CONSUMER PERCEPTIONS AND KNOWLEDGE OF COMMON FURNITURE WOODS

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ABSRTACT.—We report findings from two studies that describe the perceptions consumers have of several common furniture wood species. A comparison is made between a 2001 survey of undergraduate students at a large midwestern university, and adult consumers intercepted at furniture stores and trade shows in the same and a nearby city in 2003. In both samples, participants were split into two groups and asked to rate six species on several semantic differential items, based either on word association or the appearance of wood specimens. Use in bedroom furniture was given as the frame of reference. The two methods of evaluation often produced different results, suggesting that the reputation a species has is not always based on its physical appearance. A high correspondence was found between the two groups concerning the species ratings. However, the adult consumers were better at identifying the specimens than were the college students. The results obtained from both studies should alert secondary wood manufacturers to the need for better understanding of the role perceptions play in consumer choice. This understanding can be used to enhance product design and communications decisions.

It has been demonstrated that people have differing perceptions of different wood species (Blomgren 1965, Swearingen et al. 1998, Bumgardner & Bowe 2002). If recognized and understood, these perceptions can be leveraged for marketing and product development advantages. In the furniture product development process, many decisions are made as to what new products will look like. One of the more important decisions involves what species to use (Bumgardner et al. 2001). Manufacturers have many species choices, and in many instances, multiple species will meet appearance, cost, and processing criteria for a given design. It is therefore important for furniture manufacturers to understand what their species selection decisions contribute to their products. The total product concept suggests that all attributes, both tangible and intangible, are part of what a consumer ultimately purchases when choosing a product (Levitt 1986).

There are indications that such decisions might play a role in determining the competitiveness of U.S. manufacturers as well. The furniture industry in the United States is undergoing substantial structural changes. Many domestic furniture companies have made the decision to move some or all of their manufacturing base offshore, either through outsourcing or direct investment in production facilities. Offshore manufacturers, particularly in China and Southeast Asia, enjoy considerable cost savings over their U.S. counterparts (Schuler and Buehlmann 2003). While the extent of loss of the domestic furniture manufacturing remains unclear, one thing seems certain: the industry of tomorrow will look quite different from the one of today.

Familiarity with U.S. species has been discussed as a possible source of competitive advantage for domestic manufacturers of secondary wood products (Lawser 2002), and research has shown that industry practitioners generally concur with this belief (Buehlmann et al. 2003). However, we found that most college students could not identify common hardwood species, although they maintained definite perceptual images of those same species (Bumgardner and Bowe 2002). The Appalachian

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Hardwood Manufacturers, Inc. (2002) report on a recent High Point Furniture Market noted that rubberwood (*Hevea brasiliensis* Muell. Arg) and other foreign species were often stained to look like cherry or referred to as "Asian oak" or "Asian cherry." Combined with consumers' perceptions but limited knowledge of wood species, these factors might contribute to confusion on the part of consumers and a missed opportunity for domestic manufacturers.

The objectives of this paper are to compare college students' perceptions and knowledge of wood species as reported in Bumgardner and Bowe (2002) with a sample of older consumers surveyed at furniture stores and trade shows in the same general geographic area. Questions this study will help answer include: Is there a general perception and level of knowledge of different wood species among consumers, or does this change with experience? If there is a change, how much is "learned" through experience? Answers to these questions have implications for the design and promotion of wood products, the design of future studies investigating such topics, and the education of consumers.

Methods

Data Collection

As a comparison to the college student data from the 2001 study, an adult consumer sample was targeted for a follow-up study that took place from August 2002 through May 2003. Only individuals 25 years or older were included in the follow-up study. The University of Wisconsin Survey Center (UWSC) was contracted to collect the data. The survey instrument that was developed, pre-tested, and employed in the 2001 college student study was also used in the adult consumer study. The title *University of Wisconsin Survey Center: Wood Study* and center logo was added to the questionnaire booklet to identify the survey organization.

The data collection procedure utilized a modified mall intercept method in two midwestern cities, Madison and Milwaukee, WI. Initially, furniture stores were identified as the survey locations. This was to help insure that respondents had more experience with furniture purchases than did the college students previously surveyed. Two furniture retailers in Madison and one in Milwaukee offered space to conduct the survey. After several trials, it was determined that data collection volume was too low to achieve the data collection goals in a timely manner. Several relevant trade shows at local convention centers were then identified as alternate survey locations, and booth space was provided for the UWSC personnel. A simple display of forestry and forest products pictures was arranged in the booth space to pique interest in the study, and a UWSC banner was displayed to identify the organization. Incentives of candy bars and soda were used to encourage participation in the study.

