SPECIES SELECTION IN SECONDARY WOOD PRODUCTS: IMPLICATIONS FOR PRODUCT DESIGN AND PROMOTION

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ABSTRACT

This study investigated the perceptions that people have of several commercially important wood species and determined if word-based and specimen-based evaluations differed. Such knowledge can help secondary wood manufacturers better understand their products and develop more effective design concepts and promotional messages. A sample of more than 250 undergraduate students at a major midwestern university was split into two groups and asked to rate six wood species on several semantic-differential items, based either on word association or physical wood samples. The two methods of evaluation often produced different results that were more pronounced for certain species, especially oak. Some gender-based differences were also observed. Respondents generally had difficulty identifying the species that they were observing, particularly mahogany and maple, yet maintained definite perceptual images of these same species. It is suggested that species perception is an important and lasting component of the total product concept for secondary wood products, and can moderate appearance-based evaluations.

Keywords: Wood species, perceptions, total product concept, product design, product promotion.

INTRODUCTION

It has been said that, "a product must be thoroughly understood by the firm before successful communication [about the product] can be achieved" (Sinclair 1992, p. 79). Perhaps the best way to understand a product is to consider the total product, or the whole bundle of benefits, both tangible and intangible, provided by a product (Levitt 1986). For example, a consumer purchasing a high-end vehicle is not just buying transportation, but a host of other benefits, including prestige, status, reliability, precise handling, engineering excellence, quiet ride, etc. (Fig. 1).

Among wood products, durable consumer goods such as household furniture and cabinets are often expensive, emotion-evoking goods that must be considered in terms of the total product concept. In a recent speech before the American Society of Furniture Designers, a prominent CEO of a major case goods company stressed the importance of product image and moving beyond a commodity mentality in the furniture industry (Epperson 2001). What does a secondary hardwood product embody to consumers beyond the functional utility of a place to sit, eat, sleep, or store dishes? More specifically, what psychological contributions do individual wood species make to such products?

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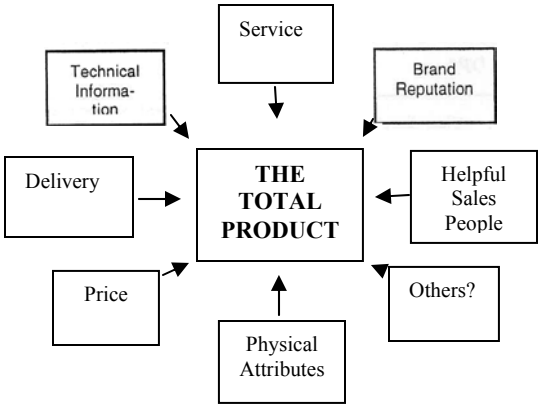

FIG. 1. Some of the many components of the total product concept (Sinclair 1992).

BACKGROUND

Furniture designers and merchandising managers have considerable interest in species selection during the product development process. Bumgardner et al. (2001) found that wood species selections, along with decisions concerning other physical attributes such as style and finish, were major product development considerations for furniture manufacturers and designers. Often, the product development committee will consider several possible species during the product development process as new product concepts unfold. While factors such as cost, workability, and availability are obvious aspects of the species decision, the selected species must also fit well with the other design elements presented in the product (Eads 1967). Often more than one species will fit cost and manufacturing criteria for a given design. In most interior applications, appearance is the most important selling feature of wood, and appearance varies widely among species as a result of color, grain characteristics, and other naturally occurring features. There are traditional associations between species and style, such as the use of oak in Mission and Arts & Crafts styles and cherry or maple in Shaker furniture (Kaiser 1997). Gilligan (1999) claims that the selection of wood species is the most important design element to the rustic-styled cabinet. Frye (1996), however, notes a trend of decreasing correlation between style and species in household furniture products, opening the door to consideration of a broader array of species and finishes for any given style. He claims this is a function of experimentation on the part of designers and furniture manufacturers, as well as labor and raw material costs. A similar trend has been observed in cabinet designs (Ohm 2001).

