Antigravity Roads are Visual Illusions

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THE LEGEND OF...

SPOOK HILL

AGES AGO AN INDIAN TOWN ON LAKE WAILES LAKE WAS PLAGUED WITH RAIDS BY A HUGE GATOR. THE TOWN'S GREAT WARRIOR CHIEF AND THE GATOR WERE KILLED IN A FINAL BATTLE THAT CREATED THE HUGE SWAMPY DEPRESSION NEARBY. THE CHIEF WAS BURIED ON ITS NORTH SIDE LATER PIONEER HAULERS COMING FROM THE OLD ARMY TRAIL ATOP THE RIDGE ABOVE FOUND THEIR HORSES LABORING HERE... AT THE FOOT OF THE RIDGE... AND CALLED IT SPOOK HILL.

IS IT THE GATOR SEEKING REVENGE, OR THE CHIEF PROTECTING HIS LAND?

STOP CAR ON WHITE LINE, PLACE IN NEUTRAL, AND LET IT ROLL BACK.

http://www.psy.ritsumei.ac.jp/~akitaoka/saka12e.html

Dr. Seiichi Tsuinashi

Slope illusion 11 (Skewed staicase of the Shigaraki Ceramic Cultural Park, Shiga, Japan)

Slope illusion 10 (Skewed staicase of Shomaru railway station, Saitama, Japan)

Slope illusion 9 (Illusory slope in Minamitane-town, Tanegashima-island, Kagoshima, Japan)

Slope illusion 8 (Illusory slope in Nakatane-town, Tanegashima-island, Kagoshima, Japan)

Slope illusion 7 (Danjo-zaka and Okyo-zaka in Amakusa-Shimojima, Kumamoto, Japan)

Slope illusion 6 (Slope-ascending river in Miyama, Nantan, Kyoto, Japan)

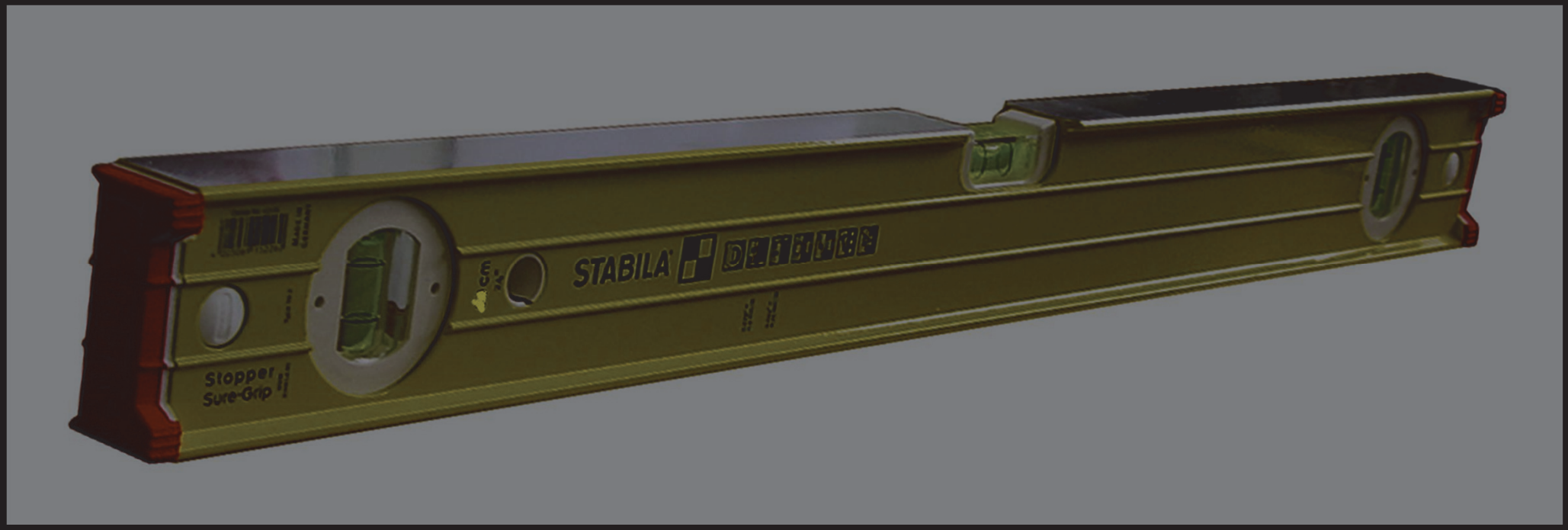
Slope illusion 5 (Ghost slope in Okagaki, Onga-county, Fukuoka, Japan)

Slope illusion 4 (Slope-ascending water in Tanushimaru, Kurume, Fukuoka, Japan)

Slope illusion 3 (moving-back slope in Hashikami, Aomori, Japan)