Like in the college student study, the respondents were randomly split into two groups with approximately one-half completing a word-based perception questionnaire and one-half completing an appearance-based perception questionnaire. Respondents completing the word-based questionnaire were asked to evaluate six commonly used wood species based on the name of the species only. No visual cues were given. Respondents completing the appearance-based questionnaire were asked to evaluate six sample boards, which were identified only by question number. Two sample board sets were constructed for the 2001 study and reused for the current study. The sample boards consisted of six species samples measuring 0.5 inch by 4.0 inches by 6.0 inches mounted on plywood backing. The species evaluated included northern red oak (*Quercus rubra* L.), American mahogany (*Swietenia* sp.), black cherry heartwood (*Prunus serotina* Ehrh.), black walnut heartwood (*Juglans nigra* L.), sugar maple (*Acer saccharum* Marsh.), and eastern white pine (*Pinus strobus* L.). With the word-based perception questionnaire, the respondents were asked to evaluate each species based on the common names of *oak*, *mahogany*, *cherry*, *walnut*, *maple*, and *pine*. On the word-based perception questionnaire, respondents were asked to evaluate the species under the scenario that they had just seen a magazine advertisement for bedroom furniture made from the species in question. On the appearance-based perception questionnaire, the scenario for evaluation was being in a furniture store showroom and seeing bedroom furniture made from the wood specimen in question.

Table 1.—Theoretical factors describing household furniture and the semantic differential items selected to represent each factor.

Factor	Item
Quality	Fragile vs. Durable
Price	Expensive vs. Inexpensive
Visual Elements	Cold vs. Warm
Environmental Considerations	Sustainable vs. Depleting
Style	Casual vs. Formal
	Old-Fashioned vs. Modern
	Stately vs. Modest

Common components of both the word-based and appearance-based perception questionnaires were the semantic-differential scales employed and the theoretical factors they represented. Five theoretical factors used to describe wood household furniture were identified for the 2001 study (Ozanne and Smith 1996). One or more scale items were developed by the authors to describe each theoretical factor. The theoretical factors and corresponding items are show in Table 1. Specific details on the factor/item development and instrument pre-testing can be found in Bumgardner and Bowe (2002).

To illustrate the word-based perception questionnaire, the respondent would consider the species *oak* and rate whether they thought it was *Fragile* or *Durable* on a seven-point scale (Fragile = 1 and Durable = 7). Likewise, on the appearance-based perception questionnaire, the respondent would examine the unlabeled oak sample block and rate whether they thought it appeared *Fragile* or *Durable* on a seven-point scale. The scales were treated as interval in nature (Coombs et al. 1970, Aaker et al. 1998), allowing for mean-based statistical analysis.

Sample Description

The number of usable questionnaires obtained was 871, which included 466 and 405 word-based and appearance-based questionnaires, respectively. Twenty-one percent of the responses were collected through furniture store interviews, and the remaining 79 percent were collected through trade show interviews. A large majority of the trade shows had a home and garden theme, the exception being one Corvette show. Fifty-three percent of the questionnaires were completed in Madison and the remainder were completed in Milwaukee.[1]

Demographic data were collected, including information on age, gender, household income, home ownership status, and furniture purchases. The median age of respondents was 49. The sample was nearly equally split by gender with 51 percent female. Approximately 71 percent of respondents had a household income of more than $50,000 per year. In addition, more than 87 percent of respondents owned their own house or townhouse. Thirty percent of respondents had been personally involved in a major furniture purchase in the past six months.

Results

Claimed vs. Ability to Identify Species

On the word-based perception questionnaire, respondents were asked if they *thought* they could correctly identify each of the six species if given the opportunity. On average across all species, 69 percent of adult consumers claimed they could identify each species, compared to 50 percent of college students from the previous study that claimed such ability. On the appearance-based perception questionnaire, the respondents were asked to identify each sample block in question. On average across all species samples, 36 percent of adult consumers correctly identified each sample, compared to 18 percent of college students that correctly identified each sample. As shown in Table 2, the adult

[1]By comparison, the college student sample consisted of 146 word-based respondents and 107 appearance-based respondents. Ninety-one percent were 25 years of age or younger.

Table 2.—Claimed and actual ability to identify wood species, adult consumers and college students.

