More goal-oriented action
Prokopčáková	2014	High PNS	More frequent use of rational and dependent decision making style
Sollár and Turzáková	2014	High PNS	Feel more fear of losing control
Kim, Hahn and Yoon	2015	Low PNS	Evaluate really new products (RNPs) higher than incrementally new products (INPs)
Beersma, Greer, Dalenberg and De Dreu	2016	High PNS	Under high ambiguity, less accurate and shared knowledge structures
Lalwani and Forcum	2016	High PNS	Consumers with high power distance belief have a higher need for structure
Pundt and Venz	2017	High PNS	Attenuate the effects of humor in leadership
Li, Gordon and Gelfand	2017	High PNS	Individuals in tighter nations have a greater higher need for structure
Kristina Klein, Franziska	2019	High PNS	Individuals with high need for structure enhances the positive



Völckner, Hernán A. Bruno, Henrik Sattler, Pascal Bruno			relationship between Brand Image - Country Image (BICI) and brand evaluations
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Table 1. Literature review of Personal Need for Structure

Drawing on our earlier conceptualization suggesting that people associate higher (lower) hierarchical items with darker (lighter) colors and on past work showing that people perceive darker-colored objects as weighing more than identical lighter-colored objects and that PNS is positively correlated with the use of existing categories to new situations, we propose that people who are high in PNS will make stronger association between color lightness with inter-item hierarchy than people who are low in PNS. More formally:

**H3:** People’s association between color lightness and inter-item hierarchy will be moderated by their personal need for structure. More specifically, people with high PNS will relate higher hierarchical items with darker colors and lower hierarchical items with lighter colors more strongly than people low in PNS.

Continuing this line of argument, preference for a congruent bundle, where a higher hierarchical item is darker than a lower hierarchical item, should also be higher for high-PNS consumers, because they prefer structured and matched information more than low-PNS consumers. Therefore, more formally, we predict:

**H4:** People’s preference for a congruent bundle will be moderated by their personal need for structure. More specifically, people with high PNS will have a higher preference for a congruent bundle than people with low PNS.

## **EMPIRICAL OVERVIEW**

We test our hypotheses with a set of 9 experiments on the basis of the reasoning described earlier. We first seek to demonstrate the basic association between color lightness and inter-item hierarchy (studies 1, 2). In study 1, participants are given multiple pairs of words with higher- versus lower-hierarchy, and asked to classify each word into a lighter or a darker colored “basket”. In study 2, participants are asked to choose the more suitable products colored either darker or lighter for two different people or items with higher- versus lower-hierarchy. We then illustrate the effect of congruence between color lightness and inter-item hierarchy and the preference for bundles (studies 3, 4, 5, and 6). In study 3, participants are exposed to two different bundles, either congruent or incongruent, and asked to choose one. Then, we replicate the findings of study 3 in different product categories with more rigorous stimuli in studies 4 and 5. Study 6 examines whether priming consumers with different inter-item hierarchy influences the congruent effect. In the next three studies, we establish that personal need for structure is the key drivers for the observed effects. We achieve this by either measuring participants’ PNS (studies 7 and 8) or manipulating their motivation to cognitively structure their environment (study 9).

STUDIES	Hypothesis	DV	PNS
1	H1	Classifying items into the appropriate baskets	
2	H1	Choosing appropriate items for each target	
3	H2	Choosing preferred set of notebooks	
4	H2	Choosing preferred set of vitamins	
5	H2	Choosing preferred set of hair products	
6	H2	Choosing preferred set of notebooks (*inter-item hierarchy was manipulated)	
7	H3	Classifying items into the appropriate baskets	Measured PNS
8	H3	Choosing appropriate items for each target	Measured PNS
9	H4	Choosing preferred set of notebooks	Manipulated PNS

Table 2. Overview of the studies

## STUDY 1

In study 1, we aim to demonstrate that individuals associate higher hierarchical items with darker colors and lower hierarchical items with lighter colors. We began by testing our theory with a classification task, where participants were asked to make several classification decisions: high- and low-hierarchy-items or words were to be assigned to dark- or light-color categories.

Here, we define perceptual hierarchy as a system or organization in which items, animate or inanimate, are ranked vertically according to status, authority or some other dimension. For every set of items, participants were tasked with putting both the high and the low hierarchy items separately into one of the two baskets. We expect that people would put higher hierarchical items into darker baskets and lower hierarchical words into lighter baskets.

### Method

One hundred and fifty five undergraduates (52.9% male; mean age = 26.8; SD = 7.0) participated in a within-subjects experiment in exchange for a partial course credit. In 10 trials, participants were exposed to two colors of baskets, darker and lighter, and two targets, higher and lower. These target sets ranged from tangible items (e.g. detergent - softener) to intangible verbal descriptors (e.g. strong-weak). The two baskets vary in lightness but not on the other two properties of color, namely hue and saturation. For enhanced robustness, we test this effect using several different hues randomized across trials (blue, green, purple, brown, and red). The presentation order (left vs. right) of the two hierarchical words within each trial was also randomized. Also, the presentation order of the 10pairs was randomized across participants. Participants were asked to put each word into either darker or lighter basket. For this task, they were given the following instruction: “Please put each word into either darker or lighter basket as you see fit.” The items in 10 pairs were entrée and appetizer, detergent and softener, shampoo and conditioner, predators and prey, PhD degree and Bachelor degree, important and trivial,

expensive and cheap, first born son and youngest son, strong and weak, and Toyota and Suzuki. If we assume no color-hierarchy association, then each higher- or lower- hierarchical item has a 50 % probability of being assigned into a darker or a lighter basket.