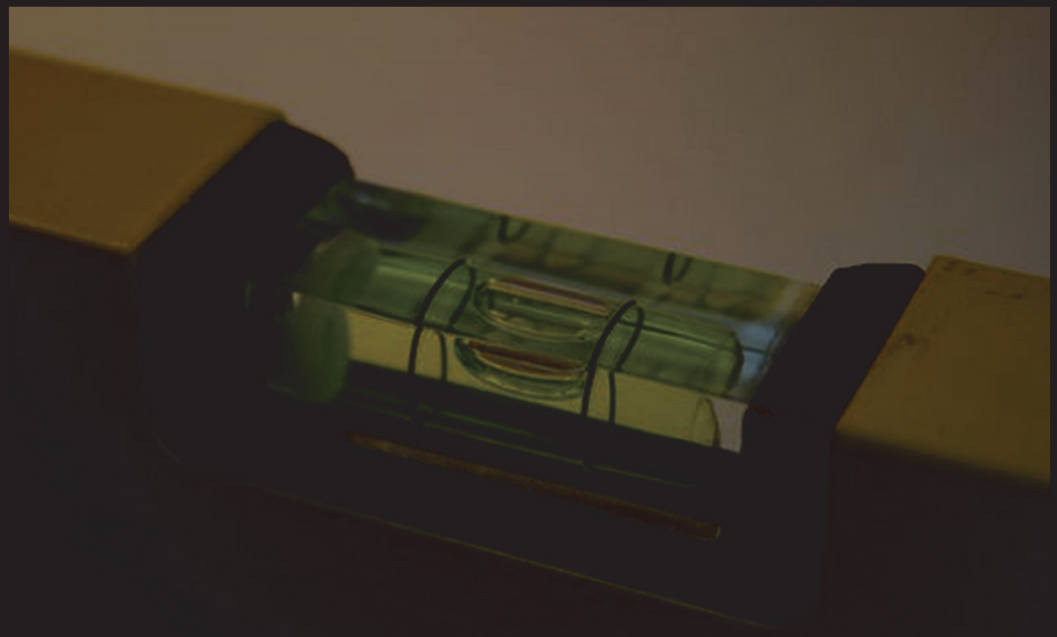
Slope illusion 2 (Mysterious slope in Towa, Iwate, Japan)

Slope illusion 1 (Mystery zone in Yashima, Takamatsu, Kagawa, Japan, etc.)



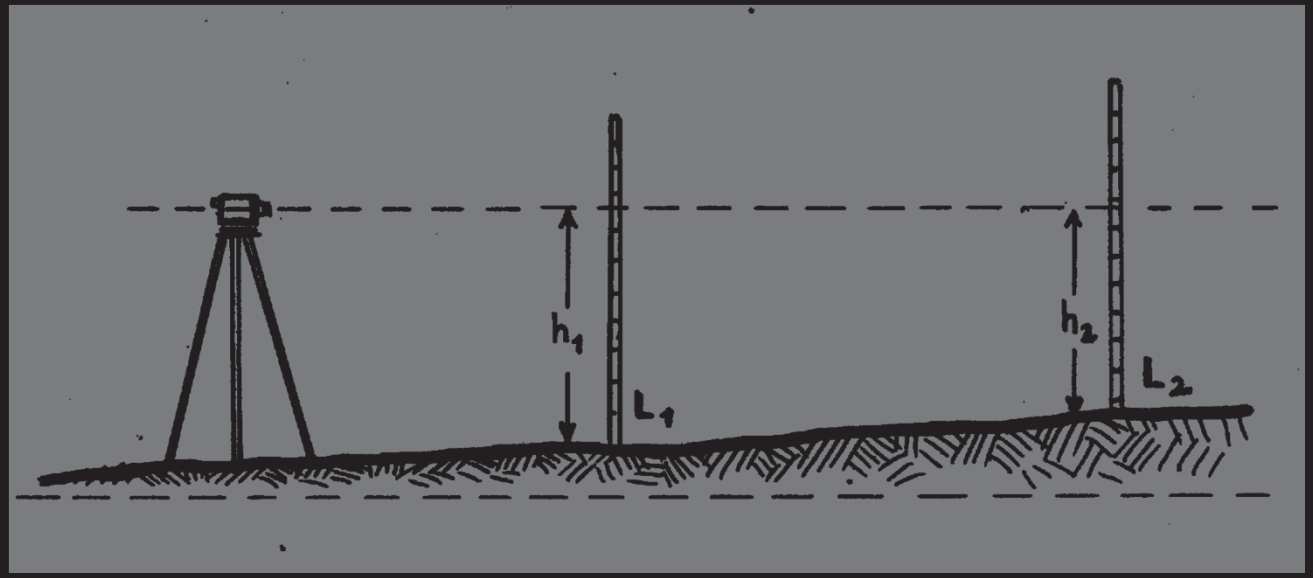
Spirit level

(Not enough!)



Theodolite

(Better if...)



1st experiment – One road

Corato (Italy)