Species	Adult consumer: Claimed ability	College student: Claimed ability	Adult consumer: Actual ability	College student: Actual ability
	%		%	
Oak	92	75	49	26
Mahogany	***54***	***56***[1]	22	3
Cherry	70	52	20	11
Walnut	51	24	45	18
Maple	60	32	***14***	***9***
Pine	89	61	64	42

[1]Numbers in bold italics denote proportions that are not significantly different between adult consumers and college students based on two-tailed z-tests, alpha=.05.

Table 3.—Summary of the adult consumer and college student word-based perception results. Adult consumer response is listed first, followed by the college student response. An asterisk denotes a mean not statistically different from the scale midpoint. A single entry indicates same response by both groups.

Species	Casual vs. Formal	Cold vs. Warm	Expensive vs. Inexpensive	Fragile vs. Durable	Old-fashion. vs. Modern	Sustain. vs. Depleting	Stately vs. Modest
Oak	∗/formal	warm	expensive	durable	∗/old-fash.	sustainable	stately
Mahogany	formal	warm	expensive	durable	old-fash.	depleting/∗	stately
Cherry	formal	warm	expensive	durable/∗	old-fash.	∗/sustainable	stately
Walnut	formal/∗	warm/∗	expensive	durable	old-fash.	sustainable	stately
Maple	casual	warm	∗/inexp.	durable	old-fash.	sustainable	modest/∗
Pine	casual	∗	inexp.	fragile	old-fash./∗	sustainable	modest

Table 4.—Summary of the adult consumer and college student appearance-based perception results. Adult consumer response is listed first, followed by the college student response. An asterisk denotes a mean not statistically different from the scale midpoint. A single entry indicates same response by both groups.

Species	Casual vs. Formal	Cold vs. Warm	Expensive vs. Inexpensive	Fragile vs. Durable	Old-fashion. vs. Modern	Sustain. vs. Depleting	Stately vs. Modest
Oak	casual	cold	*/inexp.	durable	modern	sustainable	*/modest
Mahogany	formal	warm	*/expensive	durable	old-fash./*	sustainable	stately
Cherry	casual/*	warm/*	*	durable	*/old-fash.	sustainable	*/stately
Walnut	formal	warm/cold	expensive	durable	old-fash.	sustainable	stately
Maple	casual	cold	inexp.	*	modern	sustainable	modest
Pine	casual	cold/*	inexp.	fragile	old-fash./mod.	sustainable	modest

consumers were generally more successful in identifying the sample blocks than were the college students, the lone exception being maple. The average difference between *ability* and *claimed ability* was 34 percentage points for the adults and 32 percentage points for the students across all species. Additionally, the pattern of claimed vs. ability was quite similar between the adult consumers and college students. For example, with both groups, oak was the species generating the highest claimed ability, but pine was the species most correctly identified. The student group had a particularly difficult time identifying mahogany (3% could identify), while maple provided the greatest challenge for the adult group (14% could identify).

Word-Based and Appearance-Based Perceptions

The results for the word-based and appearance-based evaluations are shown in Table 3 and Table 4 and summarized below. A two-tailed *t* test (alpha = 0.05) was used to determine if the means were significantly different than the midpoint (4.0) for each semantic differential scale. Overall, few

Table 5.—Means from the word-based perception evaluations for adult consumers[1].

Species	Casual vs. Formal	Cold vs. Warm	Expensive vs. Inexpensive	Fragile vs. Durable	Old-fash. vs. Modern	Sustainable vs. Depleting	Stately vs. Modest
Oak	3.9	4.7	3.7	5.9	3.9	3.7	3.8
Mahogany	5.8	4.6	3.0	4.6	3.3	4.2	2.7
Cherry	5.7	5.3	2.9	4.5	3.7	3.9	3.0
Walnut	4.8	4.7	3.2	5.0	3.5	3.8	3.3
Maple	3.4	4.5	4.1	4.7	3.8	3.3	4.3
Pine	1.6	4.1	5.7	2.9	3.3	3.0	5.4

[1]Means based on rating scales ranging from 1 to 7, anchored by the column headings. A lower number corresponds to the first word in the heading.

Table 6.—Means from the appearance-based perception evaluations for adult consumers[1].