## Results

Consistent with our hypothesis, participants assigned higher (lower) hierarchical words into darker (lighter) baskets significantly more frequently than what is expected if there was no color-hierarchy association. This preference in assignment decisions is significant for each trial and also when aggregated across all ten trials (Table 2). For example, 83.2% of participants assigned the word *detergent* into a darker basket. On the contrary, 82.6% of them put the word *softener* into a lighter basket. And 80.6% of the participants put detergent into a darker basket and softener into a lighter basket, making congruent choice. Also, 88.4% of the participants put the word of *strong* into a darker basket, and 88.7% assigned the word *weak* into a lighter basket. And 87.1% of the participants made congruent choices. On average, 79.4% of the time, higher hierarchical words were put into the darker baskets and 78.3% of the time, lower hierarchical words were put into the lighter baskets. Also, 77.3% of the participants put higher hierarchical words into the darker baskets and lower hierarchical words into the lighter baskets.

		Darker	Lighter	% participants who made congruent choices
1	Entrée	78.7	21.3	77.4
	Appetizer	22.6	77.4	
2	Detergent	83.2	16.8	80.6
	softener	17.4	82.6	

3	Shampoo	76.8	23.2	74.2
	Conditioner	24.5	75.5	
4	Predators	77.4	22.6	74.8
	Prey	25.2	74.8	
5	PhD degree	78.1	21.9	76.8
	Bachelor degree	23.2	76.8	
6	Important	78.7	21.3	78.1
	Trivial	21.3	78.7	
7	Expensive	74.2	25.8	72.3
	Cheap	26.5	73.5	
8	First born son	80.6	19.4	74.2
	Youngest son	23.2	76.8	
9	Strong	88.4	11.6	87.1
	Weak	12.3	87.7	
10	Toyota	78.1	21.9	76.8
	Suzuki	21.3	78.7	
Total	Higher hierarchical words	79.4	20.6	77.3
	Lower hierarchical words	21.7	78.3	

Table 3. Classification task results of study 1

These findings provide evidence that participants tend to relate higher hierarchical items with darker colors and lower hierarchical items with lighter colors. The next study was designed to investigate whether the association also extends to consumer behavior.

## **STUDY 2**

Study 2's objective is to demonstrate if the psychological association between color lightness and inter-item hierarchy, observed in Study 1, will also influence consumption decisions. To test this, we constructed 8 real-life scenarios involving actual products. It is fairly common for a consumer to shop for two different hierarchical objectives, such as buying notebooks for an extremely important class and a less important class. In this study, participants are asked to make a choice between a darker and a lighter product for higher- and lower-hierarchical objectives, persons or items. Again, the order of target sets and products was randomized. In this study, we aimed to show that people are more likely to choose darker products for higher hierarchical targets and lighter products for lower hierarchical targets.

### **Method**

One hundred and sixty undergraduates (51.2% male; mean age = 26.9; SD = 7.0) participated in a within-subjects experiment in exchange for a partial course credit. Eight scenarios were developed for this study, and they depicted real-life situations where consumers need to choose a product between darker and lighter for each higher- and lower-hierarchical target. The eight scenarios were:

Let's suppose you have two sons and both need lunch box for school. There are two lunch boxes in front of you: a darker blue and a lighter blue lunch box. Which lunch box do you want to use for each of your son?

Let's suppose you are preparing two dishes for your organization's New Year potluck party: a main dish and a side dish. There are two containers you can use. Which container do you want to use for each of dish?

Your company prepares a New Year party for its employees. Your task is to prepare participant's name tags so that people would know who is who. Here are the two participants: a CFO from a big bank and a CFO from a small bank. There are two name tags that you can use. Which name tag do you want to use for each of them?

You work at a Zoo. Your job is to prepare food buckets for two animals: a lion and a deer. There are two food buckets you can use. Which bucket do you want to use for each of them?

You are interviewing two candidates for a position at your firm. While you are combining all the documents for each job candidate, you found that one seems more suitable than the other one. You have to file folders you can use for each candidate. Which file folder do you want to use for each of them?

At your firm, you are planning to give gifts to your boss Kathy, and your intern Jennifer. You bought two bracelets for both of them for Christmas. There are two gift boxes you can use. Which gift box do you want to use for each of them?



You have two degree diplomas: the bachelor’s degree and the master’s degree. There are two picture frames in your office for displaying your diplomas. Which frame do you use want to use for each of the degree?

Let’s assume that you are taking two classes in spring semester. One is definitely more important than the other class. Each class requires you to bring a notebook. There are two notebooks you can use. Which notebook do you use want to use for each of the class?

## Results

As expected, participants picked a darker option for a higher hierarchical target and lighter option for a lower hierarchical target at a higher frequency. Table 4 depicts the results of study 2. Consistent with H1, for each pair, participants picked a darker (lighter) option for a higher (lower) hierarchical target at a higher frequency. For instance, 89% of the participants selected the darker brown frame for a master’s degree, while 83.4% selected the lighter brown frame for a bachelor’s degree. Correspondingly, 86.9% of the participants chose the darker red gift box for boss while 86.2% of them chose the lighter red gift box for intern. In total, 86.9% of the participants chose darker products for higher hierarchical targets and 84.4% of the participants chose lighter products for lower hierarchical targets.

		% of choosing darker option	% of choosing lighter option
1	First born son	86.9%	13.1%
	Youngest son	14.5%	85.5%
2	Main dish	91.7%	8.3%

	Side dish	13.1%	86.9%
3	CFO of a big bank	90.3%	9.7%
	CFO of a small bank	16.6%	83.4%
4	Predators	91.7%	8.3%
	Prey	11.7%	88.3%
5	Qualified candidate	84.8%	15.2%
	Not qualified candidate	15.9%	84.1%
6	Boss	86.9%	13.1%
	Intern	13.8%	86.2%
7	Master	89.0%	11.0%
	Bachelor	16.6%	83.4%
8	Important class	78.6%	21.4%
	Not important class	22.8%	77.2%
TOTAL	Higher hierarchical	86.9%	13.1%
	Lower hierarchical	15.6%	84.4%

Table 4. Real life scenario choice-task results of Study 2

Thus, consistent with study 1 findings, study 2 demonstrates that people associate color lightness with inter-item hierarchy; whereas study 1 asked participants to classify each target word into either a darker or a lighter basket, study 2 asked them to choose between a darker and a lighter product option for each high- and low-hierarchy target. Importantly, the results from both studies 1 and 2 showed that people relate higher hierarchical items with darker options and lower hierarchical items with lighter options. Having thus provided evidence that people relate color

lightness with inter-item hierarchy, in our next five studies we investigate the effect of congruence between color lightness and inter-item hierarchy on consumers' preference in product bundles.