1st experiment – One road – Influence of the horizon

24 subjects

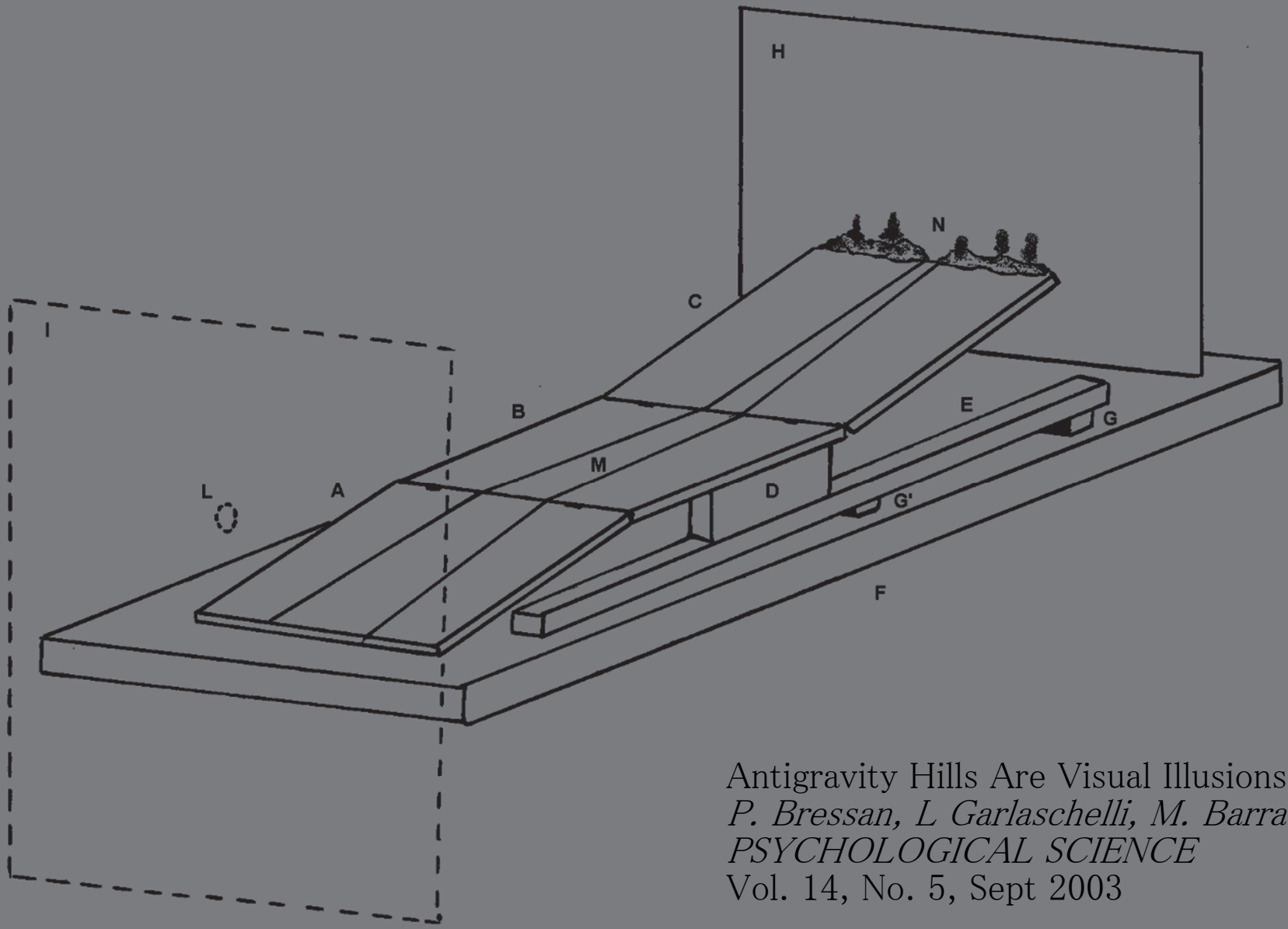
Perceived as uphill (M= +0.67)

Perceived as level (M= +0.08)

Perceived as downhill (M = -0.59)

2nd experiment – Two roads

Magnetic Hill – Moncton



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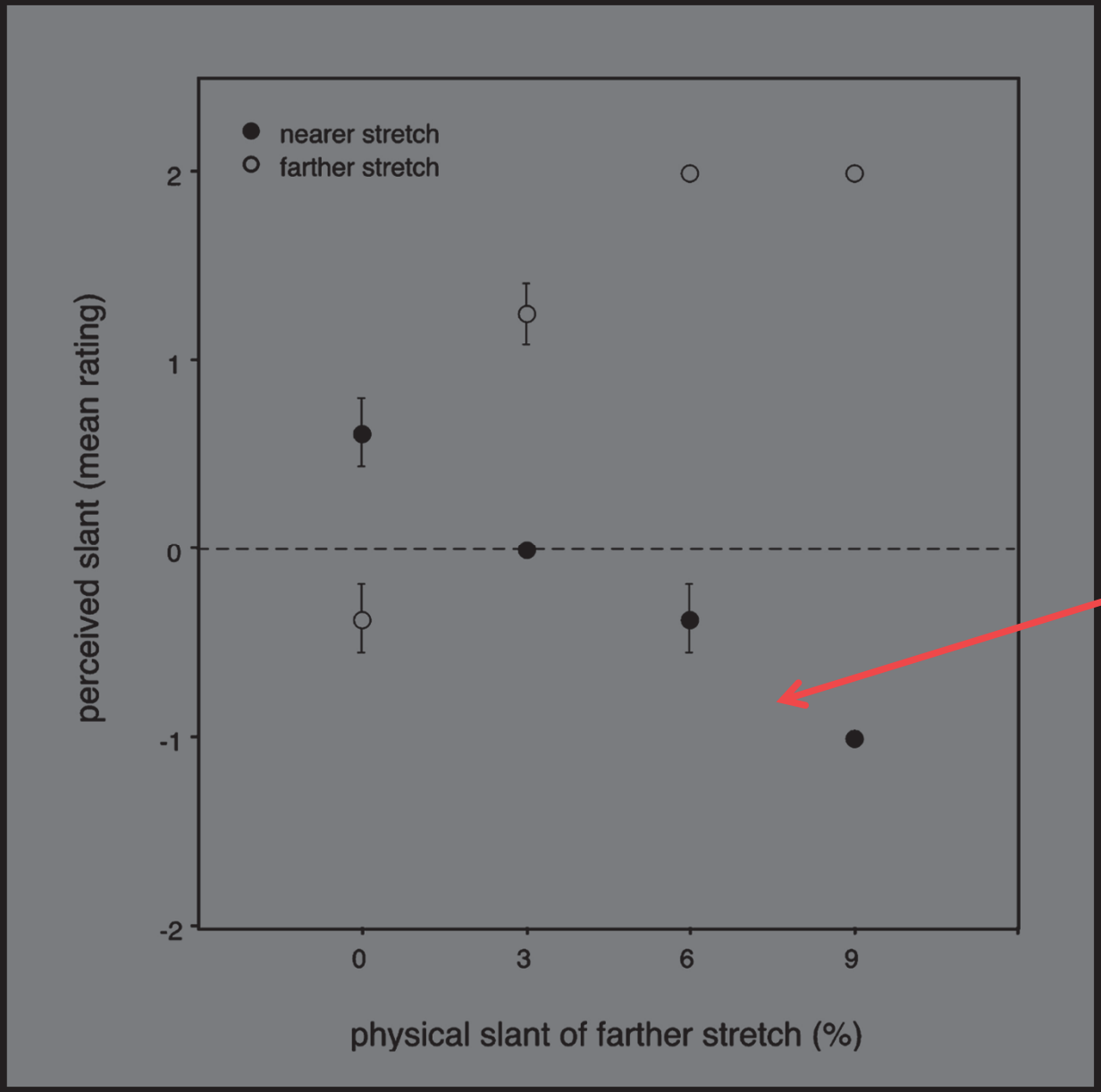


