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Relevance ratings and salience categorizations for objects in a set of 80 pictures

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In this study, we provide normative data for objects in a set of 80 digital color pictures (e.g., nature scenes, human activities, cartoon characters, magazine covers). In Experiment 1, four objects in each picture were rated by 48 observers on a 6-point Likert scale for their relevance to the overall meaning of the scene. In Experiment 2, Salience Toolbox software (Walther & Koch, 2006) provided additional information about whether the four relevance-rated objects were located in areas that were high or low in visual salience. Brief descriptions of the four objects, their locations in the picture, their categorizations as high or low in salience, the means and standard deviations of their relevance ratings, and statistical analyses specifying which pairs of objects in a picture differed significantly on their relevance to the meaning of the scene are given in the Appendix. An example is provided of how the pictures could be used to create stimuli for a change blindness task in which detection of item onset versus offset is contrasted for low-relevance and high-relevance features. The 80 pictures are accessible as jpg files from the first author's Web site at http://marcellm.people.cofc.edu/research.htm.

Change blindness refers to a phenomenon in which observers fail to notice significant changes to a visual scene. Early research on change detection showed that meaningful alterations made to text or line drawings during a saccade often go unnoticed (e.g., Rayner, Balota, & Pollatsek, 1986). Recent research with visually realistic stimuli has demonstrated that difficulty in perceiving change is much more widespread than most people believe (Levin, Momen, Drivdahl, & Simons, 2000). For instance, observers show a surprising inability to detect the substitution of actors across video cuts (Levin & Simons, 1997) and are slow to notice changes in the location, color, and presence of objects across two photographs briefly separated by a flicker (e.g., O'Regan, Rensink, & Clark, 1999). Applied work has also demonstrated the existence of change blindness in complex real-world tasks, such as driving simulations (Wallis & Bülthoff, 2000) and monitoring of Naval Combat Information Center consoles (DiVita, Obermayer, Nugent, & Linville, 2004).

One factor that has been reliably shown to influence whether a visual change is detected is the degree to which an object or a feature is important or meaningful in relation to a scene. Studies by Rensink and O'Regan have shown that changes to items of central interest are more readily detected than changes to items of marginal interest (O'Regan, Deubel, Clark, & Rensink, 2000; O'Regan et al., 1999; Rensink, O'Regan, & Clark, 1997, 2000). O'Regan et al. (2000), for instance, considered an object to be of central interest if at least three of five raters mentioned it in their short description of a scene and of marginal interest if none mentioned it. In their change blindness study, O'Regan et al. (2000) charted the eye scan paths of observers while they viewed changes (appearance/disappearance, shift in position, or color change) to both central- and marginal-interest objects in 48 photographs (the participants were unaware that the changes coincided with their blinks). The results indicated that central-interest changes were detected earlier than marginal-interest changes and that the participants' eyes fixated more on central- than marginal-interest locations.

Other researchers (e.g., Pearson & Schaefer, 2005; Shore & Klein, 2000) have noted that it is unclear, given the manner in which the terms were operationalized, whether central- and marginal-interest changes reflect differences in meaningfulness, perceptual salience, or both. Werner and Thies (2000) provided a more direct examination of the role of meaning in change detection by comparing the performances of 24 experts (professional football players) and 24 novices (people unfamiliar with the game) on their performance with 30 photographs of football-playing formations, action scenes in football games, or traffic scenes. The changes made to the pictures were either semantic or nonsemantic, determined by asking 6 football experts and 5 novices to classify changes "according to their relevance to the image's interpretation and the plausibility of the altered image" (p. 168). The individuals who participated in the change blindness study showed the predicted patterns of performance: The experts noticed semantic (but not nonsemantic) changes to the football-related photographs more quickly than did the novices, and the two groups did not differ in their detection of semantic and nonsemantic changes in the traffic scenes.

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It is evident in the above studies that the importance of an object within a scene has a reliable influence on whether a change to the object will be detected. Our goal in Experiment 1 was to create a sizable set (80) of varied pictorial stimuli with four preselected objects rated by a large group ($N = 48$) of observers on how relevant the objects are to the meaning of the scene. We used instructions to guide the observers in rating the *meaning* of selected items in a picture, rather than their perceptual salience (cf. Hollingworth & Henderson, 2000; Shore & Klein, 2000; Werner & Thies, 2000), providing an empirical set of relevance ratings that differ primarily in terms of their relationship to what O'Regan et al. (2000) called "the main theme of the picture" (p. 193). In Experiment 2, we addressed the issue of whether the relevance-rated objects resided in high- or low-salient areas of the pictures.

EXPERIMENT 1

Method

Participants. Forty-eight College of Charleston undergraduate students (10 male, 39 female) were recruited from the Psychology Department's pool of introductory psychology students who volunteer to participate as part of a research requirement in their course. The mean age of the participants was 18.9 years ($SD = 1.4$). The participants were asked to respond to the question, "I would describe my corrected vision (corrected, if needed, with glasses or contacts) as . . . ," on a Likert scale (1, *very poor*; 4, *average*; 7, *very good*). The mean self-rated vision of the sample was 5.8 ($SD = 1.3$), which was significantly above average [$t(47) = 9.151$, $p < .0001$].

Materials. Eighty digital color pictures were presented in a random order with a computer program written in Macromedia Authorware. The program was presented on 17-in. monitors by PC computers using the Windows NT operating system. The pictures, gathered from our personal collections and public-domain Internet sources, varied in type and topic (e.g., magazine covers, boating, driving, urban scenes, cartoon characters, social gatherings). The first column of the Appendix contains an identification number and the second column a brief verbal label for each picture.

Corel Photo-Paint software was used to reformat all of the pictures as paletted 8-bit jpeg files at 72-dots-per-inch resolution in order to create smaller file sizes for rapid presentation in change blindness tasks. As a result, the pictures rated in this experiment had a lower-resolution (pixilated) appearance than did their original versions (Figure 1 provides an example of both a source picture, with its higher resolution and greater color depth, and the final, lower quality version used in the experiment). Although the pictures varied in their dimensions, the maximum height and width were set to 400 and 600 pixels, respectively, and each picture was presented in a 600 × 800 pixel window.

A list of four randomly ordered descriptions of items[1] was presented next to each picture during the rating procedure. The list included objects within the picture that we believed would be more relevant to the meaning of the scene and objects that we believed would be less relevant to the meaning of the scene. We avoided selecting objects that would be difficult to alter using standard photo-editing software or that would be especially prominent with respect to purely physical features, such as brightness or color. The third column of the Appendix lists these items, and the fourth column lists their location in terms of the upper or lower, right or left quadrant of the picture.

Procedure. The participants completed the study in groups of 10–12 in an on-campus computer lab. They were first asked to read and sign a consent form and were then directed to a computer. All aspects of the study were presented by computer, and the experimenter remained in the room to be available for questions or technical difficulties. The computer program asked the participants to enter a pseudonym, first name, or nickname, and appended a random 4-digit number to the name for entry into the database. The instructions were then presented, followed by the rating task, feedback, and debriefing. The study was self-paced and took an average of 41.0 min ($SD = 6.3$ min) to complete.

The instructions explained that the task was to rate each listed item on how relevant it was to the meaning of the picture. The participants were told that an object should be rated as less relevant if it could be easily omitted without changing the meaning of the picture and more relevant if its omission had some effect, even if small, on the meaning of the picture. The instructions noted the importance of determining the degree to which an item contributed to the gist of the picture and indicated that a rating should not be swayed by the item's size or location. Six reminder screens were presented during the study (one after every 12 trials) that briefly reiterated the instructions and reminded the participants to base their ratings on the relevance of the features to the picture.

At the beginning of each trial, a picture appeared alone on the screen for 5 sec. Afterward, the picture remained on the screen as the list of four randomly ordered object descriptions appeared next to it (both the picture and the list remained on the screen for the dura-

Original Version

Final Version

Figure 1. Original version (24-bit RGB jpg file at 300-dpi resolution) of the boat launch picture (#15) converted to 8-bit paletted color at 72 dpi to reduce file size.

tion of the trial). The participants' task at this point was to locate the objects in the picture and consider their relative importance to the meaning of the scene. After another 5-sec interval, one of the four object descriptions appeared in a different color under the picture, along with a 6-point Likert scale and the question, "How relevant is the above item to the meaning of this picture?" The scale ranged from 1 (*not at all relevant*) to 6 (*highly relevant*). The rating was made using either the mouse or the number pad, and the observer had an unlimited amount of time to complete the rating. Once an item was rated, the description above the rating scale was removed and replaced by one of the other three descriptions in the list. In this manner, each of the four items was rated in a random order. Two examples of pictures as they might have appeared at the end of a rating trial can be found in Figure 2.

