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Guarding Against Misconceptions

Existing research doesn't always back up the common wisdom behind lifeguard training. Here are eight misconceptions about lifeguarding and the science that may set the record straight. | by Frank Pia, Ph.D

Several important aquatics professionals and lifeguard training agencies have questioned whether lifeguard surveillance techniques are based on science. While many opinions abound about lifeguard scanning, few of them are rooted in actual science. That's too bad because science has a lot to say about how to make guards more effective.

One of the most reliable methods is a science called human information processing, which deals with the way in which people process information, especially during complex tasks. During scanning, lifeguards look at, and think about, patrons in their area of responsibility. Psychologists call scanning an example of human information processing. You're already familiar with this idea because your five senses process information continuously. Reading this article is human information processing.

Human information processing theories are based on decades of solid, peer-reviewed research. The studies are just as valid today because though times change, people, or at least their ability to process information, do not.

That said, lifeguarding is a distinctive skill, and while human information processing has much to teach us, more research is needed to figure out exactly how it should be used. Evidence-based scientific models are needed to examine the effectiveness, validity and reliability of scanning practices.

Based on existing research, here are eight misconceptions about lifeguarding that human information processing theories may help clarify:

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Reference List
Additional information on the references cited by the author.

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1 Different settings call for different scanning methods.
Massive amounts of visual images from pools and beaches reach lifeguards' retinas every second. They must limit their attention to patron and facility surveillance images. Researcher Donald Eric Broadbent described visual attention as a strainer that limits image processing through visual pathways. The selection process occurs in visual short-term sensory/visual short-term memory storage.

When guards scan, they assign meaning to some visual images and dismiss mental pictures of safe swimmers. My review of many human information processing models has led me to conclude that the guard's eye/brain decision-making method for noticing the signs of drowning and distress is the same for all settings

2 Thinking about patrons' personal characteristics is the best way to help lifeguards spot potential drowning persons or swimmers in distress.
Sometimes during scanning, lifeguards have doubts about a person's safety. The guard brings that visual image, questions and educated guesses (hypotheses) about the bather into working memory for further examination. In working memory, guards look for more cues about whether the person is drowning, in distress or swimming safely.

Unseasoned guards may briefly think about, but then get rid of, working memory images without recognizing the person needs to be rescued. These guards often think the drowning person is playing in the water, according to my own research from 1959 to 1979. This research was supported later by New York State Department of Health's drowning investigations from 1987 to 1990. More recently, it was discovered that 89 percent of inexperienced lifeguards could not detect a drowning person on a video clip in fewer than 30 seconds, according to a 2002 study by researcher Billy Doyle. He found that 70 percent of the participants would "wait more than two minutes to see what would happen," and 30 percent indicated they would take no action.

Many studies have shown our working memory is limited to approximately seven bits or chunks of information and three to four hypotheses. Therefore, when teaching guards to scan, it may be wise to avoid surveillance practices that fill up their working memory with too many images and hypotheses.

Cognitive psychologists agree that working memory is a major human information processing bottleneck. When working memory is at or near capacity, guards divide attention between looking at visual images and making educated guesses about a person's safety. Based on these precepts, lifeguard training agencies and instructors should avoid surveillance policies and scanning rules that exceed lifeguards' working memory capacities.

Learning, however is a different matter. Learning allows the guard to store new information and reactivate past information from the two parts of long-term memory. Declarative long-term memory covers knowledge about ideas, definitions of terms, and visual images of drowning people and distressed swimmers. Procedural long-term memory consists of skill execution, such as rescue tube use and in-water spinal injury mobilization.

3 Scanning patterns are the best way for lifeguards to spot drowning persons and swimmers in distress.
With training, lifeguards can learn to automatically recognize drowning or distress images. When they use automatic processing, drowning people or distressed swimmers will "jump out" at the guard. These guards can avoid mulling over an image because training allows them to immediately match a visual image to a picture in their long-term memory. Automatic processing reduces working memory dependence, and it can be 25 times faster than controlled processing of visual images, according to researchers Walter Schneider and Richard Shiffrin.