Nearer stretch always 1.5% **uphill**

Is perceived **downhill**
when farther stretch
is strongly uphill

Also: if nearer stretch is strongly downhill (−3% −6%)
then farther stretch (actually slight. **downhill** −1.5%) is perceived **uphill**

3rd experiment - Three roads

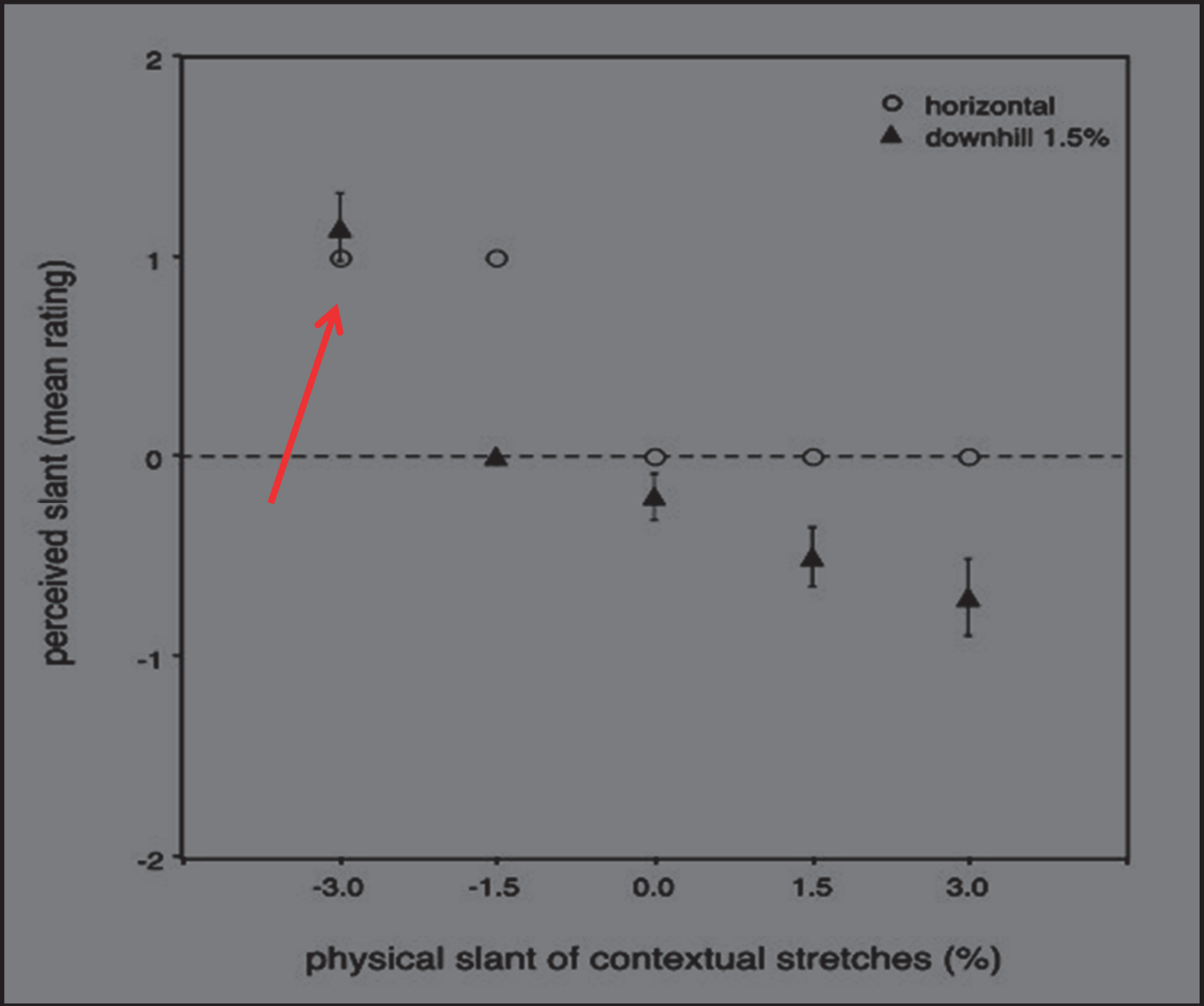
60 subjects

Middle stretch : 5 possible slopes (-3% -1.5% 0 +1.5% +3%)