After rating items in all 80 pictures, the participants answered four randomly ordered questions about the acuity of their corrected vision, their age, their gender, and the number of distractions in their surroundings. Their response to the prompt "The number of distractions in my current surroundings could be described as . . ." was made on a 7-point Likert scale (1, *very low*; 4, *average*; 7, *very high*). The mean rating was 2.9 ($SD = 1.4$), which suggested that the number of distractions during the study was significantly below average [$t(47) = -5.533$, $p < .0001$].

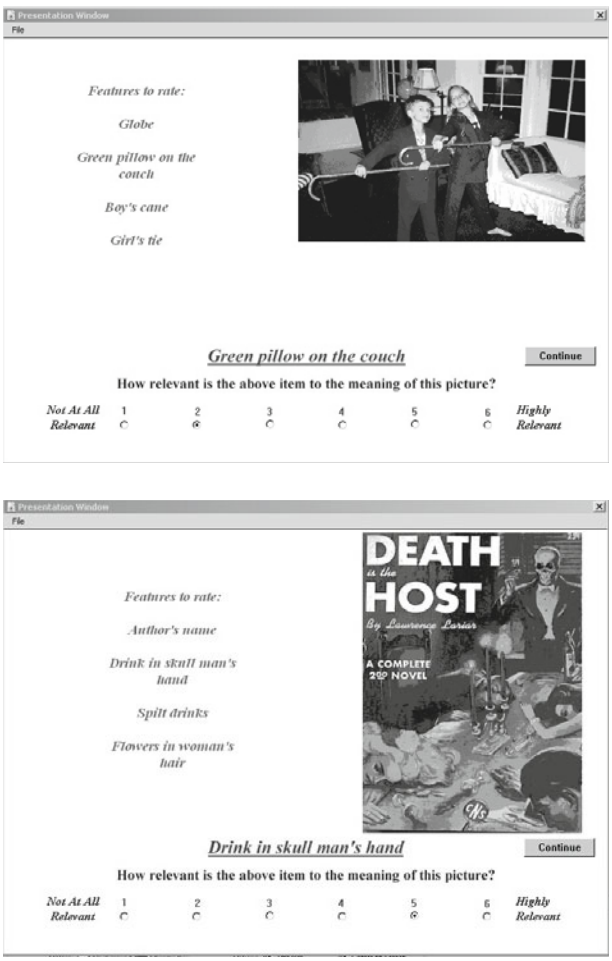


Figure 2. Screenshots of the "Song and Dance" (#6) and "Death host" (#25) pictures from Experiment 1, in which preselected objects were rated for their degree of relevance to the meaning of the scene.

At the end of the session, the participants were given a chance to enter comments about the experiment. This was followed by feedback on the average rating that they assigned to the set of features that we believed would be more relevant to the meaning of the picture and the average rating assigned to the set of features that we believed would be less relevant. Finally, the participants were debriefed and thanked for their participation.

Results and Discussion

The sixth column of the Appendix contains means and standard deviations for the ratings of the four preselected objects in the 80 pictures. The four objects are listed in descending order, from the item that was rated as most relevant to the meaning of the picture to the item that was rated as least relevant. Across all of the pictures, the lowest rated feature had a mean relevance rating of 1.58 ($SD = 0.96$) on a 6-point scale, and the highest rated feature had a mean relevance rating of 5.83 ($SD = 0.43$). A single-factor repeated measures ANOVA was performed on the four object ratings for each picture, and significant F values were followed with multiple comparisons using the Bonferroni adjustment. As can be seen in the seventh column of the Appendix, 77 of the 80 pictures revealed an F value that was significant at $\alpha = .001$ or better, indicating that the participants rated at least one object as being more relevant and one object as being less relevant to the meaning of the picture.[2] The eighth column of the Appendix specifies which pairs of objects were rated as significantly different by the participants.

An inspection of the results in the Appendix suggests that the participants were generally successful in making relevance ratings that respected the gist of the picture rather than the physical prominence of the object. In the upper picture of Figure 2, for instance, the observers rated a smaller, less detailed object (the girl's tie) as more relevant to the overall meaning of the children's song-and-dance scene than a larger, more detailed object (the green pillow on the couch); likewise, in the lower picture of Figure 2, the observers rated a more colorful foreground feature (the flowers in the woman's hair) as less relevant to the overall meaning of this scene than a smaller background feature (the skull man's glass of wine). Of the 320 objects rated (80 pictures × 4 objects per picture), our common-sense guesses prior to the rating study about which would be of lower relevance and which would be of higher relevance were supported 89% of the time by the empirical results (most of our misses were objects whose ratings were in the expected lower or higher relevance direction, but did not differ significantly). The difference in relevance ratings between the anticipated lower and higher relevance items was significant [$t(47) = 22.38$, $p < .000001$].[3]

Although previous research (e.g., Werner & Thies, 2000) has clearly demonstrated that the meaning of an object in a scene is a critically important factor in change detection, meaning is not the only dimension along which pictorial features differ, and researchers should be cautious in making direct comparisons between judgments involving lower and higher relevance items, even when they are taken from the same picture. For instance, even though the kayak and the "Adopt a River" sign in Figure 1

were reasonably rated as more relevant to the meaning of the picture than the wooden pole and the car, the observers might have better noticed changes to the kayak and sign not because they are meaningful objects in this scene, but rather because they are more visually prominent. Similarly, in the upper picture of Figure 2, both the green pillow and the globe were rated (correctly, in our view) as low-relevance features relative to the boy's cane and the girl's tie, yet the pillow was rated as significantly higher in relevance than the globe. Although it could be reasonably argued that a pillow on a couch contributes more than a globe to the home-based atmosphere of the children's song-and-dance routine, it could also be argued that observers in the present study, attempting to distinguish two less relevant features, were influenced by the potentially greater visual salience of the pillow in giving it the higher rating. In Experiment 2, we addressed the issue of physical prominence by assigning a visual salience categorization (high or low) to each of the objects listed in the Appendix.

EXPERIMENT 2

Like relevance, salience—how visually noticeable an object in a scene is—plays a role in determining what areas of a picture attract observers' attention (e.g., Wright, 2005). It has been suggested that salient areas often correspond to locations in pictures that people choose to label as objects in free viewing conditions (Elazary & Itti, 2008) and that the effects of salience in guiding visual attention tend to be early and short lived (Donk & van Zoest, 2008).

Pringle, Irwin, Kramer, and Atchley (2001) separately evaluated the dimensions of relevance and salience in a study in which the relationship between change blindness and attentional breadth (a dimension of individual difference assessed by a functional field of view task) was explored. One object in printed versions of 80 digital photographs of driving scenes was rated on a 6-point Likert scale for its relevance to driving behavior and its prominence or visibility by 6 young adults and 6 older adults.[4] Next, different samples of young and old adults examined computer-presented versions of the photographs from the perspective of the driver in a standard change detection task, looking for changes in an object's color, location, or presence. The primary finding was that the participants who had a larger functional field of view (broader attentional breadth) detected changes more quickly. Examples of secondary findings related to the topics of meaningfulness and salience included main effects of each (more meaningful changes were detected more quickly than less meaningful changes, and high-salience changes were detected more quickly than low-salience changes), and an interaction in which change detection by young (but not old) adults for low-salience objects improved when the objects were also highly meaningful.

Our goal in Experiment 2 was to identify whether the rated objects in the 80 pictures from Experiment 1 coincided with visually salient locations. Unlike Pringle et al. (2001), who used observers to provide Likert-scale ratings of salience, we decided to use recently available computer-based technology (Walther & Koch, 2006) to identify physically prominent locations. Because salience is typically considered a bottom-up (feature-driven) influence on early visual attention, one might argue that it is more objectively evaluated via feature-weighting algorithms, rather than via decisions by human raters. That is, top-down (knowledge-driven) decisions that are essential for determining the relevance or meaning of an object to a scene might be less appropriate for determining the physical prominence of areas than are decisions made by a computer unencumbered by knowledge of either the objects in a scene or the scene's meaning.

