A Blind Mind's Eye: Perceptual Defence Mechanisms and Aschematic Visual Information

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Abstract

This research reports results from an eyetracker experiment exploring aschematic perception in visual processing. While eighty percent of those exposed to an urban image containing a woman committing suicide fixated on the woman, only thirty-three percent reported seeing her. Another thirty-three percent reported schema consistent items in place of the falling woman, and were twice as likely to insert other false schema-consistent items into their memory of the image. Schematic responders still exhibited partially elevated levels of negative emotions such as anxiety and confusion, however, suggesting that the schematic transformation was not complete. Together, these effects suggest that consumers ignore aschematic stimuli due to top-down cognitive frameworks that transform the image between sight and memory, rather than affecting the visual search pattern or visual attention itself.

Objectives

People see only what they are prepared to see. Research on change blindness and inattention (Mack 2003, Resnick 2002, Simons 2000) suggest that aschematic visual elements will not be noticed or recalled. It is unclear, however, if this schematic blocking occurs due to the imposition of top-down cognitive frameworks on perception, or if these visual schema actually change the bottom-up visual search pattern itself.

The current research explores the following questions:

- Are people indeed paying attention to aschematic visual information in an image?
- How strong is the ability of visual schema to modify image perception, stimuli recognition, and recall?
- Are there differences in the visual search pattern between those that accurately report the aschematic stimuli versus those who do not?
- To what degree does schematic visual processing serve as a visual defence mechanism, shielding a person from the affective impact of threatening or disturbing stimuli?

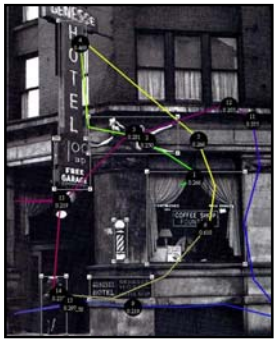
Method

Eyetracker and survey analysis were employed to explore the objectives. Fifty-six participants were run individually, each session lasting roughly thirty minutes. An ASL 5000 Remote Eyetracker system was employed to capture point-of-gaze as participants were exposed to the test stimulus.

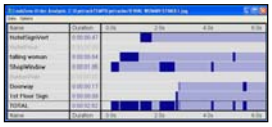
- Participants enter the lab and are seated in front of the display computer. The researcher uses the control computer to calibrate the desk-mounted eyetracker to the participants pupil and point of gaze. Subjects then read instructions saying they will be shown an image, and that they will be asked to recall as much as possible about the image after exposure.
- After a control image is shown to ensure the eyetracker is tracking properly, the test image is displayed for four seconds. Participants then use a free-response dialog box to enter everything they recall seeing in the image. This is followed by yes/no specific item recall questions, and Likert-scale emotional measures.
- This is then repeated with an eight-second image exposure. Following this, subjects complete the Need For Cognition Scale, the Anxiety Scale, and the Trait Meta-Mood Scale.

The test stimulus was a 1942 LIFE Magazine photograph taken of a woman in the act of committing suicide by jumping to her death from the Genesee Hotel in Buffalo, NY. The woman is visually aschematic, yet central to the image:

The Genesee Hotel image. Participants viewed this image for four or eight seconds, then were asked to recall everything they saw. They were then asked a series of yes/no object recall questions, followed by emotional and individual difference questionnaires.



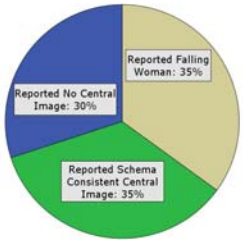
An example of one participant's GazeTrail across the target image. Black circles are gaze fixations, marked with their order and duration. The white boxes around visual stimuli are researcher-created LookZones



Using LookZones allows the researcher to break down the order and length of fixations into something interpretable.

Results

88% of participants had at least one fixation on the falling woman. The average length of fixations on the woman totalled 25% of exposure time, and participants averaged three woman fixations. **Yet when asked to recall what they saw, few actually report seeing the falling woman:**



The breakdown of mentions of the central stimulus in the free-response question. Length of exposure had little effect on the proportions of responses

A significant percentage "transformed" the aschematic visual of the falling woman into something safe and schematic:

"some flag off the main sign"
"a sculpture of an angel"
"swanlike image near the big hotel sign"
"a dancing woman in the upper window"
"a painting of a ballerina"

Examples of schema-consistent responses.

At the same time, participants' free response recall of other elements of the image (free parking, a person in the doorway, the coffee shop sign, the barber pole) were accurate and extensive. Yet, even when asked directly if they saw a falling woman, only 52% of participants responded yes.

The various eyetracker measures of visual attention show *no significant difference* between those who reported the falling woman and those who replaced her with something schema-consistent. The only difference is that schematic processors had marginally less follow-up fixations on the woman. This provides evidence that schematic visual process is a top-down cognitive framework, rather than a bottom-up change in visual attention.

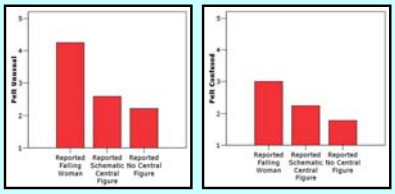
Does the Aschematic Visual Element Interfere With the Processing of the Rest of the Image?

Participants were asked a series of ten recall questions as to whether the object was or was not in the image. Five of the items were actually present, while five of the items were schema-consistent but not actually present.

	Accurate Recall	Illusory Recall
Reported Falling Woman	60%	**11%**
Reported Schematic Central Figure	77%	**31%**
Reported No Central Figure	49%	23%

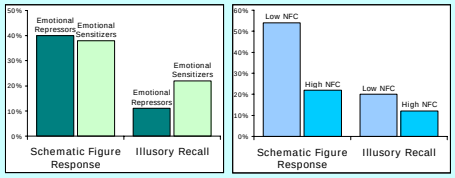
Note that those who replaced the woman with a schema-consistent figure were no less accurate at identifying the items actually in the image, but were three times as likely to insert other schema consistent items into the image.

Does Schematic Visual Processing Protect Participants From Negative Affect?



These results suggest that schematic processing is at least partially effective in protecting the viewer from the affective consequences of negative aschematic imagery.

Can Individual Difference Scales Predict Schematic Visual Processing?



Unexpectedly, the Trait Meta-Mood scale does not predict visual schematic processing, and works in the opposite way of predictions on illusory recall.

Need For Cognition works as expected, with low cognition participants reporting more than double the schematic responses of high cognition participants

Conclusions

- Over a third of participants exposed to a threatening aschematic stimulus used schematic processing to transform the image into something safe or expected, even though they had clear fixations on the aschematic visual element.
- This carries to the image as a whole, and schematic visual processors were three times as likely to insert false schematic elements into image recall.
- Together these suggest that schematic visual processing occurs in a top-down cognitive framework, rather than affecting the visual search pattern from the bottom-up.
- This could serve as a "visual defence mechanism," as the negative affect created by the aschematic stimulus is diffused.

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