1st and 3rd stretches: parallel to each other, 5 slopes

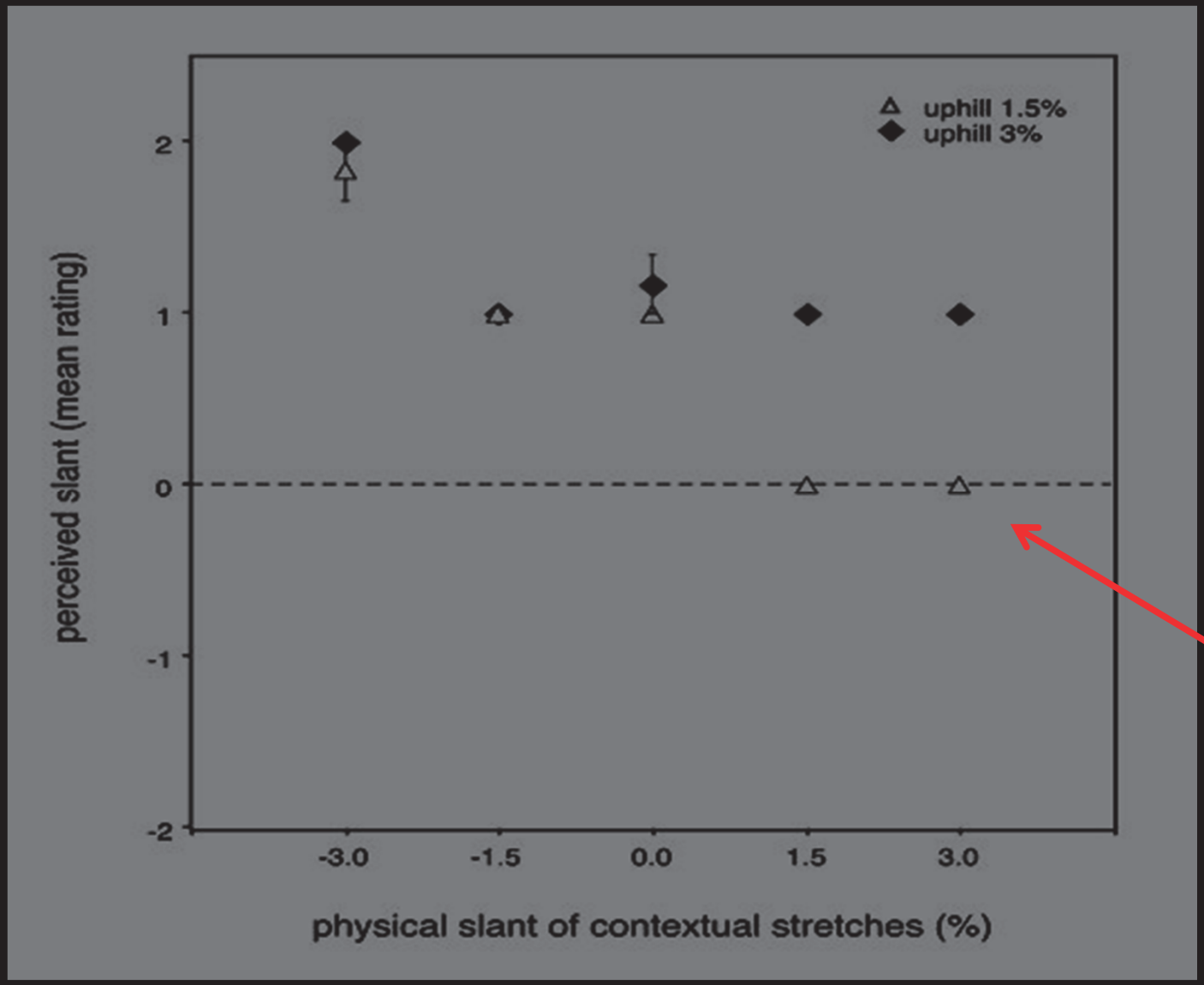
25 combinations

Perceived slant of middle stretch



When 1st and 3rd stretches are strongly downhill (−3%)
and the center stretch slightly downhill (−1.5%)
then center stretch is perceived **uphill**

Perceived slant of center stretch



When 1st and 3rd stretches are strongly uphill (+3%)
and the center stretch slightly uphill (−1.5%)
then center stretch is perceived **level**

4th experiment – Two flanking roads

Montagnaga (Italy)