More specifically, then, the purpose of Experiment 2 was to gather bottom-up visual salience data on each of the 80 pictures, independent of actual observers, and to use that information to categorize each of the relevance-

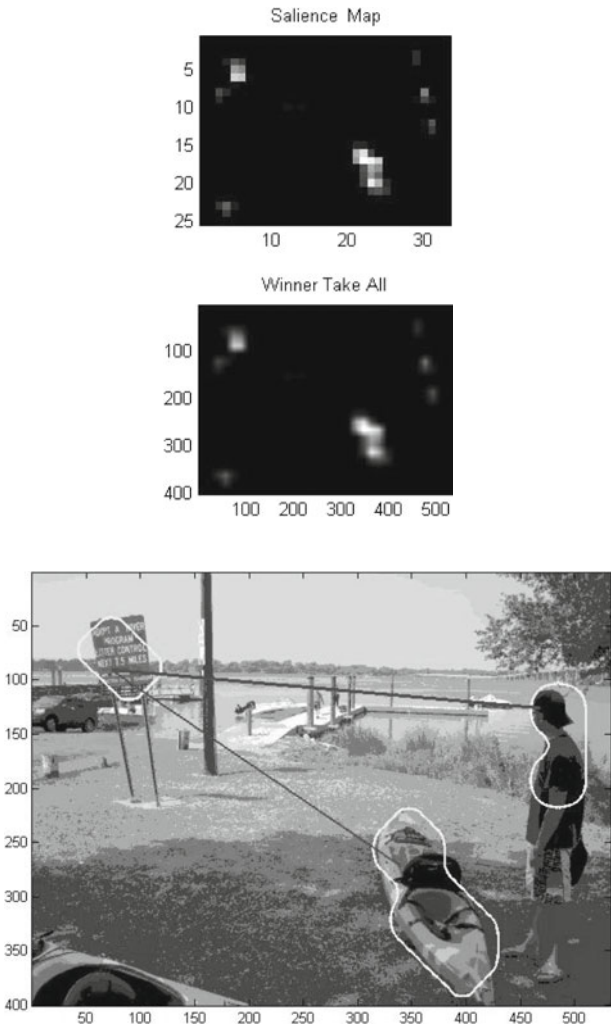
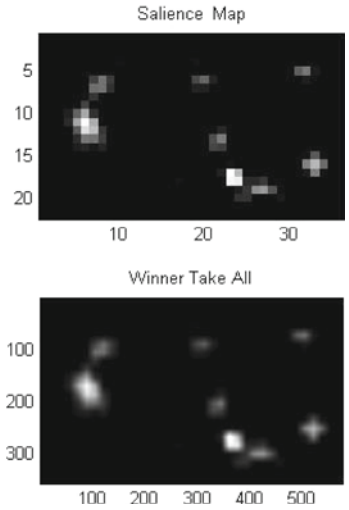


Figure 3. Initial salience map, initial winner-take-all map, and final attended-locations map for the boat launch picture (#15) in Experiment 2. Saliency Toolbox (Walther & Koch, 2006) identified high-salience focus-of-attention areas that coincided with two of the preselected objects. The Experiment 1 objects preselected for rating were the kayak, sign, wooden pole, and car.



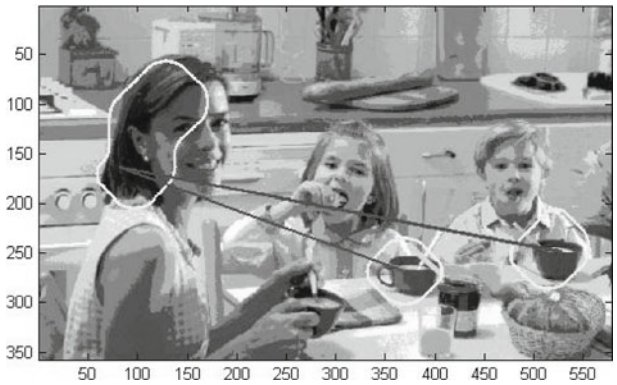


Figure 4. Initial salience map, initial winner-take-all map, and final attended-locations map for the eating picture (#68) in Experiment 2. Saliency Toolbox (Walther & Koch, 2006) identified high-salience focus-of-attention areas that coincided with one of the preselected objects. The Experiment 1 objects preselected for rating were the bread in the girl's hand, the boy's bowl, the stove, and the napkin.

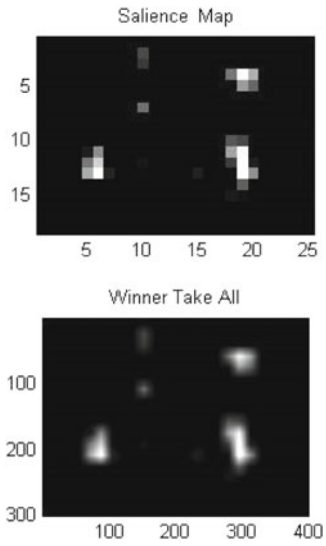
rated objects as high or low in visual salience. The results of this analysis will allow investigators to create stimuli for different purposes, such as detecting changes made to high- versus low-relevance objects with visual salience held constant. Because we had originally selected the four objects in each picture on the basis of their anticipated high or low relevance and had actually tried to minimize the selection of objects on the basis of the prominence of their physical features, we expected that most of the objects would be categorized as low in salience.

Method

Salience judgments were rendered by Saliency Toolbox, a MATLAB program developed by Walther and Koch (2006), based on the work of Itti, Koch, and Niebur (1998) and Koch and Ullman (1985). The software simulates a bottom-up biological visual system whose goal is to determine which locations in a scene are likely to be selected for attention on the basis of their visual salience alone; the program has no access to top-down knowledge about objects in the scene or the meaning of the scene.

Saliency Toolbox analyzes a picture image into 42 separate low-level feature maps on the basis of local center–surround differences in intensity, color (red–green and blue–green opponency), and orientation (0º, 45º, 90º, and 135º) at six spatial scales. The feature maps are combined into a conspicuity map for each type of feature, and the three conspicuity maps are combined into a single salience map. A biologically realistic winner-take-all neural network is then implemented to select the area of the salience map that is most likely to be attended (i.e., the area of highest salience). This area represents the first simulated fixation or focus of attention based purely on the physical properties of the picture. A second iteration of the program was then run to identify the next most salient area on the basis of the inhibition of return of attention to the prior area of recent fixation, followed by a third implementation based on the same procedure.

Following Stirk and Underwood (2007), an area of the picture was considered to be of high salience if it received one of the first three simulated fixations. Whether one of the picture's four preselected, relevance-rated objects was considered visually salient was



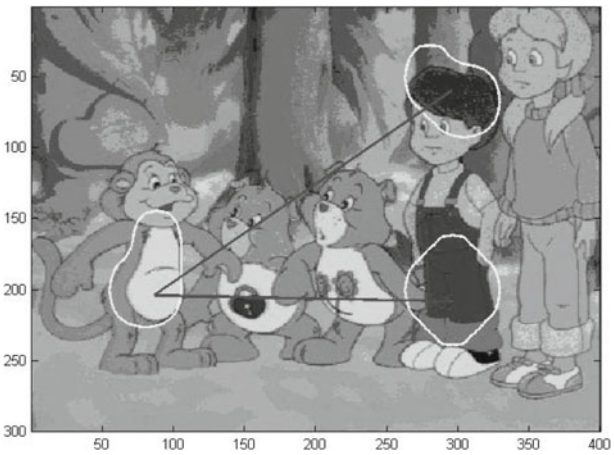


Figure 5. Initial salience map, initial winner-take-all map, and final attended-locations map for the Care Bears picture (#72) in Experiment 2. Saliency Toolbox (Walther & Koch, 2006) identified high-salience focus-of-attention areas that coincided with none of the preselected objects. The Experiment 1 objects preselected for rating were the lock on the bear's stomach, the monkey's tail, the heart on the tree, and the buckles on the boy's suspenders.