### **STUDY 3**

Having demonstrated the basic relationship between color lightness and inter-item hierarchy, we next seek to provide support for the idea that individuals' preferences for bundles is also influenced by this relationship. Consumers will display greater preference for congruent bundles, where a higher hierarchical item is in a darker colored packaging and a lower hierarchical item is in a lighter colored packaging. In particular, if our conceptualization that a higher (lower) hierarchical item is related to darker (lighter) colors, we should find a positive congruence effect when people see bundled products presenting this association.

#### **Method**

One hundred seventy-five undergraduate business students (51.2% male; mean age = 23.7; SD = 4.) participated in a within-subjects experiment in return for participation credit. Participants were told: "If you buy Ricco Bello's notebook, you can get the Mead notebook for free. Which one would you be most likely to buy?" Then they were presented with one assortment of two pairs of notebooks and asked which one they would choose to purchase from the assortment. One pair includes darker-blue Ricco Bello's notebook with lighter-blue Mead notebook, and the other pair includes lighter-blue Ricco Bello's notebook with darker-blue Mead notebook. To avoid any spatial influence, the left-right position of the pairs was counterbalanced (Arnheim 1974; Deng and Kahn 2009).

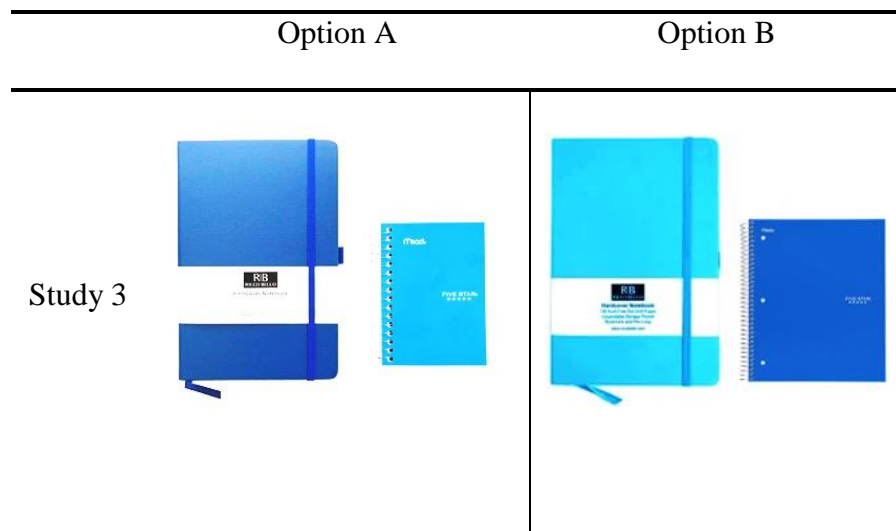


Figure 1. Stimuli for Study 3

## Results

Study 3 provided preliminary support for hypothesis H2. In a forced-choice task, 70.5% of the participants chose the congruent bundle where the main notebook was colored darker than the additional notebook (Binomial Test ( $p > 50\%$ ),  $z = 4.989$ ,  $p < .0001$ ). This confirms that people prefer a congruent bundle where a primary item is darker than a supplementary item over an incongruent bundle where a primary item is lighter than a supplementary item. The next study was designed to enhance the generalizability of our results and provide a more rigorous test of our hypothesis by including two independent variables of color of a product (yellow or green) and congruency (yes or no).

## STUDY 4

In all previous studies there is some possibility that demand effects may have led people to show a preference for congruency. This is because both bundles were of the same color and the

only consequential driver to consider was color congruency. In this study we want to establish if congruency continues to show its persuasive influence across two differently colored bundles as well.

## Method

One hundred and forty-six participants (64.4% male; mean age = 34.8; SD = 10.4) were recruited online (through Amazon.com's Mechanical Turk crowdsourcing marketplace) and paid \$.50 to complete the study. Specifically, we employ a  $2 \times 2$  between-subject design manipulating color of products in bundles (orange or green) and two levels of (in)congruency (congruent or incongruent). We asked participants to choose from two vitamin bundles: one bundle was congruent and the other bundle was incongruent – but unlike Study 2 both bundles were of different colors. Half of the participants are exposed to the options where an orange bundle was congruent and the green bundle was incongruent, and other half were are exposed to the two bundles where green bundle was congruent and the orange bundle was incongruent. As in study 3, if people prefer congruent bundles over incongruent bundles, people should choose the orange bundles more only when they present congruency between color lightness and inter-item hierarchy.

Each participant read the following information: “You want to buy the vitamins product bundles. Vitamin C is what you need the most. And, this bundle has Sprulina additionally. Please select the one you would like to buy.” Then we provided two vitamin bundles where one bundle was congruent and the other bundle was incongruent. Participants were assigned to either an Orange congruent - Green Incongruent bundle, or to a Green Congruent-Orange Incongruent bundle (see figure 2 for stimuli). The position (left vs. right) of each bundle was randomly determined for each participant. Participants then indicate which of the two bundles they preferred.