GREL = gravity-referenced eye level
SREL = surface-referenced eye level

SREL

Perceived GREL

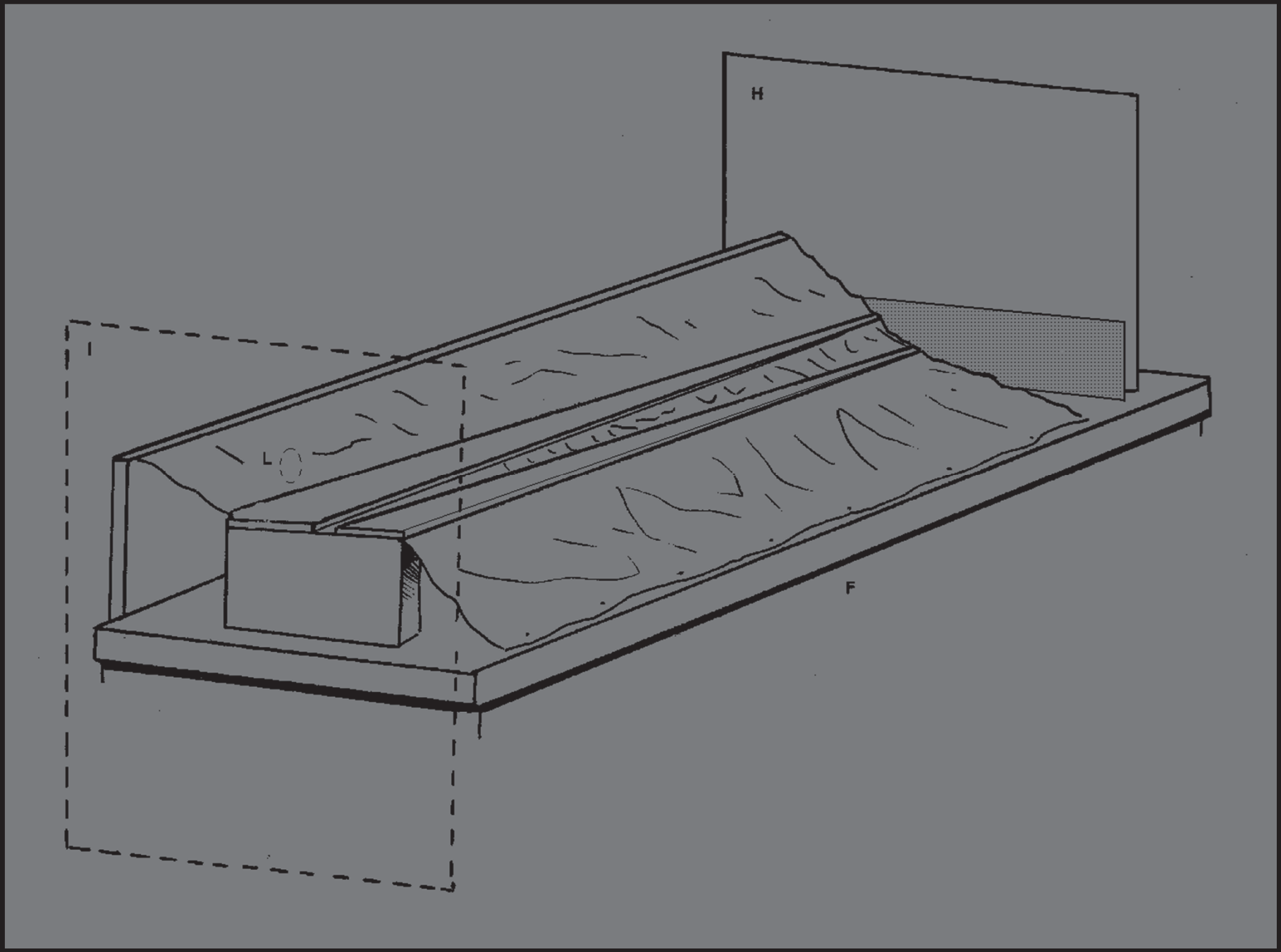
GREL

uphill

SREL

Perceived GREL