Physical appearance is not the only consideration for designers and merchandisers of secondary wood products. The decisions that consumers make are often based on the extent to which products communicate a sense of self-identity-products often contain psychological meanings that extend beyond their mere physical attributes (Blomgren 1965). Wood has been found to possess several emotional appeals that can be leveraged for marketing advantage over competing materials (Dichter 1964; Broman 1995; Pakarinen 1999). Cedar shingles, as an example, can add a sense of warmth and comfort to a home absent from other products (Dichter 1964). Similarly, Stalling and Sinclair (1989) found that solid cedar and solid pine residential siding scored highest among competing materials (plywood, hardboard, aluminum, and vinyl) in terms of beautiful appearance and high-status image, though the solid wood material was perceived to require more maintenance.

Studies comparing specific wood species are few, and yet such information could benefit product development decisions. Blomgren (1965) conducted a limited study that measured people's perceptions of several wood species commonly used in furniture. Respondents were presented with a list of 20 descriptive words and asked to indicate the five words that they most and least associated with each of nine species. Only the species names were provided; no actual samples were presented for visual observation. Many perceptual differences among the species were observed, and some were a function of the respondents' gender.

Oak, for example, was perceived by both men and women as durable, strong, practical, and secure, while men perceived oak to be more old-fashioned than did women. With pine, both men and women perceived it to be warm, friendly, rough, and practical, while women perceived pine as being more old-fashioned than did men. Generally, pine was not perceived as being elegant, sophisticated, or dignified. Mahogany was perceived as being beautiful, old-fashioned, elegant, durable, and strong.

Blomgren (1965) noted that respondents considered oak as the species with the most specific image, while cherry and pecan meant many different things to different people. The author concluded that most respondents in his study, while often having definite psychological images of the species investigated, probably could not have identified the same species by appearance, raising the question of whether perception-based (i.e., word only) evaluations would be similar to appearance-based evaluations.

More recently, researchers comparing visual preferences for Pacific Northwest hardwoods (bigleaf maple or *Acer macrophyllum* and Oregon white oak or *Quercus garryana)* to visual preferences for more traditionally utilized species (northern red oak or *Quercus rubra* and eastern maple or *Acer* spp.) found that the oaks were more appealing to consumers than the maples with reference to unstained and lightly stained molding samples (Swearingen et al. 1998). With darkly stained samples, however, bigleaf maple was the most appealing, suggesting that staining wood can alter appearance-based evaluations. Similarly, Bumgardner (1995) found that staining oak resulted in a warmer and more old-fashioned appearance compared to unstained specimens cut from the same board. Swearingen et al. (1998) also found that consumers had difficulty recognizing the maples, often misidentifying them as cherry, birch, cedar, or hemlock. The respondents were better at recognizing oak, but had difficulty distinguishing between the red oak and white oak molding samples.

TABLE 1. *Sample size by class description and questionnaire type.*

Class description	Perception-based questionnaire	Appearance-based questionnaire
Introductory forestry	33	32
Introductory psychology	63	41
Environmental literature	13	13
Silviculture	6	7
Forest recreation	7	6
Wood construction and building	19	0
Forestry and communities	5	8
Total	146	107

Objectives

While previous research suggests that consumers hold differing perceptions of different wood species, it is unclear whether these are based on recognition of actual wood appearance. The objectives of this study were to measure perceptions of six common wood species and to determine if perceptual evaluations are similar to appearance-based evaluations. A better understanding of the psychological images associated with different wood species can enhance product design and promotion, leading to more desirable products and better product communication.

METHODS

Sample description

The sample consisted of students drawn from several primarily undergraduate classes at a major midwestern university between the dates of April 25 and May 16 of 2001. A total of 253 respondents took part in the study. Data were collected during regularly scheduled class periods and generally took no longer than 15 minutes to complete. Participation was based on invitation and was not mandatory. Seven classes covering diverse disciplines and representing a wide variety of individual majors were selected for sampling. Each class was generally split into nearly equal groups by the survey proctor for receipt of either a perception-based or an appearance-based questionnaire (Table 1). Each respondent was given a candy bar for participating. In one class, the instructor offered

five additional points on the final exam for participation.