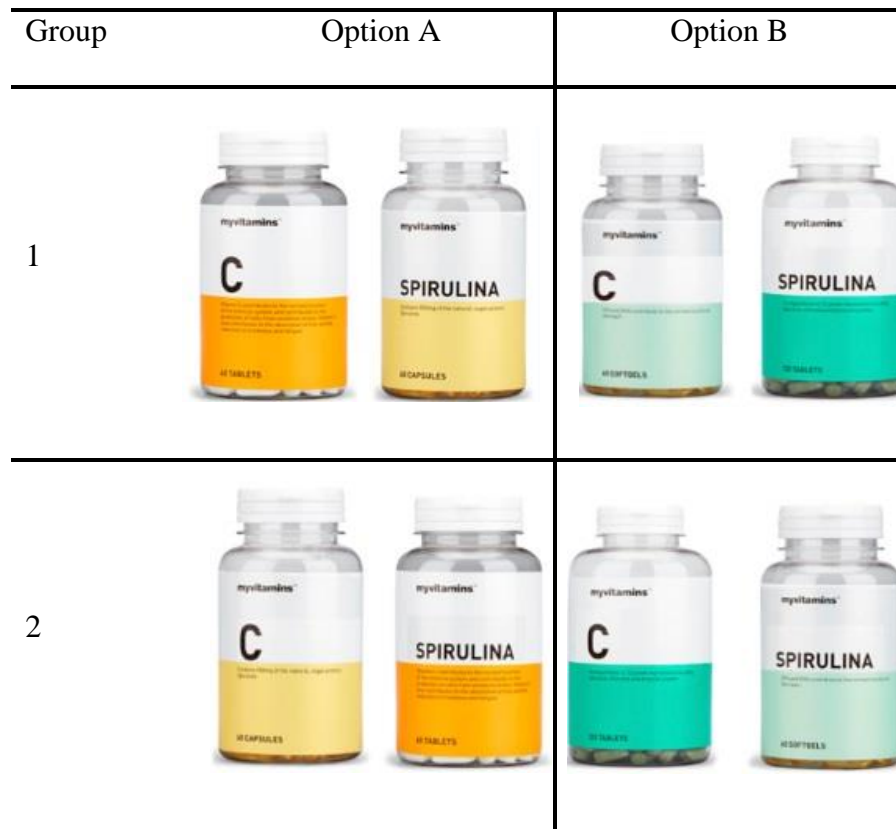


Figure 2. Stimuli for Study 4

## Results

A logistic regression analysis indicated that congruency manipulation had a significant effect on the choice of orange vitamin bundle. Individuals in the orange-congruent bundle with green-incongruent bundle condition were more likely to choose the orange bundle than individuals in the green-incongruent bundle with orange-congruent bundle condition ( $\chi^2 = 4.01$ ,  $p < .05$ ;  $M_{\text{congruent}} = 55.5\%$ ,  $M_{\text{incongruent}} = 44.5\%$ ). Thus, study 4 supports the proposition that people prefer bundles where there is a match between color lightness and inter-item hierarchy more than bundles where there is a mismatch.

## STUDY 5

Study 5 was designed to replicate the effect of increased preference for the congruent (vs. incongruent) bundles within a different product category, and also where the choice was between bundles of two different brands. In this study we also examined the underpinnings of this congruency effect. Previously, it has been suggested that such color congruency effects may result from automatic processing (Spence and Deroy 2013). By examining response latencies in consumer's preference elicitation for congruent versus incongruent bundles we put this theory to test.

## Method

Two hundred and seven undergraduate business students (65% male; mean age = 23.4; SD= 4.2) participated for course credit. The study was a 2 (product brand: Caj vs. Redken)  $\times$  2 (congruency: yes vs. no) between-subjects experiment. In groups, participants were shown two pairs of shampoo-conditioner bundles. One bundle was congruent while the other bundle was incongruent between color lightness and inter-item hierarchy. In other words, half of the participants saw Caj bundle where a shampoo is darker than a conditioner with Redken bundle where a shampoo is lighter than a conditioner. Others saw Caj bundle where a shampoo is lighter than a conditioner with Redken bundle where a shampoo is darker than a conditioner. Participants were randomly assigned to one of two conditions and asked "It is time for you to buy a new bundle of a shampoo and a conditioner. Which bundle would you likely buy?" Again, the position of each bundle was randomly assigned for each participant.

Group	Option A	Option B
1	 <p>Shampoo Conditioner</p>	 <p>Shampoo Conditioner</p>
2	 <p>Shampoo Conditioner</p>	 <p>Shampoo Conditioner</p>

Figure 3. Stimuli for study 5

## Results

A logistic regression analysis was conducted to test the hypothesis for this study – that individuals prefer congruent bundles over incongruent bundles. The analyses supported this prediction that congruency manipulation had a significant effect on the choice of Caj brand bundles ( $M_{\text{congruent}} = 53.8\%$ ,  $M_{\text{incongruent}} = 39.8\%$ ;  $\chi^2 = 4.11$ ,  $p < .05$ ). Specifically, people were more likely to select the Caj brand bundle when it was congruent than incongruent.

The results of studies 3, 4 and 5 provide evidence for H2, demonstrating the tendency that consumers prefer a bundle where a higher hierarchical item is in darker packaging and a lower hierarchical item is in lighter packaging. However, all the stimuli used in studies above include the two items with inter-item hierarchy that were commonly held conceptualization. For example, most people would agree that a shampoo is a higher hierarchical item than a conditioner.



Our next study (Study 6) was designed to see if congruence effect will continue to show when we manipulate inter-item hierarchy instead of relying on commonly-behalf conceptualization.

## **STUDY 6**

### **Method**

Three hundred and ninety-nine participants (57.1% male; mean age = 36.1; SD = 10.2) were recruited online (through Amazon.com's Mechanical Turk crowdsourcing marketplace). The study was a 2 (higher hierarchical class: Mark 3323 vs BSAD 3310) × 2 (congruent bundle's hue: Blue vs Red) between-subjects experiment. First, participants read a scenario that constituted the manipulation of the inter-item hierarchy. Participants were asked to imagine that they were shopping for notebooks for two different classes: MARK 3323 and BSAD 3310. Depending on the hierarchy condition, they were told that MARK 3323 or BSAD 3310 was more important class. All participants were then presented with the two options of bundled notebooks and asked to choose one bundle that would like to buy. The order of notebook options were randomized. At the end of the study, we included a manipulation check to ensure participants understood the inter-item hierarchy as we desired. ("According to the described scenario, how important is MAKR 3323 to you?" on a scale from 1 = not important at all to 7 = extremely important)



