

Signage Preference in Grocery Stores

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This study aims to understand if currently available grocery store signage is adequately assisting customers in finding the items they're looking for. Kaplan's Preference Theory, which focuses on complexity and legibility, is used as a framework for testing the effectiveness of both existing signs and newly designed ones. Four new signs in Virtual 3D scenes were designed to reveal whether the manipulation of the two variables had any effect on their preference toward the new signage. Participants were given a task-oriented questionnaire that consisted of multiple-choice, Likert Scale, ranking, and open-ended questions. It was originally hypothesized that participants would prefer more information and the presence of a graphic (high complexity x low legibility); however, results indicated that people preferred signage with less information but more graphic appeal (low complexity x low legibility). Implications of these results suggest that designers and store owners should carefully consider limiting the amount of information they use on their signs, and potentially provide relevant graphics to enhance visual cues.

INTRODUCTION

One of the more recent topics in the field of Architecture and Interior Design is environmental psychology and the study of human behavior within built environments. The influence of the environment on peoples' behavior has been recognized and studied for quite some time (Donovan, 1982), though only in the last few decades has it becoming increasingly important to apply these findings to create more effective built environments. For example, architects and designers have made more efforts to integrate natural light into spaces now that we understand that sunlight is necessary for humans to function productively. As the Interior Design profession grows, so does research in this topic of environmental psychology. The importance of investigating different people's interactions, responses, and preferences is not only invaluable for understanding human behavior, but can also assist designers in creating spaces that are better suited to the needs of a targeted demographic.

An architectural interior can elicit certain reactions and emotions as well as shape behaviors both positively and negatively, intentionally or not. Much of the general public spends most of their time every day indoors, whether they are working, eating, sleeping, shopping, or enjoying leisure activities. For that reason, it is imperative to study the patterns of users' perceptions and preferences of interior spaces.

Retail stores have the potential to offer unique environments that may influence the customer's decision. Since many grocery shoppers decide which items they are going to purchase on the spot, in-store elements can often have more profound effects than advertising (Baker, Grewal, & Parasuraman, 1994). For example, a shopper may have "cereal" on their shopping list but may not have

already made a decision about what type of cereal. In-store displays, signage, and other design and marketing decisions have the capacity to greatly persuade the shopper one way or another.

Although retail environments provide us with the opportunity to get things that we need for our everyday lives, the shopping experience is complex and a poorly designed space has the potential to dissuade the consumer. Therefore, it is important to understand the variety of possibilities available for designing a successful retail space as well as what elements will make the space successful.

In the case of interior retail environments, a consumer's experience with the space can begin before they even step into the store (Kopec, 2006). The experience can be broken down into three distinct processes: objective (a need/desire for a particular item or service), process (time, effort, and expense required to acquire it), and outcome (feelings evoked before, during, and after the acquisition).

There are two basic types of shoppers: recreational and utilitarian (Kopec, 2006). These types of shoppers behave very differently and have different attitudes in a store environment. Recreational shoppers typically shop for the entertainment aspect, while utilitarian shoppers are on a mission to acquire a specific item or items and do not necessarily find the experience enjoyable. Different types of stores may cater to these different types of shoppers; for example, a boutique store may draw in recreational shoppers while a drugstore more likely draws in the utilitarian.

Grocery stores are somewhat unique in that they draw in all different sorts of consumers no matter which type of shopper they are. People may avoid shopping for clothes or household items if shopping doesn't excite them, but eventually most must go shopping for food to survive.

Grocery shopping isn't always a leisurely trip: people often arrive with a list of things to purchase and are interested in getting home quickly to put away cold items. The population that visits grocery stores is vast and varied from young to old, singles to families, etc. This large demographic implies a large array of different needs, including but not limited to varying levels of physical abilities (mobility, visual acuity, etc.), range in proficiency with cooking/pairing ingredients, and available time (in a hurry vs. not in a hurry).

The other issue that grocery stores face is that they stock thousands of items in many different categories, some items even being very similar or indistinguishable but produced by different brands. While organization and wayfinding tactics help people to find what they're looking for, not everyone personally categorizes foods in the same way and categorical cues may not trigger the same associations for everyone. For example, if a customer is looking for "allspice" and it is located in the "baking" aisle, someone who does not typically use it for baked goods might not pick up on that association and have trouble finding it.