Downhill !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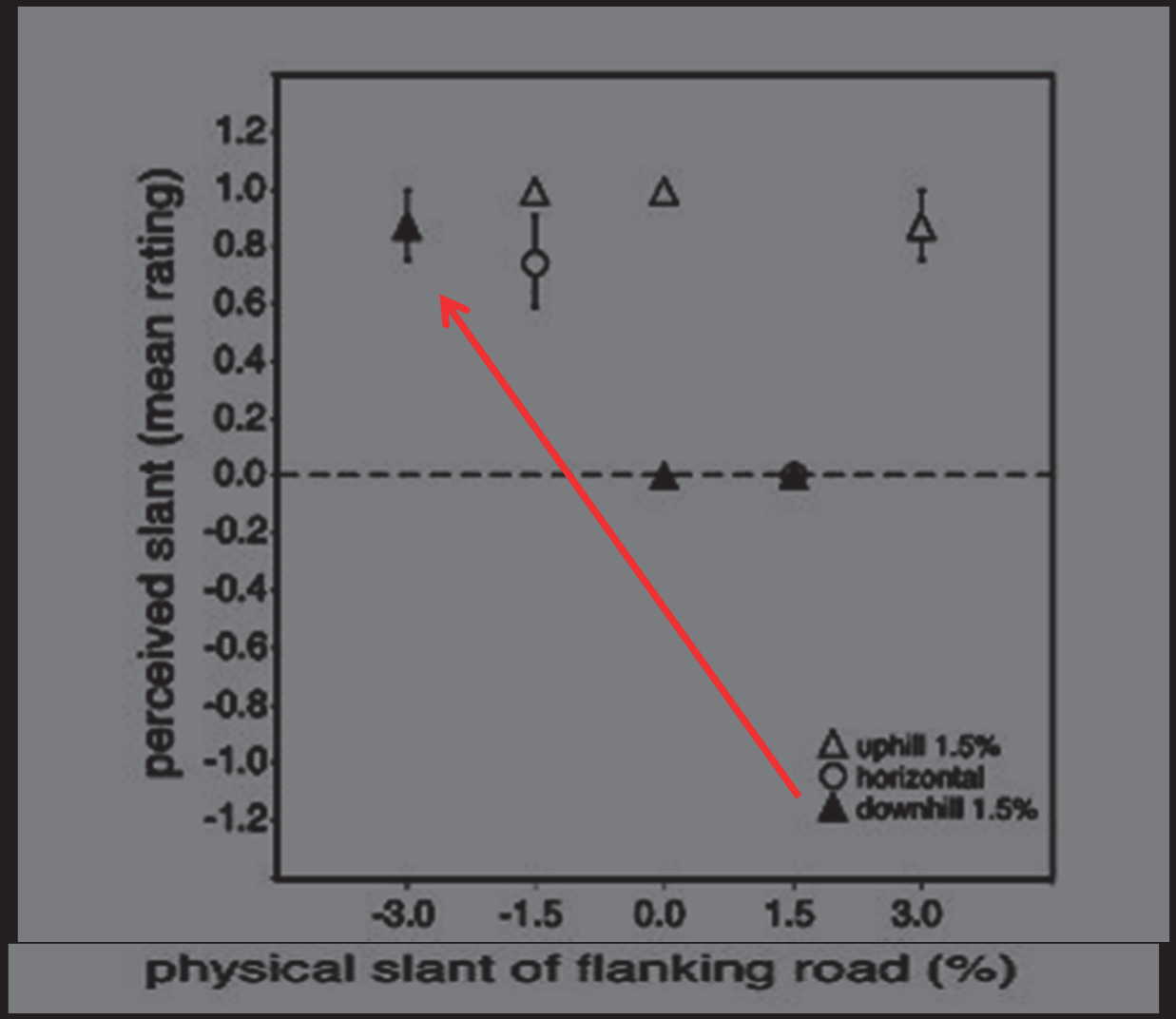
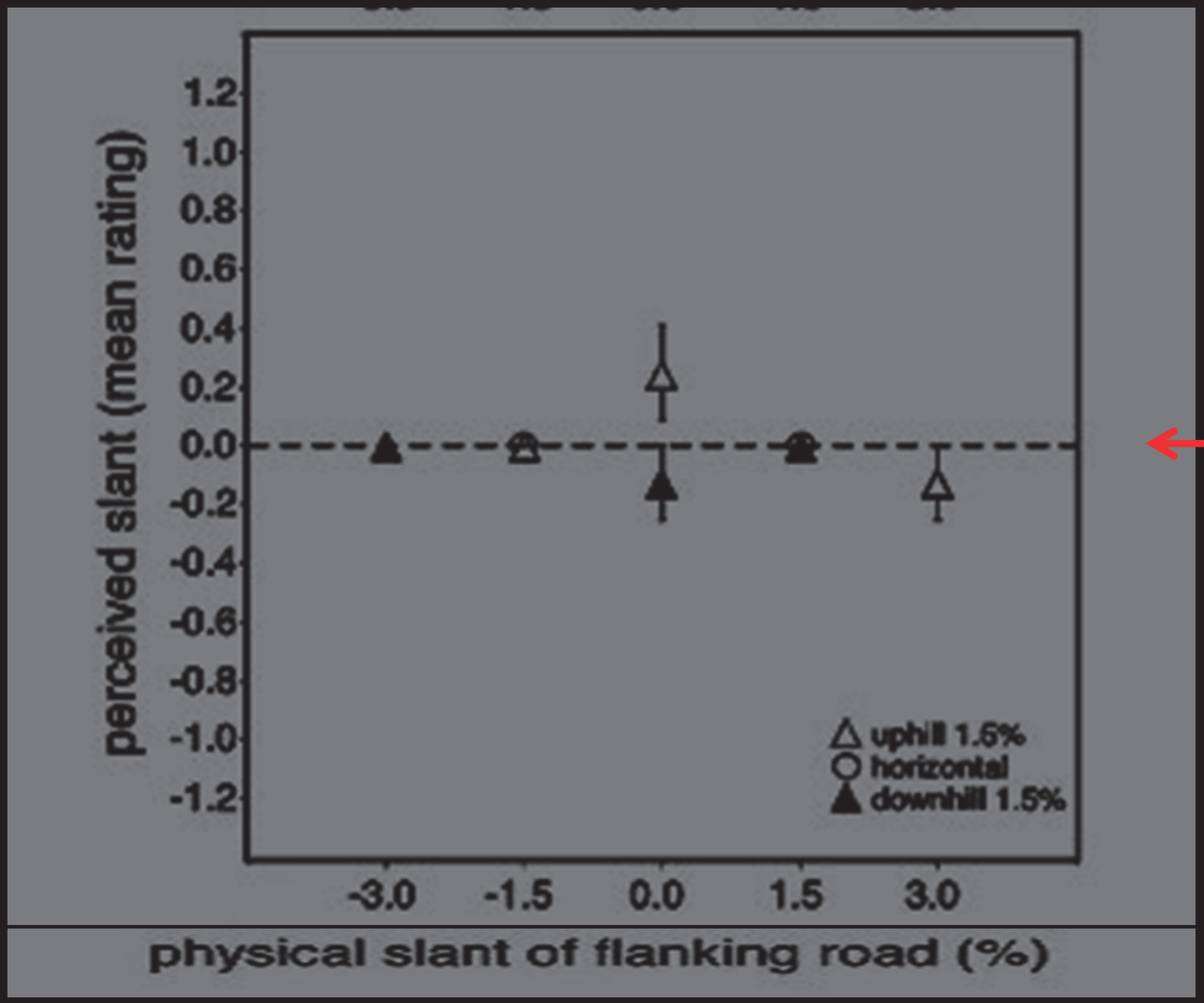
Two flanking roads – no visible horizon