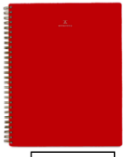




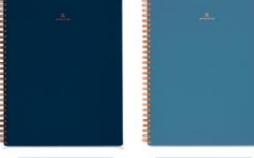
1	<p>Imagine that you are taking two courses, MARK 3323 and BSAD 3310, that require notebooks. <b>MARK 3323 is highly important to you, while BSAD 3310 is not.</b> Please choose the bundle of notebooks for the two classes.</p>	 <p>MARK 3323      BSAD 3310</p>	 <p>MARK 3323      BSAD 3310</p>
2	<p>Imagine that you are taking two courses, MARK 3323 and BSAD 3310, that require notebooks. <b>MARK 3323 is highly important to you, while BSAD 3310 is not.</b> Please choose the bundle of notebooks for the two classes.</p>	 <p>MARK 3323      BSAD 3310</p>	 <p>MARK 3323      BSAD 3310</p>
3	<p>Imagine that you are taking two courses, BSAD 3310 and MARK 3323, that require notebooks. <b>BSAD 3310 is highly important to you, while MARK 3323 is not.</b> Please choose the bundle of notebooks for the two classes.</p>	 <p>MARK 3323      BSAD 3310</p>	 <p>MARK 3323      BSAD 3310</p>
4	<p>Imagine that you are taking two courses, BSAD 3310 and MARK 3323, that require notebooks. <b>BSAD 3310 is highly important to you, while MARK 3323 is not.</b> Please choose the bundle of notebooks for the two classes.</p>	 <p>MARK 3323      BSAD 3310</p>	 <p>MARK 3323      BSAD 3310</p>

Table 4. Stimuli for Study 6

## Results

### *Manipulation check*

The manipulation check confirmed that participants primed that MARK 3323 is more important than BSAD 3310 were more likely to perceive that MARK 3323 is more important.

$(F(1,398) = 357.2, p < .000)$

### Main results

Responses to the bundle choice were coded as one when participants made a choice of a bundle including a darker notebook for MARK 3323 paired with a lighter notebook for BSAD 3310, either in blue or red. These responses were submitted to a logistic regression with the following predicting variable: the inter-item hierarchy (coded as 1 when MARK 3323 was more important class, and 0 when BSAD 3310 was more important) and the hue (1 when the bundle was blue, 0 when the bundle was red).

The results reveal that participant's preferences for the notebook bundle was contingent on which class was more important ( $\beta = .52, \chi^2 = 6.67, p < .05$ ). And the effect of color hue (red vs. blue) was not a significant factor on consumers' decisions ( $\beta = -.14, \chi^2 = .50, p > .48$ ).

Specifically, when MARK 3323 was more important, 55.5% of the participants preferred the bundle that contains a darker notebook for MARK 3323 and a lighter notebook for BSAD 3310. However, when BSAD 3310 was more important, only 41.5% of the participants preferred the same bundle.

Relative importance	Choice share	
	Darker notebook for MARK 3323 and lighter notebook for BSAD 3310	Lighter notebook for MARK 3323 and darker notebook for BSAD 3310
<b>MARK 3323 &gt; BSAD 3310</b>	<b>55.5%</b>	45.5%
<b>MARK 3323 &lt; BSAD 3310</b>	41.5%	<b>58.5%</b>

Table 5. Results of study 6

Overall, these results provide support for hypothesis 1 and 2. After having established the existence of the proposed hypotheses, in the next four studies we explore a possible motivational underpinning of this effect. In studies 7 and 8, we examined the moderating effect of personal-need-for-structure on the association between color lightness and inter-item hierarchy that we tested in the first two studies. In study 9, we explore the moderating effect of congruence between color lightness and inter-item hierarchy on consumers' preferences that we tested in the last two studies.

According to Santiago and Lakens (2016), a concept's mental representation is structured hierarchically in a way that more concrete concepts are more directly linked to abstract levels (Lakoff and Johnson, 1999). When people are confronted with external stimuli, they often have an intrinsic desire to structure it. Without sorting the multitude of external cues into coherent units that provide meaning, the world will be more chaotic and unsettling than what most people find comfortable. Relying on the color lightness - inter-item hierarchy association and the corresponding congruency therefore emerges as one handy solution to organize this chaos into a predictable, orderly pattern. Therefore, we expect that people high in structure seeking, as measured by 'personal need for structure' (PNS) (Neuberg and Newsom, 1993), will display greater usage of concrete concepts like color lightness of an object to infer abstract information like their perceptions of the object's hierarchy.

## **STUDY 7**

Study 7 was designed to investigate whether a desire for structure seeking underlies individuals' associations between color lightness and inter-item hierarchy. Specifically, we aimed to test whether people high in need for structure are more likely to put higher hierarchical words into darker baskets.

## Method

Two hundred and forty-two participants (50% male; mean age = 22.5; SD = 17.7) were recruited by an online research company. They were paid \$.50. The procedure was identical to study 3, except that i) 7 additional pairs were added to from the 10 pairs used in study 1 and ii) the personal need for structure (PNS) scale was included at the end of the online study. First, we asked participants to sort higher and lower hierarchical words into darker or lighter baskets. The 7 new pairs included were: CFO at a big bank and CFO at a small bank, qualified candidate and not qualified candidate, well known singer and not well known singer, heavy-weight and light-weight, core class and elective class, fast and slow, family and friend of family. Again, the location of the words with each pair and the location of lighter- vs darker-baskets were randomized. Also, the presentation order of the 10 pairs was randomized across participants. At the end, individuals' chronic desire for simple structure in their lives was assessed with a 12-item scale (Neuberg and Newsom 1993; 1 = strongly disagree to 7 = strongly agree;  $\alpha = .88$ ). Items included "I don't like situations that are uncertain" and "I enjoy the exhilaration of being in unpredictable situations" (reverse-scored).

## Results

Replicating study 1, we found that participants were more likely to put higher hierarchical words into darker baskets and lower hierarchical words into lighter baskets (Table 6). In total 77.8% of the high-hierarchical words were classified into the darker basket and 78.2% of the lower hierarchy words were classified into the lighter basket. In line with hypothesis H3, participants' structure seeking tendency ( $M = 4.08$ ,  $SD = .90$ ) was significantly correlated with association of the higher hierarchical item with darker baskets ( $r = .16$ ,  $p < .05$ ) and the lower hierarchical item with lighter baskets ( $r = .14$ ,  $p < .05$ ). These two significant correlation

coefficients indicate that people higher in structure seeking were more likely to make color - hierarchy congruent classifications. These results support hypothesis H3. Our next study (study8) was designed to replicate the effect of the PNS on association, but this time with a real-life scenarios that were used in study 2.