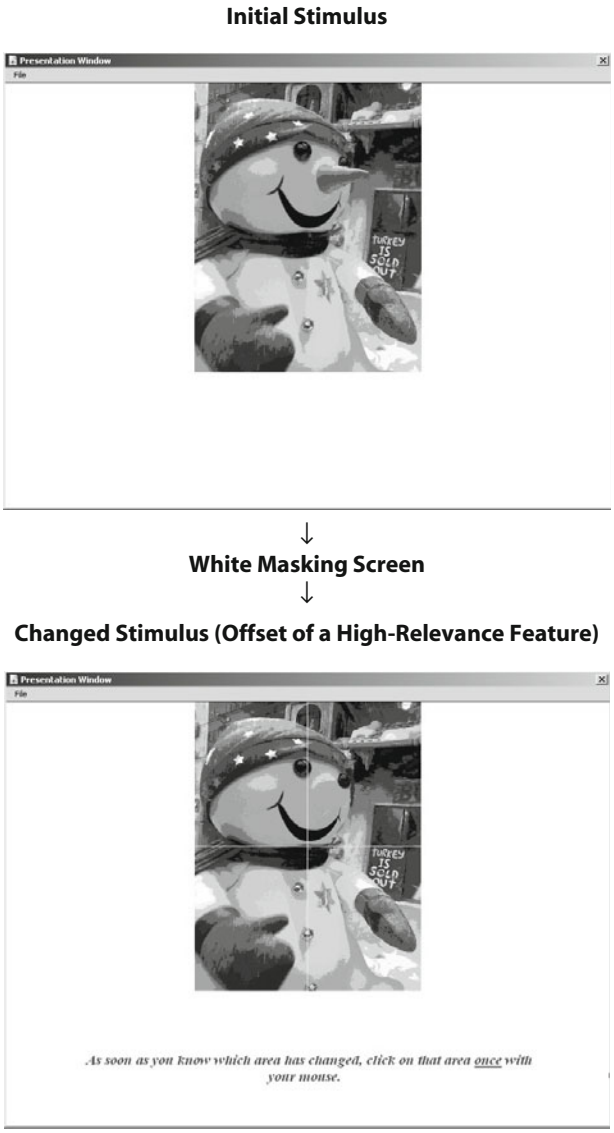


Figure 6. Example of a change blindness stimulus based on the snowman picture (#14), in which a high-relevance, low-salience feature disappears.

determined through a visual inspection of the attended-locations map generated in the final iteration of the software. This map outlined in yellow the three most highly salient areas of a picture. Figures 3–5 provide examples of the final attended-locations map, as well as the initial salience and winner-take-all maps, for three pictures. Each outlined area represents the program's best guess as to the location of a potential proto-object or proto-object region whose physical properties might capture early attention. If a preselected, relevance-rated object fell within one of these three outlined focus-of-attention regions, it was categorized as a high-salience object. If the relevance-rated object did not fall within one of these regions, or if only a portion of it fell within the region and it was clear that a neighboring area was actually the focus of attention, it was categorized as a low-salience object. Examples are provided of the pictures for which Saliency Toolbox identified high-salience areas that included two (Figure 3), one (Figure 4), or none (Figure 5) of the preselected objects.

Results and Discussion

Each of the four relevance-rated objects in the 80 pictures was categorized as high or low in visual salience using the above criteria, and the categorizations can be found in the fifth column of the Appendix. It is clear that most (86.2%) of the 320 preselected objects were categorized as low in salience.

For the purposes of the next analysis, the first two objects listed under each picture in the Appendix were considered to be high in relevance, and the last two objects were considered to be low in relevance (the objects are listed in descending order of rated relevance). Each object was then cross-categorized on salience, and the tallies were analyzed with a chi-square test for independence.

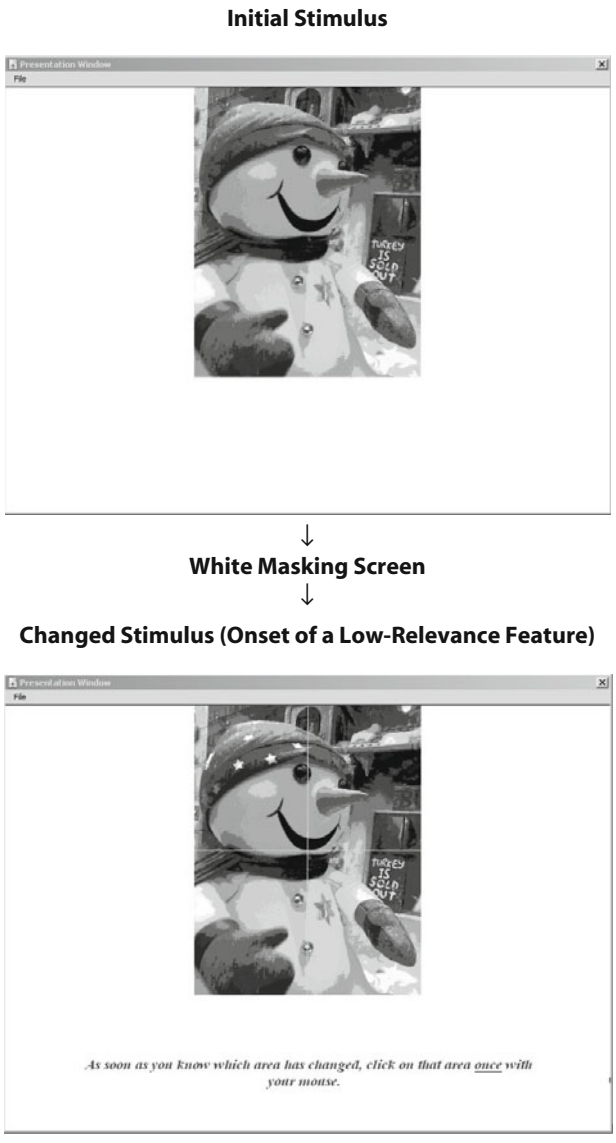


Figure 7. Example of a change blindness stimulus based on the snowman picture (#14), in which a low-relevance, low-salience feature appears.

The analysis indicated a relationship between salience and relevance in which objects categorized as highly salient were more than twice as likely to be categorized as high in relevance (10.0%) as they were to be categorized as low in relevance (4.1%), and objects categorized as low in salience were more likely to be categorized as low (45.9%) than as high (40.0%) in relevance [$\chi^2(1,320) = 9.33, p = .002$]. Practically speaking, our collection of 80 pictures contains a large set of low-salience objects that are high or low in relevance and a much smaller set of high-salience objects that are primarily high in relevance.

Visual inspection of the final attended-locations maps across the set of pictures revealed that the software often successfully identified areas that we would consider objects (e.g., see Figure 3) and also frequently outlined areas of high luminance, color contrast, texture change, and so on that attract early attention but that may not actually constitute objects as much as prominent visual elements (see, e.g., Figure 5). In any case, we believe that Salience Toolbox not only provided an objective tool for identifying salient locations in pictures, but also generated ample feedback for determining whether a preselected object would likely be a salient focus of attention on the basis of purely physical features.

GENERAL DISCUSSION

Eighty pictures varying widely in content and detail reside in a stimulus archive at http://marcellm.people.cofc.edu/research.htm, where they are freely available for downloading and use by researchers.[5] Each picture contains four objects that were rated by observers in Experiment 1 on their relevance to the meaning of the scene, and each object was categorized in Experiment 2 as high or low in visual salience by software that evaluated physical properties of the image. The Appendix contains a list of the pictures with brief descriptions of the four selected objects, their locations, their salience categorizations, and statistical summaries of the relevance ratings. The information contained in the Appendix can be used by investigators to create subsets of stimuli containing objects that differ empirically in their relevance to the meaning of the scene.

Consider, for example, a recently completed experiment in which we used standard photo-editing software to transform 64 of the pictures into change detection stimuli. In this experiment, we investigated the effects of exposure time (1 vs. 5 sec) and type of change (appearance vs. disappearance) on how quickly and accurately individuals detect changes to high- and low-relevance objects. We used a one-shot change blindness task in which a picture was initially shown for either 1 or 5 sec, followed by a 100-msec white screen that masked the motion transients associated with the change to the picture, and then the original picture was represented with one of the objects altered. The second version of the picture was divided into four equal-sized quadrants by a vertical and a horizontal line, and the participants had 15 sec to select the quadrant containing the changed item (either a new object or a missing object).

Figures 6 and 7 illustrate how one picture was systematically altered to create change detection stimuli that differed in the presence or absence of a low-salience feature that was either high or low in relevance. In Figure 6, a change detection trial began with the presentation of the snowman picture (#14). Following a brief masking screen, an altered version of the picture was presented in which a high-relevance item (#1) disappeared. The participants' task was to click the quadrant containing the change. Note that the order of these pictures could be reversed to create a stimulus in which the change was the *appearance* of the item, thus allowing offset and onset stimuli to be precisely equated on extraneous variables that might influence change detection. Figure 7 illustrates how the snowman picture was similarly manipulated to create the appearance of a low-relevance item (#4).