The perception-based questionnaire asked respondents to evaluate six commonly used wood species based on the name of the species only. Students participating in the appearance - based questionnaire were instructed to evaluate six sample boards. The sample board sets (Pig. 2), which were mounted on plywood, consisted of clear blocks measuring 0.5 in. (12.7 mm) by 4.0 in. (101.6 mm) by 6.0 in. (152.4 mm). The randomly chosen species order was northern red oak *(Quercus rubra),* mahogany *(Swietenia* sp.), cherry heartwood *(Prunus serotina),* walnut heartwood *(Juglans nigra),* hard maple *(Acer saccharum),* and eastern white pine *(Pinus strobus).*[1] Two identical sample board sets were clearly displayed on tables within the classroom. Students were able to gather around the sample board sets while completing the questionnaire. Each board was identified with a letter using "A" through "F". The boards were evaluated one at a time to reduce the possibility of making direct comparisons between the boards. Evaluations were based on seven semantic-differential items. Basic demographic questions and questions relating to wood identification were also asked on both questionnaires. On the perception-based 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 questionnaire, the scenario for evaluation was being in a furniture store showroom and seeing bedroom furniture made from the wood specimens.

The sample was 52% male and 45% female, with 3% opting to omit gender information. Ninety-one percent of the respondents were 25 years of age or younger, with 54% being under the age of 21. The sample was diverse in terms of class standing, consisting of 33% freshmen,20% sophomores, 13% juniors, and 28% seniors. Graduate students constituted 3%, and 3% did not indicate their class standing. Sixteen percent of the sample indicated having some work experience related to wood products, usually involving woodworking and carpentry/construction or retail work (e.g., lumberyards, nurseries, furniture stores).

[1]On the perception-based questionnaire, evaluations were based on the species names of "oak," "mahogany," "cherry," "walnut," "maple," and "pine."

Development and selection of semantic-differential items

The semantic-differential scale, or a multiple-point scale anchored with words that are antonyms, was used as the primary method of discerning perception-based and appearance based differences between species. A procedure outlined by Malhotra (1981) was used to develop suitable semantic-differential scale items. Initially, a universe of potential items was generated through brainstorming and a review of previous research. Previous studies (Dichter 1964; Blomgren 1965; the Hardwood Manufacturers Association 1995; Ozanne and Smith 1996) were used to assemble descriptive words and concepts generally associated with perception of wood. Then, antonyms to selected words were generated with a thesaurus to create a semantic-differential item measured on a 7-point scale. Some pre-existing word pairs were already evident in the literature, e.g., Blomgren (1965) used both "warm" and "cold" in his list of descriptive words. The initial pool contained 24 semantic-differential items.

Malhotra (1981) suggests that an important theoretical consideration is the factorial composition of the items. Previous research has shown that five factors summarize many of the attributes commonly used to depict wood household furniture. These include environmental considerations, quality, visual elements, style, and price (Ozanne and Smith 1996).

A group of judges was asked to complete a pretest designed to determine the best semantic-differential items from the initial pool for each factor listed above. The pretest group (n= 8)