		% of choosing darker basket	% of choosing lighter basket
1	Entrée	74.3%	25.7%
	Appetizer	24.5%	75.5%
2	Detergent	76.8%	23.2%
	Softener	22.0%	78.0%
3	Shampoo	73.0%	27.0%
	Conditioner	25.3%	74.7%
4	CFO at a big bank	81.4%	18.6%
	CFO at a small bank	19.8%	80.2%
5	Predators	78.0%	22.0%
	Prey	22.0%	78.0%
6	Qualified candidate	79.3%	20.7%
	Not qualified candidate	20.1%	79.9%
7	PhD degree	80.6%	19.4%
	Bachelor degree	19.8%	80.2%
8	Well known signer	74.7%	25.3%

	Not well known signer	25.3%	74.7%
9	Important Trivial	80.1% 19.9%	19.9% 80.1%
10	Expensive Cheap	81.7% 18.7%	18.3% 81.3%
11	First born son Youngest son	82.2% 19.5%	17.8% 80.5%
12	Heavy weight Light weight	79.7% 18.7%	20.3% 81.3%
13	Core class Elective class	69.3% 30.7%	30.7% 69.3%
14	Fast Slow	70.5% 29.0%	29.5% 71.0%
15	Strong Weak	85.5% 12.4%	14.5% 87.6%
16	Toyota Suzuki	75.9% 24.5%	24.1% 75.5%
17	Family Friend of family	79.3% 19.5%	20.7% 80.5%
Total	Higher hierarchy Lower hierarchy	77.8% 21.8%	22.2% 78.2%

Table 6. The results of Study 7

## STUDY 8

The procedure for the study 8 was identical to that of study 2, except that the PNS scale was included at the end of the study. We expect that people with higher PNS would be more likely to choose the darker products for higher hierarchical targets and the lighter products for lower hierarchical targets.

### Method

Two hundred and fifty-one were recruited to participate in the study online through Amazon.com's Mechanical Turk. Participants were instructed to select a darker or a lighter product for higher and lower hierarchical person and/or item in 8 real-life situations which were identical to the one in study 2. At the end, participants completed the PNS scale.

### Results

As predicted, participants were more likely to choose darker products for higher hierarchical targets and lighter products for lower hierarchical target (Table 7). Also, people with high PNS were more likely to select darker products for higher hierarchical targets ( $r = .16, p < .05$ ) and lighter products for lower hierarchical targets ( $r = .18, p < .01$ ) than people with low PNS, supporting H3.

		% of choosing darker option	% of choosing lighter option
1	First born son	83.7	16.3
	Youngest son	19.1	80.9
2	Main dish	84.9	15.1
	Side dish	13.5	86.5
3	CFO of a big bank	85.3	14.7



	CFO of a small bank	17.9	82.1
4	Predators	82.9	17.1
	Prey	18.3	81.7
5	Qualified candidate	81.3	18.7
	Not qualified candidate	17.9	82.1
6	Boss	88.8	11.2
	Intern	12.4	87.6
7	Master	77.3	22.7
	Bachelor	23.9	76.1
8	Important class	78.9	21.1
	Not important class	20.3	79.7
TOTAL	Higher hierarchical	82.9	17.1
	Lower hierarchical	17.9	82.1

Table 7. The results of Study 8

The next study was designed to investigate whether the PNS moderates the effect of color lightness – inter-item hierarchy congruence on consumers’ preferences. In studies 7 and 8 we measured individual consumers’ structure seeking tendencies to examine its moderating influence on the color congruency effect. But such results can be contaminated by the confounding influences of other unmeasured variables that are coincident with PNS. For a purer test of the moderation effect, in the next study we manipulate structure-seeking instead of measuring it.

## STUDY 9

In study 9, we tested the notion that people's evaluations of congruent bundles would be influenced by chronic differences in need for structure. More specifically, it was expected that participants with high need for structure, as compared to participants with a low need for structure, would display more favorable preferences toward congruent bundles where there is a match between color lightness and inter-item hierarchy, and less favorable preferences toward incongruent bundles where there is a mismatch between color lightness and inter-item hierarchy. Unlike studies 7 and 8, we use a different operationalization of the personal need for structure construct. By manipulating this key construct, we can be more certain that the desire for structure drives the preference for a congruent bundle observed in studies 3, 4, 5 and 6.

## Method

Two hundred and nineteen undergraduates at a large North American university (65% male; mean age = 23.6; SD = 4.2) took part in an online study in exchange for course credit. Participants were randomly assigned to either a structure or no-structure condition. Following the manipulation method in prior work (Kay, Laurin, Fitzsimons and Landau 2014), we asked participants to read a list of 10 events, and rate how much structure they saw in each event. Participants in the structure condition read five events that are selected because of their orderly, structured nature (the other five were fillers): "The earth's orbit around the sun, the tides of the oceans, soldiers marching in a parade, principles of algebra, and neatly stacked pile of books." On the other hand, participants in the no-structure condition read the following five events (the fillers were same): "Winning a promotional event, meeting a friend coincidentally, unexpected car accident, winning a lottery ticket, and the number of times I say "me" in a day." Then each participant was asked to rate how much structure they saw in each event using 7-point Likert scale (1 = not at all structured; 7 = highly structured).

After participants completed the structure-seeking manipulation, they were randomly assigned to one of the two conditions. In both conditions, they were told “if you buy a notebook A, you will get a notebook B additionally. Which one would you like to buy?” Half of the participants were shown a congruent blue notebook bundle with an incongruent pink notebook bundle, while others saw an incongruent blue notebook bundle with a congruent pink notebook bundle; see figure 2 for stimuli. Shape, size, hue, and color saturation were equivalent across the conditions using Adobe Photoshop. The order of bundles was randomized.