In summary, the outcome of the present project is a publicly accessible archive of pictorial stimuli whose features can be systematically altered (e.g., presence/absence, location, orientation, color) in standard change blindness experiments to evaluate the dimension of relevance in change detection, with the physical salience of the features taken into account.

We invite researchers to add to our initial efforts, perhaps by gathering relevance ratings on additional objects in the pictures or by rating the four preselected objects on other attributes, such as familiarity or pleasantness. We hope that investigators working in the area of change detection will find these normed pictures helpful in developing stimuli that forward our understanding of the phenomenon of change blindness.

AUTHOR NOTE

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Note—This article was accepted by the previous editorial team, when John H. Krantz was Editor.

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NOTES

1. The words *item*, *object*, and *feature* were used interchangeably during the study to refer in a nontechnical manner to those parts of the picture that were verbally described for the participant to rate.

2. Of the 80 *F* values, 79 were significant with a less conservative alpha level of .01.

3. It is important to remember that high-relevance objects in this study may not actually be the most meaningful objects in a scene; they are simply the most relevant of the four preselected objects that were evaluated.

4. Pringle et al. (2001) also conducted a separate pilot study of the meaningfulness and salience of the specific change made to each object and found high correlations between meaningfulness and salience for both object and change ratings.

5. In addition to the rated pictures, the stimulus archive also contains the original (higher quality) source pictures and the attended-locations maps generated in the final iteration of the Saliency Toolbox software (Walther & Koch, 2006). The salience data were gathered on the lower resolution versions of the pictures rated for relevance in Experiment 1, not on the original, higher resolution versions of the pictures. Because of differences in the physical properties of the two versions of the pictures, researchers should not assume that our salience categorizations will apply to the higher quality versions.

APPENDIX
Ratings of Relevance for Four Preselected Objects in Each of 80 Pictures

Picture Number	Picture Label	Brief Description of the Rated Item[a]	Location[b]	Salience[c]	Relevance Rating[d] *M*	Relevance Rating[d] *SD*	*F* Value[e]	*p*	Significant Pairwise Comparisons[f]
1	Traffic	1. License plate of closest car	LL	Low	3.73	1.40	4.36	.00571	1–4**
		2. Billboard on right	UR	Low	3.42	1.43			
		3. Two rear windows of van	UL	High	3.25	1.51			
		4. Station wagon in right lane	LR	High	2.79	1.32			
2	Birthday party	1. Woman on left	LL	Low	4.60	1.14	47.76	<.00001	1–2***
		2. Red striped shirt	LL	Low	3.04	1.46			1–3***
		3. Glass of milk	LR	Low	2.73	1.25			1–4***
		4. Light switch	UR	Low	1.90	1.34			2–4***
									3–4***
3	Interstate	1. Hwy 611 sign	LR	High	4.06	1.68	6.30	.00048	1–3*
		2. Tall building on far left	LR	Low	3.46	1.64			1–4***
		3. Taillights in nearest car	LL	Low	3.21	1.44			
		4. Car under 6th Street sign	LR	Low	2.71	1.52			
4	Pedestrian crossing	1. Man in black SUV	UR	Low	3.33	1.49	10.66	<.00001	1–4***
		2. Lady wearing blue coat	UL	High	3.13	1.41			2–4***
		3. Red sign on bus	UR	Low	2.73	1.55			3–4**
		4. Two circular marks on road (lower left)	LL	Low	1.98	1.31			
5	Simpsons	1. Remote control in Homer's hand	LL	Low	5.27	0.79	83.41	<.00001	1–2***
		2. Cat	LR	Low	3.73	1.27			1–3***
		3. Maggie's bottle	LR	Low	3.71	1.41			1–4***
		4. Lamp	UR	Low	1.98	1.06			2–3***
									2–4***
									3–4***

APPENDIX (Continued)

Picture Number	Picture Label	Brief Description of the Rated Item[a]	Location[b]	Salience[c]	Relevance Rating[d] *M*	Relevance Rating[d] *SD*	*F* Value[e]	*p*	Significant Pairwise Comparisons[f]
6	Song and dance	1. Boy's cane	LL	Low	5.35	0.84	140.19	<.00001	1–2***
		2. Girl's tie	UR	Low	4.25	1.44			1–3***
		3. Green pillow on couch	LR	Low	2.19	1.10			1–4***
		4. Globe	UL	Low	1.58	0.96			2–3***
									2–4***
									3–4**
7	Mexican kids	1. Boy's hand with peace sign	UR	Low	5.02	1.21	53.01	<.00001	1–2***
		2. Black shirt with design	UR	Low	3.27	1.32			1–3***
		3. Blue jersey stripes	UL	Low	2.44	1.30			1–4***
		4. Door handle and lock	UR	Low	2.40	1.41			2–3**
									2–4**
8	Abbey Road	1. Crosswalk lines	LL	Low	5.48	0.85	44.74	<.00001	1–2***
		2. White line in middle of road	UR	Low	4.54	1.22			1–3***
		3. Yellow car on left	UL	High	3.40	1.58			1–4***
		4. Black car on right	UR	Low	2.71	1.52			2–3**
									2–4***
									3–4*
9	Ship	1. The word *ARC*	UR	Low	4.50	1.20	12.61	<.00001	1–4***
		2. Small motorboat	LR	Low	4.00	1.29			2–4***
		3. Railing	LR	High	3.94	1.63			3–4**
		4. Window structure and crane on front deck	UL	Low	2.77	1.60			
10	Vader choke	1. Back portion of Darth Vader's helmet	UR	Low	4.77	1.34	14.25	<.00001	1–2*
		2. Trooper to immediate right of Darth Vader	LR	High	4.13	1.27			1–3***
		3. Content of right doorway	LR	Low	3.44	1.54			1–4***
		4. Trooper in left doorway	LL	Low	3.33	1.52			2–4**
11	Airplane	1. Radio tower	UL	Low	5.02	1.06	34.69	<.00001	1–4***
		2. Jet engine	LR	Low	4.71	1.41			2–4***
		3. Tail wing	UR	Low	4.71	1.09			3–4***
		4. Side window on jet	LL	Low	3.02	1.31			
12	Charles and Di	1. Bow tie	UL	Low	4.58	0.99	17.19	<.00001	1–3***
		2. Flower on lapel	LL	High	4.06	1.46			1–4***
		3. Pocket handkerchief	LL	Low	3.44	1.40			2–4**
		4. Earring	UR	Low	3.00	1.40			
13	Shag	1. Sign	UL	Low	5.42	0.92	135.52	<.00001	1–2***
		2. Man on far right and woman behind podium	UR	Low	3.00	1.54			1–3***
		3. Yellow plant on floor	LR	High	1.98	1.18			1–4***
		4. Lace on bottom of blouse	UR	Low	1.79	0.82			2–3***
									2–4***
14	Snowman	1. Carrot nose	UR	Low	5.23	1.12	24.45	<.00001	1–2***
		2. "Turkey is sold out" sign	LR	Low	3.75	1.69			1–3***
		3. Sheriff's badge	LR	Low	3.44	1.56			1–4***
		4. Stars on cap	UL	Low	2.69	1.64			2–4*
15	Boat launch	1. Kayak	LR	High	5.44	0.85	84.16	<.00001	1–2***
		2. "Adopt a River" sign	UL	High	4.13	1.41			1–3***
		3. Wooden pole behind green sign	UL	Low	2.35	1.28			1–4***
		4. Car	UL	Low	2.31	1.32			2–3***
									2–4***
16	Central Park	1. People picnicking on grass	LL	Low	5.13	0.84	77.51	<.00001	1–2**
		2. Sailboat in middle	LL	Low	4.33	1.34			1–3***
		3. White tennis shoes in grass	LL	Low	2.69	1.26			1–4***
		4. Lamppost	LR	Low	2.17	1.06			2–3***
									2–4***
17	McDonald's	1. McDonald's sign to left of doorway	UL	Low	4.38	1.27	23.08	<.00001	1–2**
		2. Man on right facing woman	LR	High	3.31	1.40			1–3***
		3. Black information booth on right	LR	Low	2.85	1.35			1–4***
		4. Person with books and orange design on coat	LL	Low	2.42	1.29			2–4**