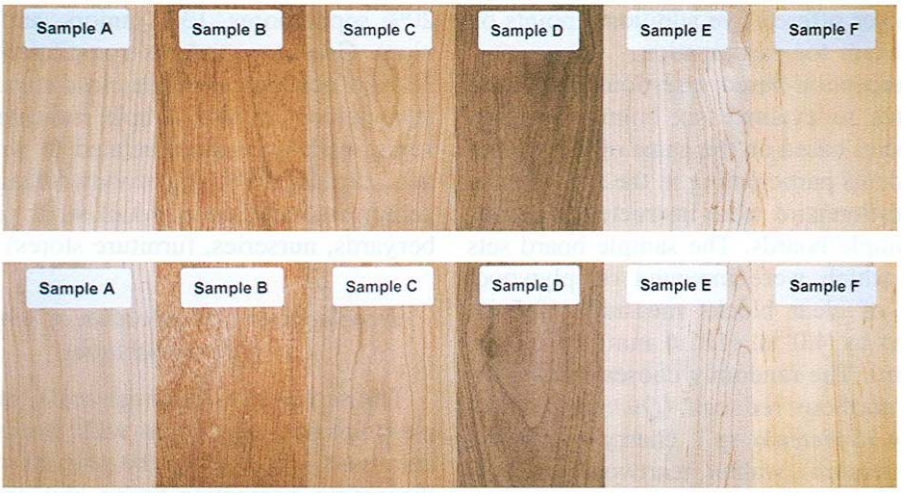

FIG. 2. The sample board sets used for the appearance-based evaluations; each specimen measured 0.5 in. 02.7 mm) by 4.0 in. 001.6 mm) by 6.0 in. (152.4 mm).

included professionals familiar with secondary wood products and/or market research, as well as two recent college graduates. The judges placed each item under the factor with which they felt it was most associated-that is, the factor that would be most affected by differences between wood species. The judges then ranked the three most applicable (i.e., clearest and most useful in describing) items under each factor. Many items were placed under the same factor by all judges.

For each item under each factor, a score was assigned based on the number of times the item was placed under the factor and the number of times it was ranked, with point values increasing for higher ranks. The highest scoring item under each factor was then selected. [2] Since the Style factor was the most frequently used (i.e., the most items were placed under Style), two additional items were included, [3] resulting in a total of seven items (Table 2). The goal of this exercise was not to develop a comprehensive list of items to strictly represent each factor, but to find relevant items that covered a broad range of the semantic space. Correlation analysis with the final data set indicated that this purpose was generally achieved. Only three Pearson product moment coefficients between items exceeded $\pm$ 0.30 on each questionnaire type, the highest being r = -0.67 between casual vs. formal and expensive vs. inexpensive on the perception-based questionnaire.

TABLE 2. *Theoretical factors describing household furniture and the semantic differential items selected to represent the factors.*

Factor	Item
Quality	Fragile vs. Durable
Price	Expensive vs. Inexpensive
Style	Casual vs. Formal
	Old-fashioned vs. Modern
	Stately vs. Modest
	Cold VS. Warm
Visual elements	
Environmental considerations	Sustainable VS. Depleting

2 In some cases, the second-highest scoring item was used instead due to concerns with possible confusion over item meaning. Specifically, renewable vs. non-renewable was originally the highest scoring item under environmental considerations, but there was some confusion on a second pretest that this referred to the capability to refinish the wood. Similarly, clear vs. knotty was replaced by the second item, cold vs. warm, under visual elements.

3 Old-fashioned vs. modem was the second-highest scoring item under Style. Stately vs. modest also scored highly under the Style factor and, although not the third highest scoring, was included at the discretion of the researchers.

TABLE 3. *Proportion of respondents claiming ability to identify wood species on the perception-based questionnaire, and proportion correctly identifying wood samples on the appearance-based questionnaire.*

	Oak	Mahogany	Cherry	Walnut	Maple	Pine
			%			
			Perception-based questionnaire			
Claimed ability to identify	75	56	52	24	32	61
			Appearance-based questionnaire			
Correctly identified	26	3	11	18	9	42
Most prominent incorrect answer	7 (maple)	15 (cherry)	11 (cedar)	8 (mahogany)	6 (pine)	3 (birch, oak)
All other incorrect answers	9	27	24	18	14	5
No attempt to identify	58	55	54	56	71	50

RESULTS

Claimed versus demonstrated wood identification ability

There was a large divergence in the proportion of respondents on the perception-based questionnaire claiming an ability to identify the study species versus the proportion of appearance-based questionnaire respondents correctly identifying the study species (Table 3). This suggests that the evaluations on the appearance-based questionnaire were generally not contaminated by identification of the individual species being viewed, but were based primarily on the appearance of the specimens. The divergence between claimed and actual wood identification could be the result of honestly held but overstated beliefs of ability, or pressure to claim wood identification skills, particularly by students in the forestry-related classes. However, when the students from the introductory psychology class were compared to the students in the remaining classes on the proportion claiming identification ability, the two groups were within 5 percentage points for each species, with the exception of pine. For pine, 46% of the introductory psychology students and 73% of the remaining students claimed that they knew pine by appearance. Since the psychology students had little incentive to claim, in an anonymous survey, the ability to identify wood species, the results suggest little evidence of willfully inflated wood identification ability.

