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The periscope box: A nonobtrusive method of providing an eye-to-eye video perspective

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An apparatus is described that allows for the nonobtrusive recording, from a direct camera perspective, of a subject watching a video or computer display. The device follows the basic principles of a periscope and is useful in a variety of experimental paradigms, particularly those involving the assessment of nonverbal aspects of behavior.

An enduring problem in the analysis of many forms of human behavior is the influence that awareness of being under observation has on the nature of the behavior in question. Individuals who think others are watching them, for example, have been found to be less facially expressive than they are when they do not presume themselves to be watched (Kleck et al., 1976). In order to create laboratory contexts in which subjects do not feel that they are under visual observation, psychologists have resorted to the use of devices such as one-way mirrors and hidden video cameras. Unfortunately, the young adults who participate in most psychological studies are now well aware of the use of one-way mirrors for surreptitious observation, and they typically become suspicious of being under observation when they encounter a mirror in a laboratory. In addition, although video cameras can be relatively easily hidden from a subject when a side or overhead view of the individual is sufficient, this is difficult to accomplish when the investigation requires an image of the subject looking directly into the camera.

Such a perspective on the subject is likely to be particularly helpful when the focus is on an objective scoring of facial behavior (e.g., using Ekman and Friesen's FACS coding, 1978) or when the direction and duration of eye movements or visual attention are being studied (as in Exline & Fehr, 1982). Similarly, in deception judgment studies it is apparently important to provide valid information as to precisely where an individual is looking with regard to a stimulus, particularly when that stimulus is another person's face (e.g., DePaulo, Stone, & Lassiter, 1985). The impression of a stimulus person looking up, down, or to the side, created by filming with the camera positioned above, below, or to the side of the point of focus of the stimulus person, is, therefore, likely to bias the observers' ratings. Finally, if an experimental paradigm requires that 2 subjects interact via closed-circuit television, apparent face gaze cannot be achieved unless the effective camera position vis-à-vis each subject is the other subject's face. In the latter application, obviously no attempt is being made to deceive the subjects regarding the presence of the video cameras, but the cameras must be positioned so that they do not obstruct the views of the subjects' faces while at the same time they validly capture each person's face gaze behaviors.

Both Wellens (1978) and Dabbs (1979) have previously suggested apparatuses for obtaining an eye-to-eye perspective in closed-circuit television interaction paradigms. The device described here can be used for this purpose when two units are employed, but it has the advantage in single subject paradigms of creating a situation in which subjects are unlikely to believe themselves to be under observation while it nonetheless provides an eye-to-eye perspective on the subject.

The general design of the apparatus (see Figure 1) follows the principle of a periscope, and in this sense it recalls Wellen's (1978) earlier concept. The camera used to record the subject's behavior (no. 4 in Figure 1) is positioned vertically under the lower, one-way mirror (3). The sides of the box are opaque and contain no openings. In research in our laboratories done with the device, the rationale given to subjects for the arrangements was that they permit the adjustment of a television image to the subject's

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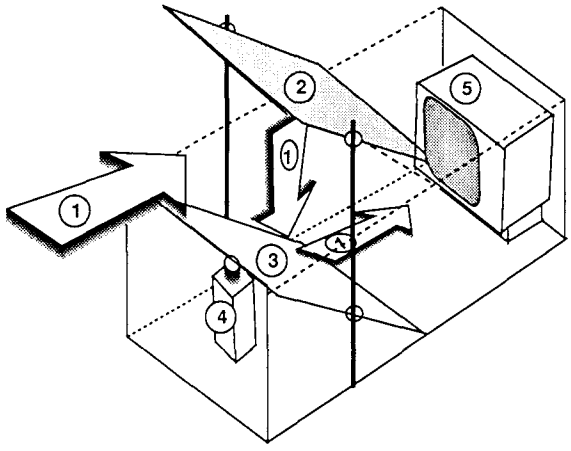

Figure 1. Diagram showing (1) viewer's line of gaze, as well as the principal components of the periscope box; (2) upper mirror (solid); (3) lower mirror (one-way); (4) concealed video camera in vertical position; and (5) TV monitor for stimulus display.

viewing angle when the subject is positioned in a reclining chair in front of the device. Individuals can be allowed to inspect the apparatus prior to the beginning of the study without risking discovery of the hidden camera.

The device consists of a cabinet painted in light absorbing black, an upper silvered mirror (2) whose angle of reflection can be adjusted, a lower one-way mirror (3) of similar size whose angle is also adjustable, and a pedestal for the television monitor (5). The camera is positioned vertically beneath the lower mirror and is focused on the subject's reflection in the upper mirror. Because of the angles of the mirrors, the subjects cannot see their own reflection but only that of the picture on the monitor. Our applications of the device have made use of a remote pan and tilt for the camera, as well as a remotely controllable lens. This makes adjustment of point of focus and field of view of the camera straightforward. Even with this feature, the front panel of the box (the subject's side) should be readily removable in order to provide access to the camera compartment. Alternately, a side door can be placed on either the right or the left side of this compartment. The lower one-way mirror should be painted on the camera side, leaving a small port of approximately 3 in. directly above the camera lens. This greatly limits the amount of ambient light entering the camera compartment and serves both to reduce the possibility that a subject will discover the camera while inspecting the device and to improve the quality of obtained images of the subjects.

Because the mirrors are adjustable, the positioning of subjects in front of the device is highly flexible. They can be standing, sitting upright in a chair, or reclining as in some of our applications. The use of a lens with variable focus length permits a subject's proximity to the front panel of the device to be varied and has the added advantage of permitting either a close-up view of the subject's face or a full-body perspective, independently of how proximate the subject is to the front panel. If a full-body perspective is desired, the subject must be far enough away from the front panel so that appropriate mirror angles can be obtained ($>$ 2m in our version of the device). If the subject is in a reclined position, head movements are naturally inhibited. In one study, we used a pillow to impede the head movements of subjects sitting upright.

Since a one-way mirror reflects approximately 60% of the light available from the subject, a good quality, low-light camera will provide good video images of the subject under typical laboratory ambient light conditions.

The apparatus has now been successfully used in our laboratories in a number of studies. Hess (1989), for example, recorded subjects' facial reactions to emotionally evocative video segments for judgment studies concerning emotional deception. The video records showed the subjects looking directly into the camera, though in fact they were looking at the emotion-eliciting stimulus. The images were of high quality, and debriefing interviews confirmed that the subjects did not think themselves to have been under observation.

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