APPENDIX (Continued)

Picture Number	Picture Label	Brief Description of the Rated Item[a]	Location[b]	Salience[c]	Relevance Rating[d] *M*	Relevance Rating[d] *SD*	*F* Value[e]	*p*	Significant Pairwise Comparisons[f]
18	La Hacienda	1. La Hacienda	UL	Low	5.29	0.80	49.34	<.00001	1–2***
		2. P & M Kelly	LL	Low	3.85	1.38			1–3***
		3. Lights above restaurant sign	UL	Low	3.15	1.37			1–4***
		4. Portion of car (lower right)	LR	Low	2.52	1.38			2–4***
									3–4*
19	Piñata	1. Streamers on piñata	UR	Low	3.85	1.46	9.10	.00002	1–3**
		2. Tire around base of piñata	LL	High	3.42	1.35			1–4***
		3. Family of three on back right	LR	Low	2.85	1.43			2–4*
		4. Stripes on left tent	UL	Low	2.63	1.21			
20	Venice	1. Large boat on right	UR	High	4.92	1.09	84.57	<.00001	1–2**
		2. Gondola closest to large boat	UL	Low	4.19	1.25			1–3***
		3. Portion of gondola (lower left)	LL	High	2.88	1.30			1–4***
		4. Three lower windows on left	LL	Low	1.96	0.97			2–3***
									2–4***
									3–4***
21	Cat	1. Food in dish	LL	High	5.25	0.91	103.56	<.00001	1–2***
		2. Pattern on food bowl	LL	Low	2.60	1.28			1–3***
		3. Writing on box	UR	Low	2.21	1.18			1–4***
		4. Handle (hole on box)	UL	Low	1.83	1.29			2–4**
22	Drumset	1. "Mapex" on drum	LL	Low	4.13	1.57	20.46	<.00001	1–3***
		2. Circular hole in drum	LL	High	4.04	1.52			1–4***
		3. Rug	LL	Low	2.60	1.28			2–3***
		4. Chair on right	UR	Low	2.58	1.56			2–4***
23	Scooby	1. Girl's glasses	LL	Low	4.73	1.33	62.56	<.00001	1–2***
		2. Scarf on girl	LL	Low	3.46	1.52			1–3***
		3. Headband on girl	UL	Low	2.71	1.50			1–4***
		4. Orange-covered book on left	LL	Low	1.75	1.16			2–3**
									2–4***
									3–4***
24	Forbidden Planet	1. Moon	UL	Low	4.98	1.10	18.36	<.00001	1–2***
		2. Flying saucer's shadow	LR	Low	3.52	1.66			1–3***
		3. Rocks on front right	LR	Low	3.38	1.59			1–4***
		4. Lights on bottom of flying saucer	UR	Low	3.33	1.49			
25	Death host	1. Drink in skull man's hand	UR	Low	4.96	1.15	40.14	<.00001	1–3**
		2. Spilt drinks	LL	Low	4.81	1.16			1–4***
		3. Author's name	UL	Low	3.96	1.58			2–3*
		4. Flowers in woman's hair	LL	Low	2.58	1.18			2–4***
									3–4***
26	City	1. Pedestrian crossing sign	UR	High	5.13	1.06	71.18	<.00001	1–2***
		2. Closest green traffic light	UL	Low	4.27	1.18			1–3***
		3. Taxi brake lights	LL	Low	3.15	1.65			1–4***
		4. Man on left	LL	Low	2.04	1.15			2–3***
									2–4***
									3–4***
27	Farm	1. Tree in silo	UR	Low	4.63	1.44	10.07	<.00001	1–3**
		2. Roof of barn	UR	Low	4.23	1.51			1–4***
		3. Background trees on left	UL	High	3.50	1.54			2–3*
		4. Small silver silo	UL	Low	3.17	1.55			2–4**
28	Aerial view	1. Turn lane arrows	UL	Low	3.67	1.55	6.66	.00031	1–3*
		2. Numbers on bus	LL	High	3.02	1.48			1–4***
		3. Yellow car on upper left	UL	Low	2.85	1.64			
		4. Red SUV on upper right	UR	Low	2.58	1.35			
29	Cigar sign	1. Cigar	UR	Low	5.56	0.82	158.06	<.00001	1–3***
		2. The word "really"	UR	Low	5.40	0.74			1–4***
		3. Man's tie	LL	Low	2.60	1.47			2–3***
		4. Shadow on right side of ad	LR	High	1.92	1.20			2–4***
									3–4*
30	Popular Science	1. Man swimming	LL	Low	4.98	1.14	19.52	<.00001	1–3***
		2. 15 cents	UR	Low	4.46	1.40			1–4***
		3. Water splashing	LL	Low	3.60	1.57			2–3*
		4. September	UR	Low	3.15	1.71			2–4***

APPENDIX (Continued)

Picture Number	Picture Label	Brief Description of the Rated Item[a]	Location[b]	Salience[c]	Relevance Rating[d] *M*	Relevance Rating[d] *SD*	*F* Value[e]	*p*	Significant Pairwise Comparisons[f]
31	Basketball	1. Basketball	LL	Low	5.67	0.60	68.30	<.00001	1–2**
		2. "Navy" on left player	LL	Low	4.98	1.28			1–3***
		3. American flag	UR	Low	3.77	1.31			1–4***
		4. Lights on stadium ceiling	UR	Low	2.65	1.12			2–3***
									2–4***
									3–4***
32	Football	1. Player handing football to #37	LL	Low	5.31	0.90	45.93	<.00001	1–2***
		2. Referee	UR	Low	4.44	1.15			1–3***
		3. Hash marks on field	UR	Low	3.92	1.50			1–4***
		4. Bottom half of player in upper left	UL	Low	2.46	1.61			2–4***
									3–4***
33	Coke ad	1. "Coca–Cola" on glass	LL	High	5.19	1.27	24.08	<.00001	1–2*
		2. Words "to act one"	UL	Low	4.40	1.40			1–3***
		3. Hair to left of face	UR	Low	3.10	1.61			1–4***
		4. Blush on cheeks	UR	Low	3.29	1.49			2–3**
									2–4***
34	Knight	1. Red cross	LL	Low	5.54	0.71	51.75	<.00001	1–2***
		2. Embellishments on helmet	UL	High	3.83	1.59			1–3***
		3. Mustache	UL	Low	3.69	1.40			1–4***
		4. Rings	LL	Low	2.81	1.51			2–4***
									3–4**
35	Beach	1. Red and white beach umbrella	UR	High	4.17	1.40	4.30	.00617	1–4**
		2. Water bottle	LR	Low	4.10	1.26			
		3. Items on lower left of blanket	LL	Low	3.52	1.43			
		4. Colorful beach umbrella on left	UL	Low	3.42	1.44			
36	Waterskiing	1. Middle dock structure	UL	Low	3.13	1.55	0.36	.78198	
		2. "Mercury" on the motor	LL	Low	3.08	1.41			
		3. Knot on rope, near motor	LL	Low	3.06	1.60			
		4. Row of trees in background	UR	Low	2.85	1.40			
37	Cat cage	1. Cage door	LR	Low	5.00	1.09	39.06	<.00001	1–2***
		2. Blanket in cage	LR	High	3.75	1.31			1–3***
		3. Ball	LR	Low	3.06	1.21			1–4***
		4. Rug under food dish	LL	Low	2.79	1.32			2–3*
									2–4***
38	Casas	1. Hammer in hand of man on right	LL	Low	5.15	1.13	73.85	<.00001	1–2*
		2. Wooden frame in back right	UR	Low	4.56	1.09			1–3**
		3. Hammer in hand of man on left	LL	Low	4.35	1.41			1–4***
		4. Small back window of van	UR	Low	1.96	1.32			2–4***
									3–4***
39	Chrysler Building	1. Top pole of Chrysler Building	UL	Low	4.65	1.28	22.15	<.00001	1–3***
		2. Windows on curved top of Chrysler Building	UL	High	4.17	1.36			1–4*** 2–3**
		3. Gargoyle on lower left building	LL	Low	3.15	1.15			2–4***
		4. Higher (closer) flag pole	UR	Low	2.81	1.42			
40	Horse	1. Pole over hay	LR	Low	5.10	1.08	30.89	<.00001	1–2**
		2. Hay	LR	Low	4.25	1.41			1–3***
		3. Blanket under saddle	LL	Low	3.06	1.60			1–4***
		4. Horse's back socks	LL	Low	2.96	1.60			2–3**
									2–4***
41	Family Guy	1. Beer can	LR	Low	4.17	1.40	14.40	<.00001	1–4***
		2. Writing in upper left ("UNcut . . .")	UL	Low	4.17	1.60			2–4***
		3. Dog's collar and tag	LL	Low	3.71	1.53			3–4***
		4. Hairbrush	UL	Low	2.48	1.38			
42	Firemen	1. Equipment held by man on right	UR	Low	4.92	1.29	39.21	<.00001	1–3***
		2. Reflective stripes on clothing	UR	Low	4.75	1.54			1–4***
		3. Backpack on man on left	UL	Low	2.75	1.42			2–3***
		4. Pole in curved cement wall	UR	Low	2.60	1.43			2–4***
43	Charleston	1. Church steeple	UR	Low	4.73	1.30	40.15	<.00001	1–4***
		2. Boat	LL	Low	4.17	1.30			2–4***
		3. Dock	LL	Low	4.15	1.38			3–4***
		4. Crane in background	UR	Low	2.29	1.41			
44	Cows	1. Cow lying down in right front	LR	Low	4.40	1.27	7.68	.00009	1–2*
		2. Front fence post on right	LR	Low	3.58	1.43			1–3**
		3. Front fence post on left	LL	Low	3.58	1.40			1–4**
		4. Four fence posts on back left	UL	Low	3.23	1.51			