Species	Casual vs. Formal	Cold vs. Warm	Expensive vs. Inexpensive	Fragile vs. Durable	Old-fash. vs. Modern	Sustainable vs. Depleting	Stately vs. Modest
Oak	2.8	3.2	4.0	4.5	4.2	3.6	4.1
Mahogany	4.3	4.8	3.9	4.5	3.7	3.6	3.7
Cherry	3.7	4.3	3.9	4.4	3.9	3.8	3.9
Walnut	4.7	4.5	3.6	4.9	3.5	3.8	3.5
Maple	2.6	3.0	4.3	4.0	4.5	3.7	4.5
Pine	2.2	3.7	5.0	3.5	3.7	3.4	5.0

[1]Means based on rating scales ranging from 1 to 7, anchored by the column headings. A lower number corresponds to the first word in the heading.

differences were found between the adult consumer and college student groups. The two groups were in agreement about 75 percent of the time with both the word-based and appearance-based evaluation (76.2 and 73.8 percent, respectively). There were only two instances were the adult consumers and college students were on opposite sides of a scale, and both occurred with the appearance-based evaluations. One case involved walnut, with adult consumers rating this species as warm and college students rating it as cold. The other case involved pine, with adult consumers rating this species as old-fashioned and college students rating it as modern.

Results important for understanding how different species might impact product design and communication decisions are shown in Table 5 and Table 6. As shown in Table 5, based on the word-based perception evaluations, adult consumers[2] rated mahogany and cherry as the most formal species, and pine was rated as the most casual. Cherry was rated as the warmest species, but all species were rated as warm with the exception of pine. Cherry, mahogany, and walnut all rated highly as expensive species. Oak was rated as the most durable. Mahogany and pine were rated as the most old-fashioned. Pine was rated as the most sustainable. Mahogany was rated as the stateliest, followed closely by cherry. Pine was rated as the most modest.

The appearance-based perception evaluations for the adult consumers are shown in Table 6. Walnut was rated as the most formal, and pine was rated as the most casual. Mahogany was rated as the warmest, while maple and oak were rated as the coldest. Interestingly, walnut was the only species rated as expensive, and pine was rated as the most inexpensive. Walnut was also rated as the most durable. Maple was rated as the most modern, and walnut as the most old-fashioned. All species were rated as sustainable. Lastly, walnut and mahogany were rated as the stateliest, and pine the most modest.

[2]See Bumgardner and Bowe (2002) for similar results from the college student study.

A final consideration is the extent to which the word-based evaluations differ from the appearance-based evaluations for the adult consumer sample. Several such differences were found (a similar trend was noted among college students in the previous study). While several of these differences involved neutral ratings for either the word-based or appearance-based evaluations, those involving opposite ratings are noted here. Cherry was rated as formal on the word-based evaluations and as casual on the appearance-based evaluations, suggesting that cherry's formal reputation surpasses its appearance. Oak was rated as warm on the word-based evaluation and as cold on the appearance-based evaluation. Maple followed this same pattern. It seems wood in general, across species, is perceived as warm in name but might be perceived as cold in appearance, particularly lighter-colored species. Maple was rated as old-fashioned on the word-based evaluation and modern on the appearance-based evaluation. Interestingly, mahogany was rated as depleting on the word-based evaluation and as sustainable on the appearance-based evaluation; these finding perhaps suggests the difficulty of rating this attribute on appearance and a general perception that tropical woods are not being utilized in a sustainable fashion.

Discussion

This paper sought to determine if age and experience with household furniture affects perceptions and knowledge of common wood species. The answer seems to be no and yes. The word-based and appearance-based perceptions associated with the species investigated were quite similar for college students and adult consumers. By investigating college students, it seems possible to get a reasonable idea of adult consumers' perceptions of wood species. So when it comes to perceptions of wood species, age and experience seem to have little effect. Stated another way, by the time people arrive at college, they have already formed their species perceptions.

However, the adult consumers were better at species identification than were the college students. This suggests a greater level of knowledge on the part of the older and more experienced consumers. Still, pine was the only species to have at least 50 percent correct identification. Overall, there seems to be a lack of wood species knowledge even among more experienced consumers, which might be a troubling finding for some domestic manufacturers. The pattern of correct identification was similar between both groups, suggesting that both groups struggle with the same species, particularly maple and to a lesser extent mahogany and cherry. The gap between claimed and actual ability was very similar for both the adult and student consumers. While both groups substantially overestimated their abilities, this corresponded to their respective abilities. Perhaps respondents intentionally claimed an ability they did not possess; an alternative explanation is that a general familiarity with common wood species, if only in name, leads people to think they will know it when they see it.

One interesting finding regarding oak noted in the previous study of college students was that word-based evaluations of oak were often opposite to appearance-based evaluations, and that the word-based evaluations were more positive. This trend was not as evident with adult consumers, though the word-based perception was *warm* while the appearance-based perception was *cold*. This suggests that adult consumers are not as enamored with the reputation of oak as are less experienced students.

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