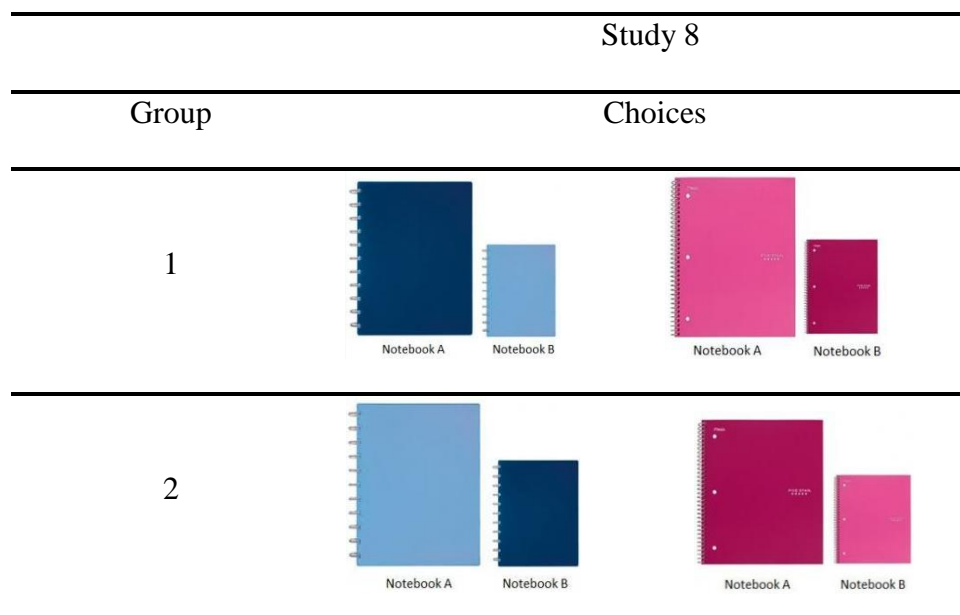


Figure 4. Stimuli of study 9

## Results

### *Manipulation check*

The manipulation check confirmed that structure-primed participants were more likely to perceive structure in the 10 events than no-structure-primed participants. Specifically, participants in the structure condition reported higher perceived structure in the events than participants in the no-structure condition ( $F(1, 218) = 48.44, p < .01; M_{\text{high}} = 65.57, M_{\text{low}} = 54.01$ ).

### Main results

Responses to the bundle choice were coded as one when participants made a choice of a bundle with blue notebooks from the choice sets. These responses were submitted to a logistic regression with the following predicting variables: the need for structure (coded as structure = 1 and no-structure = 0), congruency of a bundle (coded as congruent = 1 and incongruent = 0), and their interaction. The main effect of congruency was significant ( $\beta = 1.30, p < .01$ ). The sign of the coefficient suggests that participants were more likely to choose the blue notebooks bundle when it was congruent than incongruent. More importantly, the interaction of congruency and the structure-seeking manipulation was significant ( $\beta = 1.25, p < .05$ ). The sign of the coefficient suggests that being primed with structure increased the effect of congruency on bundle choice. Figure 3 depicts how the proportion of blue bundle choice varies across the two PNS levels. For high PNS individuals, congruency between color lightness and inter-item hierarchy increased choice by about 30%, whereas for low PNS individuals, congruency did not affect choice at all.

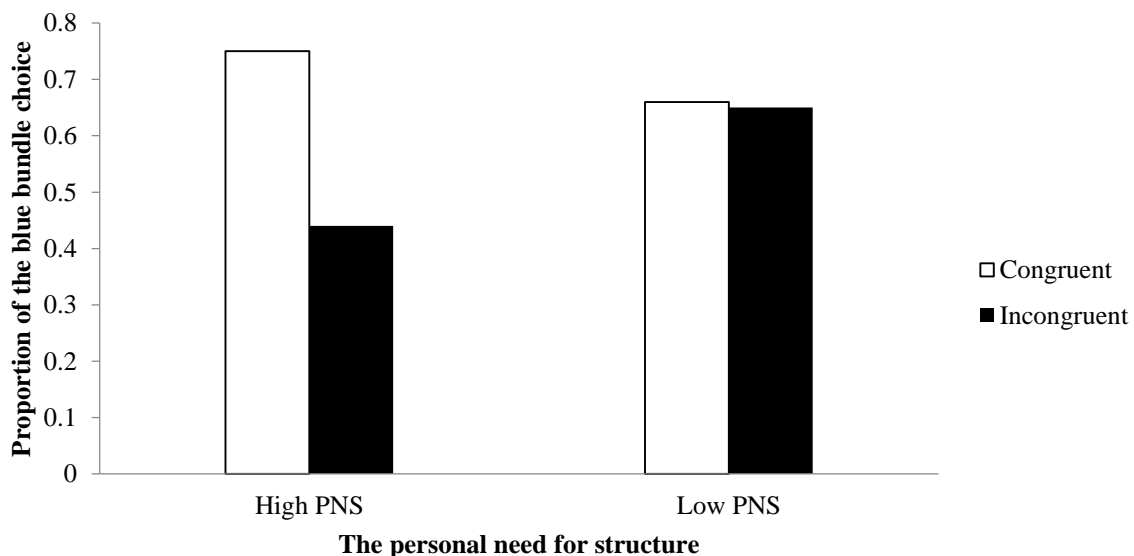


Figure 6. Moderating effect of the PNS on the effect of congruency

Thus, the role of consumers' structure seeking tendency on association between color lightness and inter-item hierarchy and congruence effect have been discussed, supporting H3 and H4.