Respondents seemed to have a particularly difficult time with identification of mahogany, maple, and cherry on the appearance-based questionnaire. Seventy-one percent of respondents attempted no answer for maple; these figures were in the 50-58% range for all other species. By observing the incorrect attempts at identification, it seems respondents at least had some idea of "dark" woods and "light" woods. Most of the incorrect answers for mahogany, cherry, and walnut involved similar-looking, darker-colored wood species, while oak, maple, and pine were misidentified most often as lighter-colored wood species.

Perception-based and appearance-based evaluations

The results of the perception-based and appearance-based evaluations for each species are shown in Figs. 3-9. A two-tailed *t* test was used to determine if each mean was statistically different from the scale midpoint of 4.0. The alpha level was set at 0.05 to reduce the occurrence of Type I errors among the multiple tests. Additionally, statistically significant differences (based on two-tailed *t* tests, $\alpha = 0.05$) between the perception-

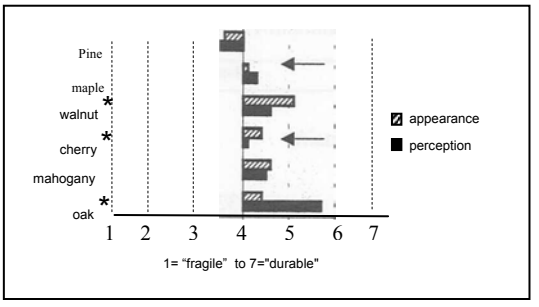

FIG. 3. Average scores by species for fragile vs. durable. Arrows denote means not significantly different than the scale midpoint of 4.0; stars denote species means differing statistically between perception and appearance.

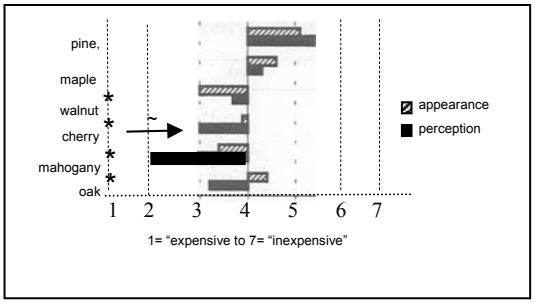

FIG. 4. Average scores by species for expensive vs. inexpensive. Arrows denote means not significantly different than the scale midpoint of 4.0; stars denote species means differing statistically between perception and appearance.

based and appearance-based item means for each species were noted.

Fragile vs. durable. -Respondents to both the perception-based and appearance-based questionnaires seemed to agree that, with the exception of pine, the species studied were in the middle to upper-half of the fragile vs. durable scale (Fig. 3), suggesting an attitude that wood is generally a durable material. Respondents further agreed that pine was a fragile species. The darker woods, especially walnut, were viewed as more durable based on appearance, but oak was perceived as the most durable. Oak also was viewed as the most durable among the lighter-colored species. There were three statistically significant differences by species between the perception-based and appearance-based item means. The most substantial contradiction between perception and appearance (defined henceforth as a difference 2:1.0 in means) occurred for oak, which was perceived to be more durable than it appeared.

Expensive vs. inexpensive. -On the expensive vs. inexpensive scale, there was again agreement between perception and appearance that pine was inexpensive (Fig. 4). Mahogany, cherry, oak, and walnut were perceived as expensive, while walnut and mahogany were viewed as expensive. Generally, darker-colored woods were viewed as expensive and lighter-colored woods were viewed as inexpensive. It is interesting that respondents did not perceive of or view maple (currently popular in furniture and cabinets applications and quite expensive in the clearer, upper grades) as expensive. It is also interesting that cherry was not viewed as expensive but was perceived as expensive. There were four statistically significant differences by species between the perception-based and appearance-based item means. The most substantial contradictions between perception and appearance occurred for oak, which was perceived as expensive but viewed as inexpensive, and mahogany, which was perceived to be more expensive than it appeared.

