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Illusions and Sampling Environmental Cues

Leibowitz *et al.* (*1*) have demonstrated that the Ponzo illusion may be related to phenomena of size constancy and have suggested an explanation based on differential sampling of environmental cues. However, a closer inspection of their stimulus displays, procedure, and reasoning indicates the need for further inquiry before their conclusions are accepted.

When one inspects the photos for which judgments were obtained, one finds abundant perspective and textural cues. Since neither the degree of texture nor perspective was determined for either photo, it is impossible to conclude that: "perspective is a relatively stronger cue than texture . . ." Clearly, unless cue weights are determined in some fashion (stimulus analysis or scaling studies), their conclusion is unwarranted. Others (*2*) have attempted to untangle this difficult problem.

In attempting to explain the differences between judgments made by Guamanian and Pennsylvanian students, the authors rely solely on an assumed "poverty of experience" theory. Although they state that short vistas, hilly terrain, and the absence of railroads on Guam may be the ecological source of the judgmental differences obtained in their study, the experiences of Guam students with still and motion pictures, streets and roads, telephone and electric wires, rooms, hallways, and so forth were not considered. Nor were possible cross-cultural differences in response bias mentioned.

I think crucial stimulus and subject factors responsible for intra-cultural and cross-cultural differences in estimation of size need further exploration.

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10 December 1970

It would be of great value if a system were available which would permit assignment of meaningful quantitative values to various monocular depth cues. However, the absence of such a specification system does not preclude the possibility of an ordinal classification in which one stimulus configuration emphasizes perspective and the other emphasizes texture cues as was the case in our study. We would agree with Schiff that our photographs, as well as any full-tone photographs of natural environments, do not isolate only one cue or the other. In the interest of broadening the base of perceptual research, the environments were selected as particularly rich in monocular depth cues. It would be unnecessarily restrictive to confine one's research to stimuli which have been quantitatively scaled or presented only in their abstract form. As we pointed out in the original paper, no theoretical values were assigned to the functions obtained. Rather, the terms perspective and texture were used to label obvious differences in the particular photographs employed.

The possibility of biased responses due to different interpretations of instructions is a well known problem and every effort was made to avoid it. The instructions, which were designed to be as unequivocal as possible, were identical throughout the study. There was no language problem as instruction at the University of Guam is in English. Intellectually and educationally, the subjects were essentially equal. In addition, a scale was used to assess the extent to which subjects might desire to put themselves in a socially desirable light and thus please the experimenter. The group means and variances were the same for the Guamanian as for Pennsylvanian students (*1*).

We do not suggest that Guamanians have no experience with perspective, but rather that familiarity with these cues in three-dimensional real-life situations is richer for the Pennsylvanian than for the Guamanian subjects. There are no railroad tracks on Guam, most roads are winding with the telephone wires following the roads, the buildings, which are constructed to take advantage of the tropical climate, do not have long hallways. There is, of course, no control over experience with perspective in two-dimensional situations.

We would strongly agree that cross-cultural research presents special methodological problems. Our choice has been to take every precaution with the objective of determining the extent to which results of abstract laboratory studies are applicable to the more familiar natural situations which provide the basis for the majority of our perceptual experiences.

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2 March 1970

Flare Identification Associated with Coronal Disturbances

It has come to my attention that an incorrect identification has been made concerning the causal nature of the Pioneer 6 Faraday rotation events observed by Levy *et al.* (*1*). They observed three large-scale transient phenomena and associated these with type III dekametric solar radio bursts. Table

Table 1. List of Faraday rotation events that Levy *et al.* associated with previous radio emission. Optical flares associated with these radio events are also shown.

Date (1968)	Distance from sun to Pioneer 6–earth line of sight (solar radii)	Faraday rotation (U.T.)		Type III dekametric noise burst (U.T.)	Flares associated with noise bursts				
		Maximum	Start		McMath plage No. associated with flare	Location (heliographic coordinates)	Importance No. and flare type	Corrected area (square degrees)	Degrees from west limb
4 Nov.	10.9	1700	1550	1244	9749	S15 W28	–N	0.70	62
				1305					
				1457					
				1502					
				1522					
8 Nov.	8.6	1730	1640	1631	9760	N18 E42	– –F	1.8	132
12 Nov.	6.2	1900	1750	1643	9760	N18 W9	– –F	0.31	81
				1647	9768	N10 E46	–N	1.2	136
				1726	9760	N17 W14	–N	1.5	76
				1746					

Table 2. List of Faraday rotation events and more recent flare identifications.

Date (1968)	Distance from sun to Pioneer 6–earth line of sight (solar radii)	Flare associated with Faraday rotation event					ΔT (hr : min)	$\bar{V}$ (km/sec)	Corrected area (square degrees)	Degrees from west limb
		Start (U.T.)	Maximum (U.T.)	McMath plage No.	Location (heliographic coordinates)	Importance No. and flare type				
4 Nov	10.9	0520	0614	9740	S15 W90	1B	10:30	200	4.8	0
		0933	0938	9740	S18 W90	–N	6:17	330	2.3	0
8 Nov.	8.6	2005*	2018*	9747	N7 W79	1F	20:35	80	1.44	11
		2017*	2032*	9747	N10 W76	–F	20:23	80	0.41	14
12 Nov.	6.2	1421	1452	9754	N5 W72	1B	3:29	340	14	18

* Flare on 7 November.

1 lists those dekametric bursts Levy *et al.* associated with the Faraday rotation events and information concerning the flare or flares that began a few minutes prior to the radio emission (*2*).

Table 2 lists the flares that I find to be more likely causes of the Faraday rotation events observed in the passage of the Pioneer 6 radio signal through the solar corona. These flares did not produce any observed type III radio emission but it would appear that the particle-producing ability necessary for the type III radio bursts (occurring within a few tenths of a solar radius above the photosphere) need not be related to the ability of that flare to cause coronal disturbances of the type observed by Levy *et al.* These coronal disturbances occur at about ten solar radii and are effects more likely associated with the ambient plasma at these distances.

The flares listed in Table 2 are located within 20° of the west limb of the sun. The west limb is the most favored position for producing the effects observed. All the flares listed in Table 1 are more than 60° away from the west limb and in one case the flare is 132° away. The flares listed in Table 2 are substantially larger in importance number and area. In addition, the transit times ΔT calculated for these events (on the basis of the starting time of the event rather than the time of the maximum) result in average coronal velocities $\bar{V}$ of a few hundred kilometers per second, in agreement with Parker's model of the solar wind (*3*) rather than with values several times larger. This agreement, however, is a product of the identification rather than a necessary condition, as these may be unusual events.

The correct identification of solar-associated events observed on earth with particular flares and active regions on the sun is a difficult task near the solar maximum as there are many active centers and many are flaring. It is, however, my opinion, and Levy *et al.* concur, that the flares listed in Table 2 are more likely the causal agents responsible for the Faraday rotation events than those flares listed in Table 1.

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3 September 1969

Ice Survey by the U.S. Coast Guard

The greatest mass of ice in the Northern Hemisphere is the Greenland ice sheet. Since the first crossing by F. Nansen in 1888, it has been the subject of recurrent exploration and investigation. As a result of detailed studies within the last two decades, it has become the earth's best known continental glacier. We now have extremely valuable information about the thickness of ice, the configuration of the subglacial floor, and the relationship of these elements to surface form. Seismic data (*1*, p. 242) indicate that the subglacial floor is like a great saucer with a portion resting below sea level.

Recently developed measurement of ice depths by airborne radio sounding is providing additional data on the