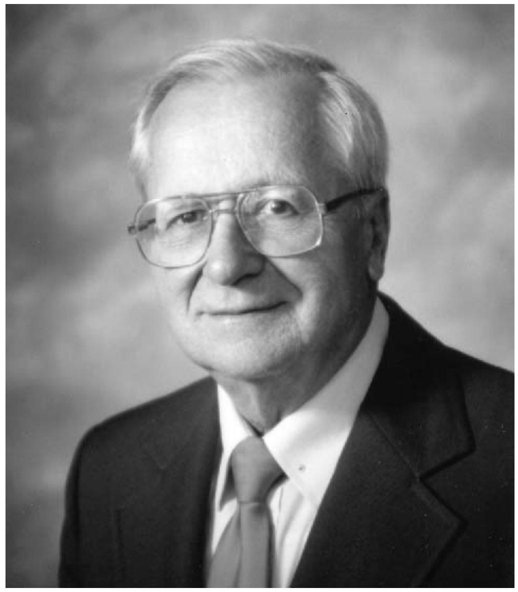
WALTER CHARLES GOGEL (1918-2006)



Walter C Gogel, Professor Emeritus of Psychology at the University of California, Santa Barbara (UCSB), died in Santa Barbara on October 20, 2006 at the age of 88, after a long and distinguished career. He was born in New Jersey in 1918. As a young man, Gogel served in WW II as a radar technician in the U.S. Army. After army service, he went to Marietta College, where he majored in physics and psychology and graduated magna cum laude in 1948. Three years later he received the Ph. D. in Psychology from the University of Chicago. From 1951 to 1965 he was a research psychologist first at the U. S. Army Medical Research Laboratory at Fort Knox, Kentucky, and later at the Civil Aeromedical Research Institute in Oklahoma City, Oklahoma. In 1965 he became Professor of Psychology at UCSB, where he taught until his retirement in 1989 and continued to be active in research for several more years.

At the University of Chicago, Gogel began working with Louis Thurstone, who was using mathematics to develop methods for psychological measurement, but he switched early on to work with Eckhard Hess on visual perception in chicks. This led him to his lifelong study of visual perception in humans focusing primarily on the perception of space and motion. Throughout his career, his primary concern was with understanding perceptual experience, and he embraced phenomenology as a starting point for the study of space perception. Indeed, many of his discoveries of perceptual phenomena and many of his ideas about perception came from his being exquisitely attentive to his own experience. However, he was wary of relying exclusively on the phenomenological reports of his subjects and thus was motivated to develop non-verbal and indirect measures of perceptual experience, which he favored in cases where the two types of measures did not agree.

In the field of space perception Walter Gogel was unexcelled as an experimentalist. During his early career, his focus was on phenomena of perceptual organization, phenomena in which the elements of a stimulus combine to produce a percept that is often quite different from the percepts evoked when the elements of the stimulus are presented one at a time. He started his career with very simple stimuli (one light in a dark room) and moved systematically to more and more complex stimuli. He got verbal reports of distance, but he corrected the subjects' verbal reports of distance to take account of their different memories of the measuring unit. He introduced several new measures of perceived extents, which included measuring distance by having subjects lean into a lighted "full-cue" alley and throw darts to the perceived distance of the target and by using hand separation to measure small extents. Later he developed an indirect method in which an observer moves his head left and right while viewing visual targets and indicates the perceived left-right motion of the targets. Gogel showed how this perceived motion could be used to compute a relatively pure measure of perceived distance.

Early in his career Gogel realized the complexity of space perception. He measured the perceived distance to a single light in a dark field and he showed that when a second light is introduced at a greater distance, the perceived distance of the first light decreases. This led Gogel to make a sharp distinction between absolute and relative cues to distance, absolute cues being those that provide information about distance from oneself and relative cues those that provide only information about the relations between distances, for example, that one distance is two times another. The convergence of the eyes to fixate a point is a good example of an absolute cue, and binocular disparity, the difference in the images in the two eyes when a 3-D scene is viewed, a good example of a relative cue. Gogel asked how absolute and relative cues combine to determine the perceived distances of all the objects in a scene. His answer was that relative cues, since they carry information only about relative distance, cannot determine absolute distances. Relative distances are scaled by absolute cues and the Specific Distance Tendency. These determine the absolute distance to one point, which, together with the relative cues, provides the basis for computing the absolute distances of all the other points in the scene. Gogel and others have produced many experimental results that are consistent with this view.

Gogel applied this same approach to motion perception. It was already known that, if a static object is surrounded by a moving frame, the static object will appear to move in a direction opposite to the frame. Gogel showed that this phenomenon generalizes to configurations of several points moving in different directions and that the perceived path of an object depends on the motions of other objects in its vicinity.

Gogel’s measurements of the perceived distance of a single object viewed in dark surroundings showed that it differs systematically from its physical distance. Near objects appear farther than they are and far objects appear nearer than they are. He hypothesized that there is a process independent of the stimulus that pulls the perceived distances toward a specific distance of about 2 meters (the Specific Distance Tendency). When the field contains multiple objects, a second factor comes into play: the objects are more similar in perceived distance than would be expected on the basis of the relative cues (the Equidistance Tendency). The Specific Distance Tendency affects absolute distance, while the Equidistance Tendency affects relative distance. Thus, in Gogel’s view there are two kinds of factors, cues and tendencies, and two kinds of each, absolute and relative. Where an object appears to be depends on the positions indicated by each of the cues present, and the relative strengths of these cues and the two tendencies. He found that the strength of the relative factors increased as the distance between objects decreased (the Adjacency Principle).