Casual vs. formal.-Based on the casual vs. formal evaluations, pine was the species for which there was the most agreement between perception and appearance (Fig. 5). In both cases, pine was rated as somewhat casual. In general, the lighter-colored woods were reported to appear as more casual than the darker-colored woods. Mahogany and cherry were perceived as the most formal species. There were five statistically significant differences by species between the perception-based and appearance-based item means. The most substantial contradictions between perception and appearance occurred for oak, mahogany, and maple. In particular, oak was perceived as formal but viewed as casual.

Old-fashioned vs. mode. -On the old fashioned

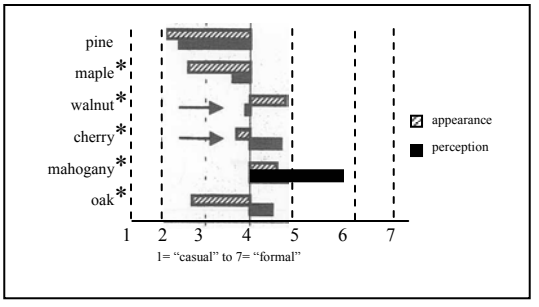

FIG. 5. Average scores by species for casual vs. formal. Arrows denote means not significantly different than the scale midpoint of 4.0; stars denote species means differing statistically between perception and appearance.

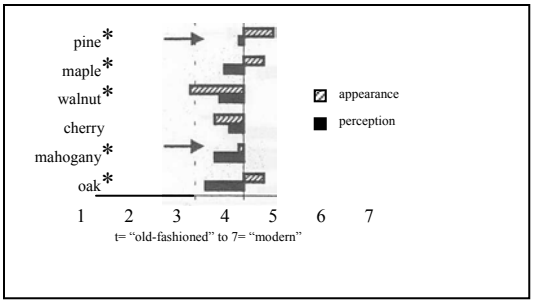

FIG. 6. Average scores by species for old-fashioned vs. modern. Arrows denote means *not* significantly different than the scale midpoint of 4.0; stars denote species means differing statistically between perception and appearance.

vs. modem scale, respondents perceived all study species as being old-fashioned, with the exception of pine that fell in the middle of the scale (Fig. 6). Lighter-colored woods were viewed as more modem. Walnut, the darkest of the study samples, was viewed as the most old-fashioned, but mahogany, another dark species, was not viewed as old-fashioned. There were five statistically significant differences by species between the perception-based and appearance-based item means. Both oak and maple were perceived as old-fashioned but viewed as modem; the difference was substantial for oak.

Stately VS. modest.-For the stately vs. modest item, only pine was perceived as modest (Fig. 7). All other species were perceived as stately, except for maple, which was not significantly different from the midpoint. The appearance-based evaluations closely followed wood color; the darker-woods were rated as more stately and the lighter woods were rated as more modest. Mahogany was perceived as the most stately, while walnut was viewed as the most stately. There were four statistically significant differences by species between the perception-based and appearance-based item means. Once again, there was a substantial contradiction regarding oak, with this species being perceived as stately but viewed as modest. Mahogany was perceived as substantially more stately than it appeared.

Cold vs. warm.-Most species were perceived as warm on the cold vs. warm scale, with pine and walnut being exceptions nearer the scale midpoint (Fig. 8). However, based on appearance, only mahogany was rated as warm. It is interesting that mahogany was viewed as warm while walnut was viewed as cold, despite their similarity in color. There were four statistically significant differences by species between the perception-based and appearance-based item means. The most substantial differences between perception and appearance occurred for oak, cherry, and maple. Oak and maple were perceived as warm but viewed as cold. Cherry was perceived to be somewhat more warm than it appeared. Among all the semantic-

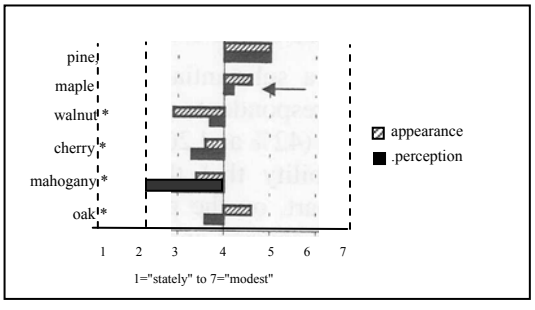

FIG. 7. Average scores by species for stately vs. modest. Arrows denote means not significantly different than the scale midpoint of 4.0; stars denote species means differing statistically between perception and appearance.