An effective tactic for dealing with all of these issues related to grocery shopping is to provide effective signage. If the system of signage is designed properly, the majority of people will be able to read it, find what they are looking for, and leave the store in a timely manner. Signage should be a whole system that helps customers navigate and make decisions, and if the signage is done well it should effectively disappear (Mellgren, 2005).

Research Purpose & Questions

The purpose of this study was to investigate alternate ways of designing signage for grocery store aisles. Given the large demographic, vast number of items to choose from, and the store's desire to make as much profit as possible, it is important that signage be clear and informative for the largest number of shoppers. This study was based on the Kaplan and Kaplan Preference Framework and tested a combination of two variables: legibility and complexity.

The research question aims to evaluate peoples' preferences at varying levels of complexity and legibility in order to conclude which type of signage would be best for grocery store aisles. At this point it is unknown whether more complex (itemized) signage would be more helpful or more confusing for people trying to locate items, as well as

how the level of legibility (graphic design) will affect this. For example, would it be better to have a very detailed sign that listed every item in the aisle, or would it be better to have a simple sign with just a few words as cues? Within those two options, would it be better to provide a decorative graphic for a visual cue or a sign with no embellishment? This study aims to pinpoint peoples' preference for these different options and to find out their effectiveness.

This study will contribute to the body of knowledge concerning signage issues in grocery store environments and provide designers with knowledge for creating a more effective retail space. This in turn will provide a better shopping experience for consumers as they try to locate items in the store, and perhaps boost sales and create repeat customers.

In this study, some of the questions being asked are as follows:

- How do people feel about grocery store aisle signage that is currently available?
- What are the perceived problems/advantages concerning existing signage?
- How will people to respond to more complex, itemized signage?
- How will people respond to signage with varying levels of graphic design?
- Will people prefer a newly proposed signage design over any of the existing designs?

Results from this study responded to the significance of this topic and demonstrated whether these issues are important in the world of grocery store design. It is anticipated that participants will prefer a signage design with high complexity and low legibility based on the hypothesis that more information and visual stimulation will be the most appealing.

RESEARCH METHODS

Initial Investigations

Pre-design research began with visiting different existing grocery stores and documenting signage types that were already being implemented. The discovery was that four main types of signage were present in all six grocery stores (some stores used more than one type), and each type had their own pros and cons. These four types are indicated in Figure 1 (shown in aerial view, signs have arrows indicating the direction of information):