APPENDIX (Continued)

Picture Number	Picture Label	Brief Description of the Rated Item[a]	Location[b]	Salience[c]	Relevance Rating[d] *M*	Relevance Rating[d] *SD*	*F* Value[e]	*p*	Significant Pairwise Comparisons[f]
45	Graveyard	1. Large front window	LR	High	4.13	1.30	13.49	<.00001	1–2*
		2. Second row from left, front–most gravestone	LR	Low	3.31	1.69			1–3*** 1–4***
		3. Three small windows on side of church	LR	Low	2.73	1.23			
		4. Railings and sign on ramp	LR	Low	2.73	1.59			
46	Houses	1. White chimney on blue house	UR	High	3.94	1.45	6.27	.0005	1–4**
		2. Large window in front of blue house	LR	Low	3.54	1.49			
		3. Side windows of white house on right	LR	Low	3.25	1.59			
		4. Small house in left rear	LL	Low	2.73	1.51			
47	Library	1. Books standing on top of middle display	LR	Low	4.65	1.45	24.81	<.00001	1–2** 1–3***
		2. Nearest black sign (of four)	UL	Low	3.56	1.51			1–4*** 2–4**
		3. Two black signs (of four) farthest away	UR	Low	3.10	1.46			
		4. Skylight windows near ceiling	UR	Low	2.48	1.35			
48	Soccer	1. Soccer ball	LR	Low	5.83	0.43	72.62	<.00001	1–2***
		2. Yellow and white lines (upper right)	UR	Low	4.00	1.53			1–3***
		3. Parents in rear right	UR	Low	3.85	1.50			1–4***
		4. Stripe on pants	LL	Low	2.17	1.43			2–4*** 3–4***
49	Boating	1. Orange and yellow inner tube	LL	High	4.63	1.18	11.17	<.00001	1–4***
		2. Black bridge	UR	Low	4.50	1.27			2–4***
		3. Cupola (top black portion) of lighthouse	UR	Low	4.15	1.38			3–4*
		4. Approaching motorboat (far left)	UL	Low	3.33	1.56			
50	Paddle-wheeler	1. Large American flag	UR	Low	5.06	1.02	34.74	<.00001	1–2*
		2. Smokestacks	UL	High	4.48	1.29			1–3***
		3. Sign on side of boat	LL	Low	3.65	1.56			1–4***
		4. Ship in left background	LL	Low	2.58	1.40			2–3* 2–4*** 3–4**
51	Picnic	1. Girl in white t-shirt, sitting on grass	UR	High	4.90	1.15	51.27	<.00001	1–2***
		2. Building in background	UL	Low	3.46	1.54			1–3***
		3. Shirt in hand of standing girl	UR	Low	2.23	1.39			1–4***
		4. Stripes on girl's shirt (left)	LL	Low	2.19	1.41			2–3*** 2–4**
52	Pirate ship	1. Pirate flag symbol	UL	Low	5.63	0.79	55.95	<.00001	1–2***
		2. Yellow flag	UR	High	4.13	1.42			1–3***
		3. Brown crow's nest (on pirate flagpole)	UL	Low	3.92	1.49			1–4*** 2–4***
		4. Black lantern on back of ship	LL	Low	2.42	1.37			3–4***
53	Classroom	1. Teacher	UL	Low	5.52	0.85	51.17	<.00001	1–2***
		2. Overhead projector screen	UR	Low	4.35	1.55			1–3***
		3. Pull-down screen near ceiling (above teacher)	UL	Low	3.23	1.70			1–4*** 2–3**
		4. Empty desk (bottom left)	LL	Low	2.40	1.27			2–4*** 3–4*
54	Rollercoaster	1. Orange safety grip handles (front right)	UR	Low	5.04	1.16	42.38	<.00001	1–2***
		2. Black side gate on left	UL	Low	3.50	1.41			1–3***
		3. Man on lower left wearing blue shirt	LL	Low	2.98	1.44			1–4***
		4. Writing on the yellow shirt	UL	High	2.04	1.17			2–4*** 3–4**
55	Rollercoaster 2	1. Rollercoaster track arching to left	UL	Low	4.60	1.40	31.06	<.00001	1–2***
		2. Vertical yellow dividers between seats	LL	Low	3.75	1.51			1–3***
		3. Arm sticking up at bottom	LL	Low	3.04	1.57			1–4***
		4. Light-haired person in white t-shirt	LL	Low	2.19	1.10			2–4*** 3–4**

APPENDIX (Continued)