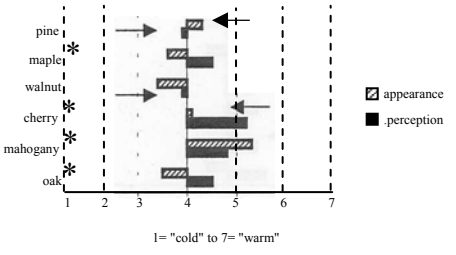

FIG. 8. Average scores by species for cold vs. warm. Arrows denote means not significantly different than the scale midpoint of 4.0; stars denote species means differing statistically between perception and appearance.

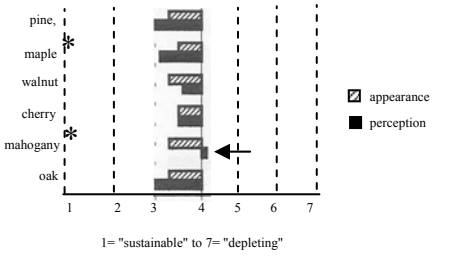

FIG. 9. Average scores by species for sustainable vs. depleting. Arrows denote means not significantly different than the scale midpoint of 4.0; stars denote species means differing statistically between perception and appearance.

differential items, the greatest number of means not differing from the scale midpoint occurred for cold vs. warm.

Sustainable vs. depleting.-Respondents to both questionnaires generally agreed that the study species were on the sustainable side of the sustainable vs. depleting scale (Fig. 9). The lone exception was mahogany, which was not significantly different than the scale midpoint based on perception. There was very little variation between the species averages based on appearance, suggesting, understandably, the difficulty of such an evaluation based on wood appearance. However, there also was relatively little variation among the species means based on perception. There were two statistically significant differences by species between the perception-based and appearance-based item means.

The moderating role of perception in appearance-based evaluations

The fact that a substantial portion of appearance-based respondents correctly identified pine and oak (42% and 26%, respectively) raises the possibility that these evaluations were based, in part, on the perceptions associated with these species and not appearance alone. Two-tailed *t* tests confirmed this possibility (Table 4). At ex = 0.05, respondents who correctly identified pine found it to be more fragile, inexpensive, casual, old-fashioned, modest, and sustainable than did those not correctly identifying pine. In fact, only cold vs. warm was not significantly different between the two groups. Respondents correctly identifying oak found it to be more formal than did those who failed to identify it correctly, which is more consistent with the perception-based evaluation.

Differences by gender

Gender differences were not widespread, but some were observed based on two-tailed *t* tests (ex = 0.05). Men tended to perceive of oak as more formal and more expensive than did women, while women perceived pine as more formal than did men. Men perceived walnut to be more expensive than did women. Some gender differences based on wood appearance also were observed. Women viewed oak as more casual and more modern than

TABLE 4. *Comparisons of item means and results of two tailed t tests for those correctly and incorrectly identifying pine and oak on the appearance-based questionnaire.*

Item	Correctly identified	Incorrectly identified	*p* value
	Pine		
Fragile vs. durable	2.8	4.1	<0.0
Expensive vs. inexpensive	5.7	4.6	<0.0
Casual vs. formal	1.7	2.4	0.0
Old-fashioned vs. modern	4.2	4.9	0.0
Stately vs. modest	5.5	4.6	0.0
Cold vs. warm	4.1	4.5	0.2
Sustainable vs. depleting	2.8	3.6	0.0
	Oak		
Fragile vs. durable	4.8	4.3	0.0
Expensive vs. inexpensive	4.2	4.5	0.4
Casual vs. formal	3.3	2.6	0.0
Old-fashioned vs. modern	4.4	4.4	0.7
Stately vs. modest	4.3	4.8	0.1
Cold vs. warm	3.3	3.6	0.2
Sustainable vs. depleting	3.5	3.2	0.1

did men. Men viewed pine to be more fragile than did women. Lastly, women viewed cherry as more casual than did men.