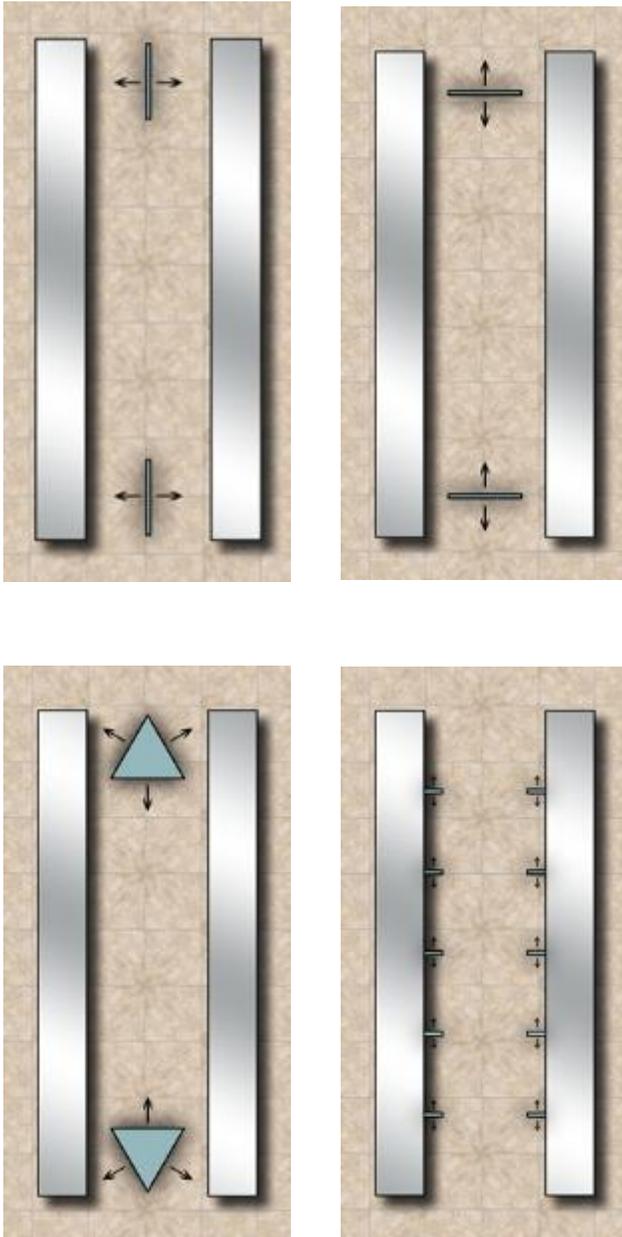


Figure 1. Four Existing Signage Types, Viewed From Above

Participants

The participant group for this study consisted of both male and female adult undergraduate students and was recruited for the study through the Behavioral Research Lab in the Marketing Department at the University of Florida. Participants could volunteer to partake in the study and were awarded extra credit for classes in which they were currently enrolled.

The study required participants to perceive colors in the scenes that they were shown, so they were asked whether they had any visual impairment or inability to see colors that could not be corrected by contact lenses or eyeglasses. Participants gave their consent to be surveyed, and permission was granted by the University of Florida's

Institutional Review board to engage in research with human subjects.

Kaplan's Theory

This study focused specifically on legibility and complexity and how signage can be designed to test varying levels of these two characteristics. Each category had two levels of intensity (low and high); this creates four different combinations of virtual store environments, demonstrated in Table 1.

Table 1. Kaplan's Theory Applied to Store Scenes

Characteristic	Complexity (low)	Complexity (high)
Legibility (low)	Scene A Graphic Few words	Scene B Graphic Many words
	Scene C No graphic Few words	Scene D No graphic Many words

Differences in legibility and complexity were manipulated by the use of a graphic design and the amount of information, respectively. Low legibility signage displayed a large graphic meant to enhance the aesthetics of the sign at the potential cost of being more legible, while high legibility signage contained no graphic. The graphic was also indicative of what the aisle contained. Low complexity signage listed just a few items indicating the types of foods in each aisle, and high complexity signage listed every type of item in the aisle.

The different scenes were created by computer rendering through the use of a combination of AutoCAD, Revit Architecture, and Adobe Photoshop. Each scene contained the same types of products, colors, and lighting methods and only the signage itself in the space was manipulated.

Research Setting

In order to find out peoples' preferences towards signage with the different combinations of characteristics, participants needed to be presented with realistic scenes that would give them enough context to make an informed decision. By providing digitally rendered scenes, it was much easier to control potential unwanted variables that could appear if testing in a real-life setting. The alternative would have been to construct an actual life-sized grocery store model, which was not feasible given the constraints of this study.

The layout for the grocery store that appears in the scenes was taken from an actual grocery store provided through a design competition presented by the Retail Design Institute. This floor plan used a generic grocery store layout that fit the needs of this study.

A field investigation was done in order to find out what type of modular shelving was being used in grocery stores and if there was consistent sizing among shelving units. Most units averaged about 7' tall and contained 6 to 7 rows of shelving, depending on the size of the items being displayed. Shape and form were more or less the same, though there was slight color variation from store to store. Stores consistently employed rows of these shelving units with endcaps at either ends of the rows.

The first set of four scenes in Figure 2 was created to reflect the four existing signage types found in the initial investigations. Neutral colors were used in the scenes in order to avoid triggering any recognition of an existing grocery store, and shelving was populated with staple items that most participants could recognize. The lighting used in the scenes was a series of cool fluorescent fixtures, which are extremely prevalent in stores of this type.



Figure 2. Scenes for existing signage

The second set of four scenes was created using the same method; however, they contained slight differences. First, they employed the new signage, which only differed graphically from scene to scene and not by shape, form, or location. The point of reference was shifted slightly to focus more on one individual sign, whereas the first set of images used a wider cone of visibility in order to provide a comprehensive view of the signage as a system. The new scenes also displayed different foods on the shelves, drawing selections based on research done about commonly recognized “staple foods.” Signage was designed to be visually appealing while still being functional and not lending itself to mimic any particular grocery store’s design.