A scientific study was conducted to teach lifeguards to use automatic processing to detect the signs of an active drowning person. Beginning in 1959, a 21-year observational study of thousands of drowning people at Orchard Beach, Bronx, N.Y., was carried out. This research led to my drowning vs. distress water crisis classification, and was contained in the 16 mm film "On Drowning." This study documented the difference between a drowning person and a swimmer in distress.

In 1995, the United States Lifesaving Association's manual adopted the drowning person and distress swimmer classification. The USLA built on the original 1970 water crisis classification and added 13 distressed swimmer descriptions to its training manuals.

4 All scanning methods work the same.
When scanning, lifeguards' eyes move rapidly from one point in the visual field to another. The American Red Cross advises guards to "scan from point to point, rapidly glancing at all the movements of people in your area." Scientists call a single rapid eye movement within the visual field a "saccade."

Within each saccade, the guard's eyes and brain work together to examine all the bathers. Images of people bathing safely are filtered out and need not remain in working memory. The guard's brain selects some people for closer examination. Selecting, focusing and discarding images are continued as the guard examines people in each consecutive scan.

During saccade-based sweep scanning, guards do not neglect examining people in any part of their zone. During consecutive saccades, they glance at and evaluate every person in each saccade.

This process assigns an equal chance that every bather might be a drowning person or distressed swimmer. Saccadic sweep scanning comfortably fits into guards' eye and brain system, by using familiar human information processing and natural eye movements.

5 Lifeguards should look out for "high-risk" patrons.

The instruction to lifeguards to "check high-risk patrons" suggests that a different observation and evaluation method is used for "nonhigh-risk" bathers. Asking guards to mentally rehearse images of "high-risk guests" who are neither drowning nor in distress after a guard completes a zone scan is unnecessary. This practice increases working memory load and can hasten the onset of sensitivity loss-induced fatigue.

Further, this practice does not increase detection of drowning persons, according to my own research. Other research by Raja Parasuraman in 1979 found that any vigilance task requiring a continuous load on working memory leads to a signal sensitivity loss.

6 Lifeguards don't need frequent breaks.

Studies suggest that the best way to increase lifeguard attentiveness is giving breaks. "You should take a break at least once an hour," state the American Red Cross' lifeguard manuals. The USLA encourages facilities to provide guards on continuous surveillance duty with a 15-minute break every hour. Likewise, the YMCA recommends sufficient guard surveillance breaks.

Researcher N.H. Mackworth developed the visual sensitivity loss model. Using classic clock task experiments, signal detection performance often declined during the first half hour of the watch. Later experiments found five- to 10-minute breaks reset the vigilance level to its original point.

Unless lifeguards are given regular surveillance breaks, the chances increase that as their shift progresses, they will be less likely to detect images of drowning people or distressed swimmers. Broadbent pointed out that the attention necessary to fixate continuously on images causes visual fatigue. Another reason for surveillance breaks: There are considerable environmental and psycho-physiological factors that cause guard fatigue.

The low arousal theory usually applies to lifeguards with long watches who do not have regularly scheduled surveillance breaks.

Facilities marked by few preventive actions and rare rescues can cultivate within the guard decreased central nervous system arousal.

Preservice and in-service discussions of the causes and solutions of low arousal are important. Individuals could be trained with biofeedback techniques to suppress brain theta waves indicative of low arousal, according to researchers Jackson Beatty, Arana Greenberg, W. Philip Deibler & James I. O'Hanlon. The National Sleep Foundation in Washington, D.C., offers tips for recognizing low arousal signs, and recommends that lifeguards take a break at least once an hour.

Some pool managers in the state of New York clear their single lifeguard pools every hour for 10- to 15-minute guard surveillance breaks. The manager remains on deck during the guard's break.