Picture Number	Picture Label	Brief Description of the Rated Item[a]	Location[b]	Salience[c]	Relevance Rating[d] *M*	Relevance Rating[d] *SD*	*F* Value[e]	*p*	Significant Pairwise Comparisons[f]
56	Runner	1. Front runner's number	LR	High	4.65	1.33	20.04	<.00001	1–3**
		2. Lines in middle of road	LL	High	4.00	1.57			1–4***
		3. Rear runner's white sign	UL	Low	3.96	1.34			2–4***
		4. Spectator in sandals on right	UR	Low	2.60	1.54			3–4***
57	Scarecrow	1. Purple blush on cheeks	UR	Low	3.63	1.39	8.98	.00002	1–4***
		2. Leaf on pants	LR	Low	3.52	1.46			2–4***
		3. Green support beam on upper left	UL	High	3.21	1.74			3–4*
		4. Right triangle on suspenders	LR	Low	2.33	1.17			
58	New York	1. Budweiser bottle (sign in middle)	UR	Low	3.52	1.52	6.05	.00066	1–3*
		2. "No Turns" sign	LL	Low	3.40	1.50			1–4**
		3. Smiling girl (sign on left)	UL	Low	2.83	1.45			2–4**
		4. Chase sign (right)	UR	Low	2.65	1.41			
59	Tractor	1. Grain in truck	UR	Low	4.65	1.44	25.77	<.00001	1–3***
		2. Green arm of grain loader	UR	Low	4.52	1.47			1–4***
		3. Smoke stack on tractor	UL	Low	3.27	1.38			2–3***
		4. Headlights on truck	LR	Low	2.75	1.34			2–4***
60	Desert	1. Sand dunes	LL	High	4.90	1.21	23.45	<.00001	1–3***
		2. Main post	LR	High	4.60	1.32			1–4***
		3. Grass on left of main post	LL	Low	3.71	1.40			2–3**
		4. Post on left	LL	Low	3.29	1.27			2–4***
61	Planet Stories	1. "Electricity" from hand on lower right	LR	Low	5.21	1.03	16.41	<.00001	1–2**
		2. Hair	UL	Low	4.44	1.47			1–3***
		3. Ship with rays	LL	Low	3.67	1.35			1–4***
		4. Robot looking back (lower left)	LL	Low	3.46	1.76			2–4*
62	Lighthouse	1. Black platforms on lighthouse	UR	Low	4.00	1.38	18.58	<.00001	1–3**
		2. Taller chimney	UL	Low	3.38	1.35			1–4***
		3. Sidewalk	LR	Low	2.90	1.42			2–4***
		4. Dark green structure on roof	LR	Low	2.19	1.25			3–4*
63	Army	1. American flag patch	LL	Low	4.27	1.89	7.44	.00012	1–3**
		2. Helicopter wheels	UR	Low	3.56	1.29			1–4**
		3. Windows on helicopter sliding door	UL	Low	3.10	1.32			
		4. Gun strap	LR	Low	2.90	1.60			
64	Dashboard	1. Red needle on center gauge	LR	Low	4.75	1.14	91.60	<.00001	1–3***
		2. Car tail lights	UR	Low	4.60	1.27			1–4***
		3. Sidewalk	UL	Low	2.38	1.41			2–3***
		4. Fence	UL	Low	1.79	1.07			2–4***
65	Clowns	1. Red lipstick of clown on left	UL	Low	4.85	1.01	68.28	<.00001	1–2***
		2. Blue and black suspenders	LR	Low	3.54	1.52			1–3***
		3. Button with picture of girl	LL	Low	2.48	1.40			1–4***
		4. Overhanging branches	UL	Low	1.67	1.12			2–3**
									2–4***
									3–4**
66	Disney	1. Tallest castle tower	UL	Low	4.88	1.10	50.32	<.00001	1–3***
		2. Minnie's bow	UR	Low	4.54	1.13			1–4***
		3. Black lines on Mickey's gloves	LR	Low	3.19	1.61			2–3***
		4. Banner above castle entrance	LL	Low	2.33	1.40			2–4***
									3–4**
67	Driving	1. Rearview mirror	UL	Low	4.73	1.30	42.17	<.00001	1–2***
		2. Gear shifter	LL	Low	3.40	1.70			1–3***
		3. Street lights	UL	Low	2.94	1.45			1–4***
		4. Red windshield sticker	LR	Low	1.81	1.04			2–4***
									3–4***
68	Eating	1. Bread in girl's hand	LR	Low	4.83	1.04	41.82	<.00001	1–3***
		2. Boy's bowl	LR	High	4.44	1.20			1–4***
		3. Stove on left	UL	Low	3.15	1.62			2–3***
		4. Napkin	LR	Low	2.65	1.18			2–4***
69	Marines	1. Ammunition belt of man on right	LR	Low	4.35	1.36	26.60	<.00001	1–3***
		2. Goggles on helmet	UR	Low	3.85	1.46			1–4***
		3. Man in black	UR	High	2.94	1.74			2–3**
		4. Wristwatch (middle)	UR	Low	2.40	1.28			2–4***

APPENDIX (Continued)

Picture Number	Picture Label	Brief Description of the Rated Item[a]	Location[b]	Salience[c]	Relevance Rating[d] *M*	Relevance Rating[d] *SD*	*F* Value[e]	*p*	Significant Pairwise Comparisons[f]
70	Motorcycles	1. Yellow lines	LL	Low	4.94	1.02	45.47	<.00001	1–2***
		2. Right motorcycle tail light	LR	Low	3.67	1.51			1–3***
		3. Right motorcycle mirrors	LR	Low	3.23	1.37			1–4***
		4. Right motorcycle pedals	LR	Low	2.60	1.30			2–4***
									3–4*
71	Planes	1. Yellow plane	LR	Low	4.46	1.35	22.94	<.00001	1–2***
		2. Small white jet in middle	LL	Low	4.21	1.35			1–4***
		3. Colorful designs on left upper jet	UL	Low	3.23	1.32			2–3**
		4. Grass on top right	UR	Low	2.52	1.49			
72	Care Bears	1. Lock on bear's stomach	LL	Low	5.00	1.07	50.59	<.00001	1–2**
		2. Monkey's tail	LL	Low	4.08	1.50			1–3***
		3. Heart on tree	UL	Low	2.60	1.33			1–4***
		4. Buckles on boy's suspenders	UR	Low	2.27	1.50			2–3**
									2–4***
73	Snorkeling	1. Man's snorkel	UL	Low	4.92	1.13	26.32	<.00001	1–3***
		2. Woman's flippers	LR	High	4.85	1.25			1–4***
		3. Dark underwater spots in upper left	UL	Low	3.48	1.73			2–3***
		4. Dark underwater spots on lower right	LR	Low	3.29	1.69			2–4***
74	Liberty	1. Flame on torch	UL	Low	5.04	1.15	28.66	<.00001	1–3***
		2. Spikes on crown	UL	High	4.71	1.35			1–4***
		3. Windows in brick support structure	LL	High	3.19	1.42			2–3***
		4. American flag in bottom right	LR	Low	2.92	1.74			2–4***
75	Map	1. Hawaii	LL	Low	4.83	1.36	24.46	<.00001	1–3***
		2. Labels for DEL and MD	UR	Low	4.75	1.44			1–4***
		3. Lake in Utah	UL	Low	3.21	1.69			2–3***
		4. P.R. (Puerto Rico)	LR	Low	3.04	1.54			2–4***
76	Oysters	1. Oysters on the table	LR	Low	5.35	1.10	39.23	<.00001	1–2***
		2. Bowl	LL	Low	4.02	1.38			1–3***
		3. Camper trailer in background	UR	Low	2.69	1.70			1–4***
		4. Jean pockets of man on left	LL	High	2.44	1.64			2–3**
									2–4***
77	Di and kids	1. Pearl necklace	LL	High	4.42	1.29	28.13	<.00001	1–2***
		2. Buttons on dress	UL	Low	3.33	1.51			1–3***
		3. Lines on dress	LL	Low	2.63	1.36			1–4***
		4. Pocket handkerchief	LR	Low	2.52	1.58			2–3**
									2–4*
78	Fishing	1. Reel of girl's fishing pole	LL	Low	4.56	1.25	29.87	<.00001	1–2*
		2. Yellow divider in water	LR	Low	3.60	1.57			1–3***
		3. Second story of tug boat	UR	Low	3.00	1.49			1–4***
		4. Flag	UL	Low	2.04	1.22			2–4***
									3–4**
79	Traffic cop	1. "Topper" on roof of taxi	UR	Low	3.46	1.43	8.77	.00002	1–4***
		2. VW symbol on car grill	LR	Low	3.33	1.67			2–4**
		3. Policewoman's blonde hair	UL	Low	3.23	1.61			3–4**
		4. Yellow flashlight	LL	Low	2.21	1.30			
80	Wedding	1. Veil	UR	Low	4.77	1.29	34.66	<.00001	1–2**
		2. Flowing portion of bride's dress	LR	Low	3.85	1.47			1–3***
		3. Black bow ties	UL	Low	3.75	1.44			1–4***
		4. Ribbons hanging from bouquets	LR	Low	2.19	1.23			2–4***
									3–4***

Note—The four objects listed for each picture were preselected for rating by the authors. They were chosen to provide a variety of potential high- and low-relevance items that could easily be altered or removed with standard photo-editing software in a change detection study. [a]These are the phrases used to describe the to-be-rated objects to Experiment 1 participants. The four items are listed in descending order, from the object rated as most relevant to the meaning of the scene (1) to the object rated as least relevant (4). [b]Each rated item was located in one of four quadrants of the stimulus: LL, lower left; LR, lower right; UL, upper left; UR, upper right. [c]In Experiment 2, each item was categorized as high or low in visual salience on the basis of output from Saliency Toolbox software (Walther & Koch, 2006). [d]In Experiment 1, participants were asked to rate each object's relevance to the meaning of the scene on a 6-point Likert scale (1, *not very relevant*; 6, *very relevant*). Each mean score represents the average rating of 48 participants. [e]$df = 3$ and 141 for each repeated measures ANOVA F test comparing the relevance ratings of the four objects preselected for rating in a picture. [f]This column lists all significant pairwise comparisons for the main effect, with the Bonferroni adjustment for multiple comparisons. For example, in Picture 2 (birthday party), there were five pairs of objects that differed significantly. The second pairwise comparison in the list indicates that the glass of milk (Object 3) was rated as significantly less relevant to the meaning of the scene than the woman on the left (Object 1), and the last pairwise comparison in the list indicates that the glass of milk was significantly more relevant to the meaning of the scene than the light switch (Object 4). $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .0001$.

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