Complexity and legibility were manipulated to create four distinct new signs. In the low-legibility scenes, the

aisles contained pasta products and sauces, so the graphic was a close-up image of a prepared pasta dish. Hypothetically, other aisles in the grocery store would have similar signage with a different graphic for each aisle. The logic behind this decision was that the graphic may interfere with the legibility by complicating the background, but would be aesthetically appealing and indicate the contents of the aisle. The complexity of the signage was manipulated by changing the amount of information on each sign. Two of the scenes contained signs with general, categorical words such as “PASTAS, SAUCES, RICE,” etc. and the remaining two scenes contained a detailed, alphabetized list of every item in the aisle. These 4 combinations can be seen in Figure 3 and 4.

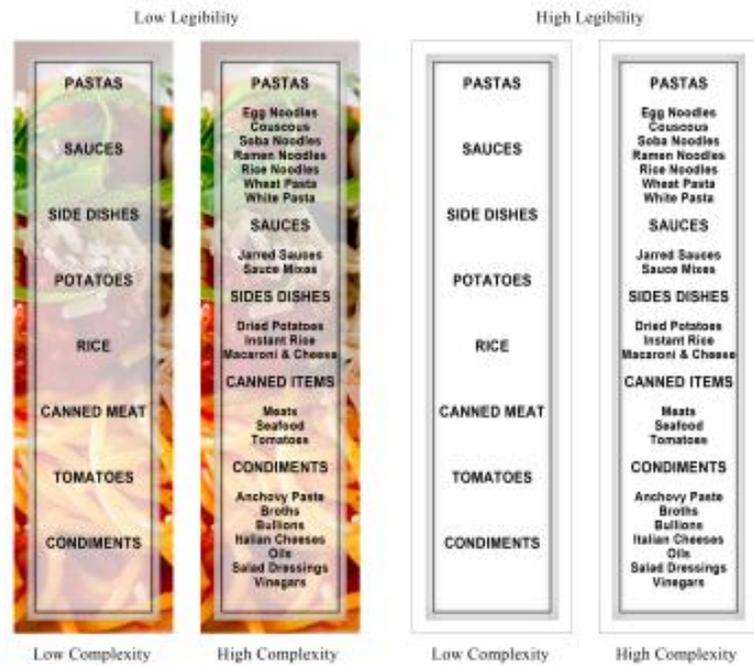


Figure 3. New signage designs



Figure 4. Final rendered scenes

Instrument

After creating all eight rendered scenes, a questionnaire was created that could accurately test participants' preferences toward the signage as well as gather qualitative responses about their preferences and why they made certain decisions. The questionnaire used a combination of Likert Scale, ranking, open-ended, and multiple-choice questions. Seven-point Likert Scale questions were used to find out how participants viewed characteristics for each scene.

Each participant was first presented with one random scene and then later with all four scenes and was asked to rank them. Participants were also asked to simply describe what they did or did not like about the scene and later their reasoning for which they ranked first and last.

Previous research studies using similar methods to test environmental preference and/or Kaplan's Theory were referenced in order to develop an effective questionnaire. Herzog and Miller's study (1998) about perceived danger and environmental preference uses a very similar approach by showing participants different scenes and asking them a

series of these types of questions. Results were statistically analyzed and revealed the desired representations of preference for each scene.

Data Collection

A survey tool called Qualtrics was used to create the questionnaire and distribute it to participants. This software allowed for the creation of a questionnaire that could distribute a random scene to each participant and ensure that a similar amount of participants received each of the scenes. After the data collection was complete, each of the four scenes collected responses from about 25% of the participants, making the results very evenly distributed.

RESULTS

Analysis of variances was used on the questionnaire data in order to find out if the different levels of complexity and legibility played a role in participants’ preferences of the scenes. The first section addresses demographic information of the participant group and their overall preference towards shopping. The next section contains both Likert Scale open-ended questions concerning peoples’ personal opinions about single scenes as well as rankings where participants order all four scenes from most preferred to least preferred and give a rationale.

Participant Demographics

As shown in Table 2, males represented a higher percentage of the participant group than females. Only 3 participants failed to provide their gender information. The largest percentage of the participants was between the ages of 21 and 30, and only 3 participants failed to provide their age.