Every lifeguard training agency should discuss the necessity of providing regularly scheduled surveillance breaks from the many stressors that fatigue guards. Pool management companies should list regularly scheduled break periods in their lifeguard manuals and safety plans. Aquatics professionals can no longer encourage guards to "stay alert" without advocating hourly surveillance breaks to guards assigned continuous surveillance duties.

Multiple lifeguard facilities also should list surveillance break times within their rotation system. Because rotation only changes guards' positions, alternating their positions is not equivalent to a surveillance break.

Arousal theory accounts for some aspects of vigilance performance. If inexperienced guards think there's a low possibility for a drowning or near-drowning, they lower their vigilance.

7 The fewer the people, the less likely a drowning will occur.

Novice lifeguards at facilities with few drownings or near-drownings decrease their vigilance levels by silently noting to themselves that a water crisis is unlikely. This faulty conclusion allows them to lower their vigilance level.

This means lifeguards might look only at certain areas in their zone, according to a study by Neville Moray.

Researcher C.H. Baker linked expectancy vigilance decrements (for example "nobody drowns at this facility") to decreases in the perceived likelihood of target events. A target event would be a drowning person, swimmer in distress or person engaging in a dangerous practice.

Douglas C. Sackett, assistant director for the New York State Health Department's Bureau of Environmental Health, is developing a matrix for studying causes contributing to drownings during an 18-year span at lifeguarded facilities in New York. This matrix is based on data from 1987 to 2005. It provides valuable data for preservice and in-service discussions about the ways low arousal levels and decreased drowning person expectancies contribute to guards missing the signals of drowning or distress. For example, because 33 percent of pool drownings occurred with one to five bathers present, managers can prove to guards they must remain vigilant even when a single bather is using the pool.

8 Lifeguarding is inherently boring and tasks must be assigned to fight it.

Patron surveillance is a repetitive task. However, repetitious activities do not invariably lead to boredom. A 1985 study looked at the cognitive and affective features of boredom and noted sensory monotony alone does not induce boredom, according to research by R.E. Perkins and A. B. Hill. Using the research of other scientists, Perkins and Hill suggested boredom results when stimuli lack meaning to the person. In-service training and lifeguard supervision practices need to continually remind guards that watching swimmers is a meaningful activity.

Describing rectangular pools as "boring" predisposes inexperienced lifeguards to accept this biased evaluation. Portraying scanning as a dull, undemanding activity similar to filling up your bathtub with water, pulling up a chair and watching the water for half an hour creates a self-fulfilling prophesy for unseasoned lifeguards.

Opinions that patron surveillance is boring and monotonous have led to pattern scanning involving alphabet, geometric and multistage strategies.

Pattern scanning superimposes letters or geometric figures over the guard's visual field. While the guards' eyes follow the pattern, they are looking only at people in the areas they guess will contain drowning people or distressed swimmers. Testing whether one pattern results in faster water crisis detection than another pattern has not been conducted.

Multistage scanning contains quadrant grouping, focal person identification, pattern scans, postural changes, and rescue visualization.

Several lifeguard training agencies now recommend guards combat boredom by imagining (visualizing) a rescue if they are bored during patron surveillance. Visualization is forming a mental image. While composing mental images, guards cannot give full attention to people in their areas of responsibility. My research suggests that visualization while scanning, creates self-induced inattentional blindness.

Individuals can miss obvious signals during attentionally demanding working memory tasks, according to studies by Arien Mack and Irwin Rock, as well as another by Daniel J. Simons and Christopher F. Chabris. Many individuals in the Simons study failed to see a person dressed in a gorilla suit walk through the middle of a 62-second basketball passing exercise.

Multistage scanning uses a series of mental manipulations and postural changes over a consecutive five-minute interval. Research questions and hypotheses supporting the theoretical basis for quadrant grouping and focal person selection within each quadrant have not been identified. Furthermore, the consecutive scans in the multistage model have research design weaknesses.