Although the major cues to distance had been discovered before Gogel’s time, he did an extensive series of experiments to determine which of them were effective as cues to absolute distance and which to relative distance. He was led to challenge commonly held views about some of the cues. Familiar size is the best example. It was widely held that if an observer knew the size of an object, the object would be perceived to be its familiar size and that the product of perceived size and the visual angle of the retinal image would determine its perceived distance (the size-distance invariance hypothesis). Consistent with this, experiments had shown that, if all cues except the physical size of an object were eliminated, people report that perceived distance increases as image size decreases. Gogel did such an experiment using transparencies of playing cards, but he had subjects judge the perceived size as well as the perceived distance. The distance judgments followed the usual pattern, but subjects did not judge the cards to be of the same size. Perceived size was reported to vary with image size. This led Gogel to doubt that the reported perceived distances were accurate measures of perceived distance, and to propose that they were cognitive judgments based on the familiar experience that distant objects look small. Gogel introduced his head motion procedure to obtain purer measures of perceived distance. He found that there was at most a very small change in perceived distance when the image size of a familiar object changes.

He later used this same analysis to explain reports that the moon appears both large and close when it is near the horizon.

Gogel came to view perception as arising from the resolution of unavoidable conflicts between absolute cues, relative cues, and tendencies in the visual system. He provided much evidence that the resolution of these conflicts depends on the relative strengths of the competing factors and that the solution is a weighted average of the perceptions that would be produced by each factor alone. He showed that the relative strengths of the factors vary continuously with the adjacency of objects, and he proposed that strength also co-varied with the precision of the factor. The same analysis applies to cases where cues are deliberately put in conflict. It accounts for several illusions including those occurring in the Ames' room and provides the basis for predicting new illusions. Most of his work was concerned with size and distance, but he showed that these same ideas account well for the perceived path of the motion of a point when one or two points are moving relative to it.

Besides being a superb experimentalist, Gogel gradually emerged as one of the field's major theorists. His most important theoretical contribution is his article presenting "a theory of phenomenal geometry" published in 1990 at the age of 72. This theory grew out of his earlier work on percept/percept relations, most notably his important elucidation of "apparent concomitant motion", which refers to perceived motion seen in stationary objects when the observer's head moves through space. A familiar example occurs when one views an inverted facial mask while moving side to side. The mask is often misperceived as facing the observer and turning as the observer moves. In a number of important papers in the 1970s and 1980s, he showed conclusively that apparent concomitant motion primarily occurs when distance is misperceived, while direction and the movement of one's own head are perceived correctly. He eventually extended his analysis of perceived motion to the general case of stationary and moving stimuli viewed with the stationary and moving head (including motion in the sagittal plane). His 1990 paper presenting a theory of phenomenal geometry was the final and most developed expression of his approach, for it provided an account of how the factors of perceived visual direction, perceived distance and depth, and the sensed movement of the head could account for the derived perceptual variables of size, orientation, shape, and motion. With the development of this theory of phenomenal geometry, he had moved from his earlier concern with how sensory cues and internal tendencies act as constraints on the mapping from physical to perceptual space to a greater concern with the relations of the perceptual dimensions of visual space, relations that act as fundamental constraints on the physical-perceptual mapping.

Walter Gogel became a world leader in the field of space perception early in his career and subsequently influenced many other leading researchers. He authored more than 100 scientific articles, which are frequently and widely cited. He was active in research late into his seventies and, well after that, took great delight in talking about space perception with anyone who was interested. He mentored some excellent researchers who continue to pursue the approach that he developed. Numerous scientists visited his laboratory, where he was always prepared to demonstrate his latest perceptual discovery. He was for many years consulting editor of the journal *Perception and Psychophysics*.

It was our great fortune to have Walt Gogel as a colleague and friend for many years. We have never met anyone with a deeper interest in or more intense focus on science than Walt. He loved to think about and do research on perception, and his passion was contagious for us all. He had a deep understanding of perception. During his career, he developed some strongly held views and was never one to shy away from argument. Yet, while arguing his position, he was always gracious and good natured, and whether we agreed with him or not, we always learned something. He made very substantial contributions to the science of perception that will have lasting importance. We will remember him with great fondness and respect.

Although Walt did not often talk about his life outside the university, it was a full life. From early childhood he participated in sports and became an expert gymnast. Until he was well into his seventies, he worked out almost daily at a gym and was admired for his strength. Walt loved nature. He and his family traveled and camped throughout the United States, visiting almost all of the national monuments. He had a tender heart for animals, which he expressed in his care of the many dogs that he had during his life. He was a very loyal, kind, good-natured, and deeply philosophical man. Walt leaves Nancy, his devoted wife, constant companion and supporter for more than 50 years, three children, Howard, David, and Susan, and two grandchildren.

John Foley
Jack Loomis