Table 2. Participant Demographics

Source	Frequency	%	Frequency	%	
Gender			Age		
N/A	3	2.6	N/A	2	1.8
Male	60	52.6	41+	8	7.0
Female	51	44.7	31-40	23	20.2
Total	114	100.0	21-30	53	46.5
			18-20	28	24.6
			Total	114	100.0

Participants were also asked if they had any type of visual deficiencies that could not be overcome using

corrective lenses. Any data from participants who responded “yes” to this question was removed, since the study relied on visual capabilities.

One of the demographic questions asked to participants was how they felt about grocery shopping in general, and they responded on a scale of one to seven with one being “hate it” and seven being “love it.” The reason for this was to find out if peoples’ attitude towards shopping affected any of the other variables in the study. Most people felt neutral or better towards grocery shopping, with only 21.1% responding below neutral (see Table 3). Further analysis of this data showed no significant difference between genders, and it did not largely affect preference for any of the scenes.

Table 3. Participant Shopping Preference

Source	Frequency	%
1 (Hate it)	6	5.3
2	8	7.0
3	10	8.8
4 (Neutral)	18	15.8
5	36	31.6
6	25	21.9
7 (Love it)	11	9.6
Total	114	100.0

*7-point Bipolar Semantic Scale: 1 = Hate it; 7 = Love it

Scene Rankings

When first presented with one random scene, responses were positive, negative, and neutral towards the signage: participants were given no other scenes to compare with and therefore responded abstractly about what came to mind. Once all four scenes were presented and participants were asked to rank them from highest to lowest preference, there was a very strong, consistent ranking pattern and responses began to produce similar themes.

Upon seeing the first scene, participants were asked if they liked the signage and if they thought it provided adequate information. People were relatively neutral about liking the signage, and their decision was not significantly affected by either complexity or the legibility. They were slightly more positive about feeling that the signs provided adequate information, but again were not highly affected by either the complexity or legibility variables (see Tables 4 and 5).

Table 4. Mean and Standard deviation (SD) Scores for Subjects' Evaluation of Preference

Source	n	Mean ²	SD	p-value
Complexity				.994
Simple	57	3.79	2.27	
Complex	57	3.81	2.12	
Legibility				.221
Easy to read	56	4.05	2.19	
Difficult to read	58	3.55	2.17	
Complexity by Legibility				.114
Scene A (Simple x Easy)	28	3.71	2.39	
Scene B (Complex x Easy)	28	4.39	1.97	
Scene C (Simple x Difficult)	29	3.86	2.20	
Scene D (Complex x Difficult)	29	3.24	2.13	

*7-point Bipolar Semantic Scale: 1 = Not at all; 7 = Very much

Table 5. Mean and Standard Deviation (SD) Scores for Subjects' Evaluation of Adequate Information

Source	n	Mean ²	SD	p-value
Complexity				0.50
Simple	56	5.61	1.80	
Complex	57	5.37	1.88	
Legibility				0.40
Easy to read	55	5.64	1.70	
Difficult to read	58	5.34	1.95	
Complexity by Legibility				0.48
Scene A (Simple x Easy)	27	5.63	1.74	
Scene B (Complex x Easy)	28	5.64	1.70	
Scene C (Simple x Difficult)	29	5.59	1.88	
Scene D (Complex x Difficult)	29	5.10	2.02	

*7-point Bipolar Semantic Scale: 1 = Strongly disagree; 7 = Strongly agree

When presented with all four scenes at once and asked to rank them, the themes that the responses began to create were very clear and able to be organized into three categories: complexity, legibility, and overall appearance (see Table 7). Most participants used words to describe the scenes like “complex, simple, easy to read, clear, busy, hard to read, attractive, etc.” that matched the definitions of the variables. This was a very positive outcome since it reinforced that the study achieved what it set out to discover. Overall, there was an overwhelming preference for scene A (low complexity, low legibility) and an overwhelming dislike for scene D (high complexity, high legibility). People found scene A to be simple and attractive, and scene D to be boring and cluttered (see Table 6).

Table 6. Ranking Frequencies for each Scene

Scene	Ranking			
	1	2	3	4
A	66	33	9	6
B	18	20	46	30
C	25	50	24	15
D	5	10	37	62

For each of the scenes that participants ranked “most liked” or “least liked,” Table 7 presents the frequency of open-ended answers in each category. Comments in the “most liked” category were positive, and comments in the “least liked” category were negative. It is clear that scene A was thought to be clear and legible, while scene D was too busy and aesthetically unappealing.