DISCUSSION

The basic conclusion to be drawn from this study is that major wood species used in secondary products are not equal in terms of the psychological meanings they can contribute to products. With the appearance-based evaluations, there was a tendency to rate woods similarly based on the general color of the wood. Darker woods (i.e., mahogany, cherry, and walnut) tended to be rated as expensive, formal, old-fashioned, and stately, while lighter woods were generally viewed as inexpensive, casual, modern, and modest. This is consistent with previous research, which found that staining altered appearance-based evaluations. While the impact of grain was more difficult to assess since most studied species were closed-grain, the open-grain of oak may have contributed to its durable appearance when compared to the other lighter-colored species. For some scales, such as sustainable vs. depleting, there was general agreement across species. Interestingly, with the exception of mahogany, respondents perceived all of the study species as sustainable. In some cases, gender differences were found. Differences between the male and female perspective generally involved casualness and expensiveness and were most apparent for oak and pine.

The results suggested that respondents over-estimated their ability to identify the wood species used in the study. This indicates that perceptions of individual wood species were not often based on knowledge of appearance but something else, perhaps a general familiarity gleaned from cultural references (Blomgren 1965). The exception might be pine, which was correctly identified the most often and was the species for which the perception-based and appearance-based evaluations were most similar. Respondents seemed to have a particularly difficult time with identification of mahogany and maple, the latter being an interesting finding given its current popularity in the marketplace but similar to findings by Swearingen et al. (1998) that maple was not readily recognized. By observing the incorrect attempts at identification, it seems respondents at least had some idea of the common species comprising darker- and lighter-colored woods.

It is often said that perception is reality, and an important marketing consideration is the perception that customers have of a given species without necessarily knowing what it actually looks like. Often, promotional messages via magazine, television, or newspaper advertisements reach consumers before actual store or showroom observation of products, and by understanding perceptions, more effective and relevant promotional messages can be developed. For instance, the study species were considered durable with the notable exception of pine. Thus, promotion of pine in secondary products might do well to stress durability. Another implication is that perceptions might change once the actual product is viewed in the store or showroom, so an understanding of such inconsistencies can help reduce consumer anxiety or confusion. Oak is an example of a species whose reputation might outweigh its appearance. Perceptually, oak was considered formal, warm, expensive, and stately. Based on appearance, oak was rated as casual, cold, inexpensive, and modest.

A final consideration is the design implications for secondary wood products and the psychological contributions different species can make to the overall product concept. While cost, availability, and workability are prominent considerations in species decisions by manufacturers, the emotional appeal of wood should be considered as well. For example, a perception associated with all of the study species was that of being old-fashioned (i.e., wood is an old-fashioned material). How ever, lighter-colored woods were viewed as modem, suggesting the

appropriateness of their use in more contemporary designs or as providing a modem twist to a traditional or transitional design. Lastly, with the ability of modem finishing techniques to greatly alter the appearance of any given wood, species perception may represent a more consistent and lasting component of the total product concept for wood products. Perception marks a potentially important difference between products made from similar-looking woods (e.g., cherry and stained maple). Cherry was perceived as expensive and formal, while maple was perceived as inexpensive and casual. Thus, when species decisions are made by product development personnel, consideration of associated differences in promotional messages should also be made.

This study was limited in that potential interactions between species and other design factors such as style, finish, and hardware were not considered. Although bedroom furniture was given as the reference product for species evaluation, no physical furniture samples were used, only wood specimens. Perhaps attitudes toward species vary by the product for which they are used. Also, the sample was not necessarily representative of current consumers but more closely represented future consumers; it is not known from this study if attitudes toward wood species change with age and experience. Given the possible bias present in the sample and the corresponding difficulty in assessing external validity, caution should be used in drawing conclusions about household consumers. The study has demonstrated, however, that there are perceptual differences between wood species and that these are frequently not related to appearance or the ability to identify the same species. The results also suggest that perception can affect appearance-based species evaluations when the consumer knows what he or she is observing.

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