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## CHAPTER 3

### GENERAL DISCUSSION

The research reported here has examined three general issues. The first one was to demonstrate the tendency of people to associate darker colors (vs. lighter colors) with higher (vs. lower) hierarchical targets. Earlier research on color lightness revealed that color lightness affects people's perception of physical weight. Specifically, a darker colored object is perceived to weigh more than an identical object that is colored lighter. The current research shows that color lightness also affects perceptions of metaphorical weight. The second issue was to examine how the lightness in color of product packaging between items in a bundle affect consumers' purchase decision-making. Specifically, it was demonstrated that congruence and incongruence between color lightness and inter-item hierarchy on a display would induce differential perception and choice. Lastly, this research showed the moderating role of PNS on the first two issues addressed above. People, who have higher desire for order and structure in their environments, are more likely to associate darker colors with higher hierarchical targets and are also more likely to prefer bundled items where a higher hierarchical item is darker than a lower hierarchical item.

Study 1 established that higher-hierarchical words (vs. lower-hierarchical words) are more likely to be put into darker (vs. lighter) baskets. In study 2, we found that people are more likely to choose darker (vs. lighter) products for higher (vs. lower) hierarchical person and/or item. In short, the first two studies confirmed that people associate darker colors with higher hierarchical items and lighter colors with lower hierarchical items. Study 3 explored the implications of this effect in choice of bundled products, providing preliminary results that people chose a bundle where a focal item is darker (and the non-focal item lighter) over a bundle where the focal item is lighter (and the non-focal item is darker). Studies 4, 5 and 6 provided further support that regardless of the hue (either orange or green) and the brand, the congruent bundles were

consistently preferred over incongruent bundles. Across these four studies, we found converging evidence that consumers preferred congruent bundles over incongruent bundles in various choice conditions. Two studies then demonstrated that a psychological state, personal need-for-structure (PNS), affected participants' tendency to link higher-hierarchical targets with darker colors and lower-hierarchical targets with lighter colors. In particular, individuals with a high PNS displayed stronger association between higher (vs. lower) -hierarchical targets and darker (vs. lighter) baskets than individuals with a low PNS. In studies 7 and 8, participants with high PNS chose darker (vs. lighter) products more frequently for higher (vs. lower) hierarchical targets than participants with low PNS. Then, study 9 demonstrated that situationally activated structure-seeking also enhanced preference toward bundles where a higher hierarchical item was colored darker than a lower hierarchical item.

### **Theoretical Contribution**

This project contributes to the existing literature in several ways. First, this is the first research to explore how the hierarchy of a target, both tangible and intangible, is perceptually associated with color lightness. Additionally, we demonstrate the downstream effect of this association in the domain of product bundles: evaluations are more favorable, and willingness to buy is higher, for bundles when a higher (lower) hierarchical item is colored darker (lighter). Second, our findings add to the literature on information processing. In particular, higher (lower) -hierarchical items lead to a stronger association with darker (lighter) colors. This response is particularly interesting because it shows that people not only encode color lightness as a metric for physical heaviness of an item, as suggested by Walker, Francis and Walker (2010), but also transfer this encoding to a descriptor of the metaphorical weight of an item. Our studies also contribute to the understanding of what drives these findings. The current research is the first to demonstrate that higher motivation to maintain a sense of structure is a driver of the association



between color lightness and inter-item hierarchy. The present research thus highlights the importance of the personal need for structure to understanding consumers' bundle preference.

### **Managerial Implications**

It has become more popular for firms to use bundling in the market (Yan, Myers, Wang and Ghose 2013). Thus, optimal bundling strategy needs to be improved in order to increase firms' performance. Our findings reported here may provide several inputs that can be used to gain comparative advantages in creating favorable perceptions of the product bundle. First, marketing managers may gain benefit by understanding how the lightness in color of the packaging of the products in a bundle influences consumers' purchase decision. Specifically, making a packaging of a primary product (e.g., shampoo) darker than a secondary product (e.g., conditioner) may have a positive influence on shoppers' purchase behavior. For instance, when a fabric detergent is already colored red, if marketers want to enhance sales of new fabric softener, they can make the package of the softener lighter-red, instead of putting it in a darker-red package. Similarly, while designing "Buy One Get One free", a marketer wanting to enhance sales of this bundle might want to display the main item in a darker package while the additional item in a lighter package. Second, when marketing managers are making strategies for bundling, the decision regarding congruence and incongruence between packaging color lightness and inter-item hierarchy of bundled products could be helped by considering the target consumers' PNS. In other words, if targeted customers are individuals from relatively more structured country such as Korea having high PNS, employing a congruence in packaging of the products in a bundle may be advantageous. Thirdly, our findings suggest that if manufacturers could associate the lightness of the package color of the items with their inter-item hierarchies in a bundle, consumers' potential perceptual confusion is minimized. For example, if an American consumer is traveling

in China and has a shampoo and a conditioner at a hotel room, even though they cannot read the labels, they may be able to infer which product is which purely based on the relative color lightness of the two products. This could be a useful tip for bundled products in settings where consumer familiarity is low.

### **Limitations and Future Research**

One limitation is these studies have the difficulty of ensuring that the individual product image used in the experiments reflect the exact attributes specified. Although we used Adobe Photoshop to control hue and saturation, electronic presentation could vary depending on factors such as software and screens. In order to minimize type II errors, we replicate findings multiple times employing different product domains. However, more research is needed to strengthen our findings.

Our research leaves many interesting questions unanswered. One important question is whether it is possible to manipulate people's perceived inter-item hierarchy merely by changing color lightness of the items. In all our studies we assumed perceived hierarchy of a target or item to be endogenous. However it is conceivable that color lightness may influence the inferred hierarchy of an item as well/

It would also be interesting to explore the set of characteristics that are required for stronger association between color lightness and inter-item hierarchy. For example, in the case of the items which already have strong association with a specific color such as chocolate cake mix (dark brown) and whipping cream (white) bundle, to what extent do the consumers prefer a bundle that includes a chocolate cake mix in a darker-brown packaging and a whipping cream in a lighter-brown packaging. Would bigger hierarchy differences have stronger associations? As an example, will "PhD degree vs bachelor" generate a stronger association between color lightness and inter-item hierarchy than "master degree vs bachelor?" Our hypothesis is the association

between a primary (vs. secondary) target and darker (vs. lighter) color would be enhanced when the hierarchical difference between the two items gets bigger.