Table 7. Qualitative Themes

	Themes (Most Liked)			Themes (Least Liked)						
	Complexity	Legibility	Appearance	Total		Complexity	Legibility	Appearance	Total	
				n	%				n	%
Scene A	35	31	44	110	59.46	5	1	2	8	4.88
Scene B	12	1	14	27	14.59	22	10	10	42	25.61
Scene C	15	19	4	38	20.54	8	1	10	19	11.59
Scene D	5	4	1	10	5.41	49	13	33	95	57.93
Total	67	55	63	185	100.00	84	25	55	164	100.00

Statistical analysis revealed that the scenes did indeed vary in complexity and legibility as they were designed; however, the factors affecting them were not as expected (see Tables 8 and 9). For complexity, the amount of text in the sign was manipulated and created either a simpler or more complex sign as intended. For legibility, the presence of a graphic element was supposed to create a sign that was either easier to read or harder to read. However, the graphic actually did little to affect the legibility and it was the amount of text on the sign that affected it instead. As a result, more is known about peoples' preference towards signage with interesting graphics, but in this case it did not affect how easy or difficult it was for someone to read it.

Table 8. Mean and Standard Deviation (SD) Scores for Subjects' Evaluations of Complexity

Source	N	Mean ²	SD	p-value
Complexity				.000
Simple	57	6.04	1.60	
Complex	57	4.32	2.22	
Legibility				.835
Easy to read	56	5.21	2.21	
Difficult to read	58	5.14	2.04	
Complexity by Legibility				.712
Scene A (Simple x Easy)	28	6.14	1.82	
Scene B (Complex x Easy)	28	4.29	2.19	
Scene C (Simple x Difficult)	29	5.93	1.39	
Scene D (Complex x Difficult)	29	4.34	2.29	

*7-point Bipolar Semantic Scale: 1 = Complex; 7 = Simple

Table 9. Mean and Standard Deviation (SD) Scores for Subjects' Evaluations of Legibility

Source	N	Mean ²	SD	p-value
Complexity				.001
Simple	57	5.67	2.0	
Complex	57	4.39	2.03	
Legibility				.331
Easy to read	56	5.21	2.18	
Difficult to read	58	4.84	2.03	
Complexity by Legibility				.570
Scene A (Simple x Easy)	28	5.96	2.12	
Scene B (Complex x Easy)	28	4.46	2.01	
Scene C (Simple x Difficult)	29	5.38	1.86	
Scene D (Complex x Difficult)	29	4.31	2.09	

*7-point Bipolar Semantic Scale: 1 = Difficult to read; 7 = Easy to read

CONCLUSIONS AND DISCUSSIONS

This study was designed to investigate preference for signage based on varying levels of complexity and legibility. The results indicated that the original hypothesis was partially incorrect, and that participants did not find the signage more appealing when it was densely populated with information. Despite the fact that the more complex signs offered more specific and detailed information about the aisle's contents, people felt they were more cumbersome to read. However, this finding was consistent with the hypothesis that participants were more drawn to the signage with the graphic detail and in general thought it was a positive aspect. The combination of aesthetics and a moderate amount of information (low complexity, low legibility) was the most appealing.

Some possible limitations and/or opportunities for further investigation may include the effects of reducing the area for product display on the endcap, varying the typeface/graphic elements, and testing participants' ability to read the signage at different distances. There are many opportunities for this study as there are several other variables and environmental characteristics that can be manipulated.

To further this study, the next logical step would be to redesign the new signs so that legibility is being measured in the way that it was intended. As previously stated, legibility was successfully manipulated but as a result of complexity and not the influence of the graphic. This was a minor setback and it does indicate that a pleasing graphic

does not interfere with how easy or difficult it is for people to read the signs.

These findings suggest that interior/graphic designers could benefit their clients' facilities by creating and employing these types of signs. Placing signs at eye level, including visually appealing elements, and limiting the amount of information on each sign are positive factors for this type of setting. Signage that uses these design elements could lead to higher sales and less customer confusion. This information could potentially be a useful addition to the current body of knowledge, and will continue to expand as more is discovered about interior environmental preference.

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