When flanking road is downh. −3%

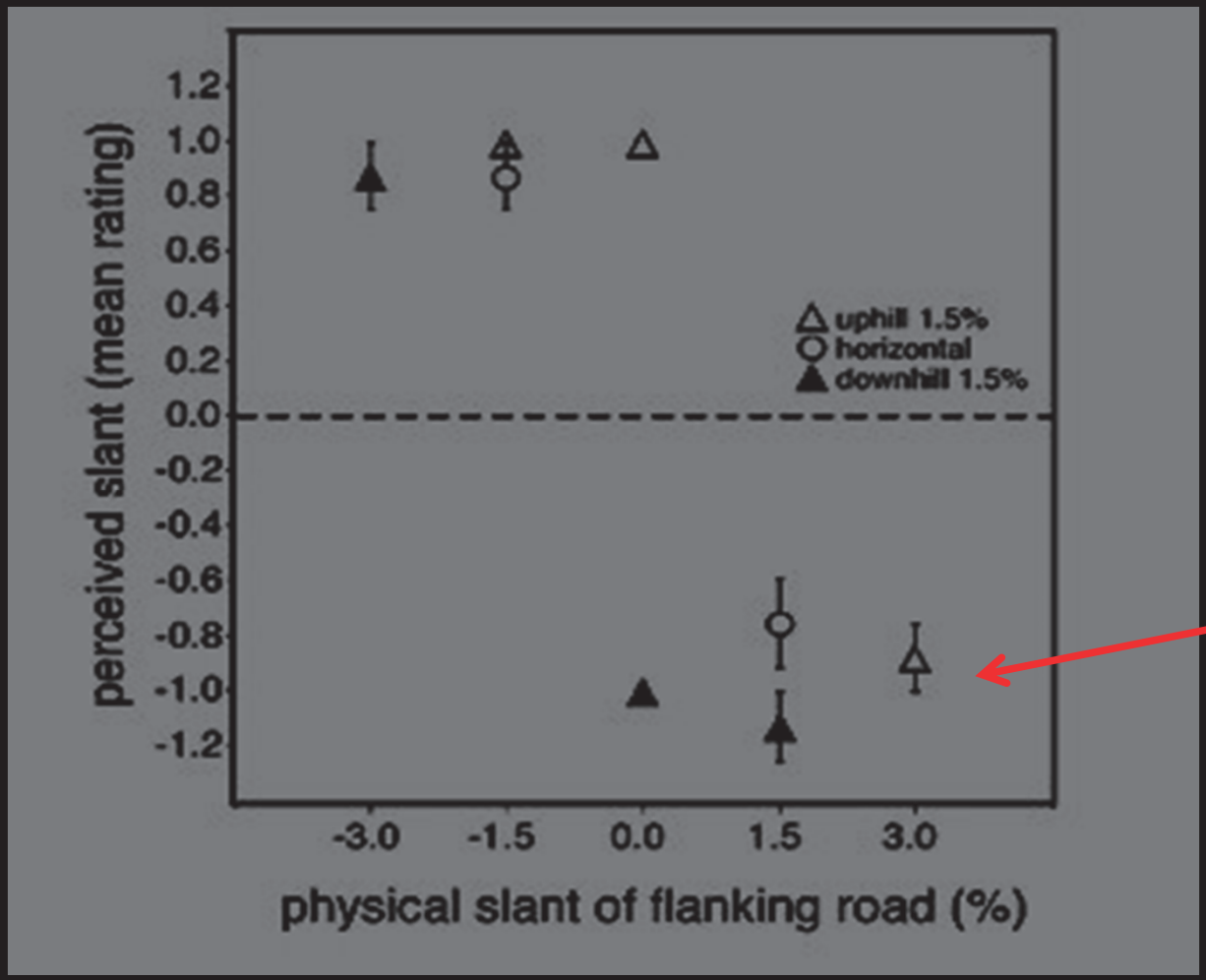
The test road (downh. −1.5%) is perceived uphill +1%

Two flanking roads – Horizon on test road



Test road (−1.5%, 0, +1.5%) is always perceived nearly level for any slope of the flanking road.

Two flanking roads – Horizon on flanking road



When horizon is on flanking road (+3%) this road is perc. level.

The test road (uphill +1.5%) is perceived downhill – 1%.

THE OREGON VORTEX

The tilted frame of reference (tilted ca 25˚)

Research Article

THE MYSTERY SPOT ILLUSION AND ITS RELATION TO OTHER VISUAL ILLUSIONS

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Abstract—*Observations at The Mystery Spot, a roadside attraction near Santa Cruz, California, suggest intriguing visual illusions based on tilt-induced effects. Specifically, a tilted spatial background at The Mystery Spot induced misperceptions of the orientation of the cardinal axes (i.e., true horizontal and vertical), which then led to illusions in the perceived height of two individuals. This illusion was assessed at The Mystery Spot and replicated in the laboratory using pictorial and lined displays rotated in the picture plane. These findings are described in terms of the* orientation framing theory, *which suggests that these and other tilt-induced illusions (e.g., Ponzo illusion, Zöllner illusion) can be attributed to distorted frames of reference.*

imately 18° in the picture plane. The apparent height of the two individuals—as seen by observers—changes as the two individuals move from one position to another (see Fig. 1). We refer to this misperception of the height of two indiv

In our investiga
created the illusio
findings and offer
be attributed to in
the background. T
angled hillside, a
"true" horizontal a
tery Spot illusion

Fig. 1. The Mystery Spot illusion. In this illusion, observers view two individuals standing in front of a tilted background. As the two individuals move from one side to the other, their heights appear to change relative to each other. In these images, the two individuals were digitally inserted into the scene to avoid distortions resulting from other perceptual anomalies, such as viewer position. For example, if the viewer (or camera) is not exactly equidistant from the two individuals (i.e., views the individuals from an oblique angle), then the individual standing closer to the viewer will have a larger retinal image compared with that same individual standing further away.

the true horizontal. The experimenter moved the orientation of the rod until the observer indicated that the rod appeared to be oriented at the true horizontal. The angle subtended by the rod and the true horizontal was then recorded. This measurement assessed the degree to which the tilted background affected the perception of the horizontal orientation. It is tantamount to assessing a rod-frame effect using the Mystery Spot location as the frame.

Results and Discussion

A height illusion and a rod-frame illusion were apparent in both observers. That is, when the two markers were judged to be at the same height, the actual height of the left marker was greater than the height of the right marker by an average of 11 cm, which represented an 8.3% distortion in perceived height in the direction of the tilted background (see Table 1). In the adjustment of the rod to the true horizontal, the observers misjudged the perceived horizontal by an average of 3.4° in the direction of the tilted background.

We compared the height and rod-frame illusions by calculating the height illusion in terms of the angular displacement from the true horizontal. That is, we used the disparity in height between the two markers (Δh) and the distance between the two poles (d) to calculate the magnitude of the perceived tilt between the two markers with respect to the true horizontal. The following equation was used to define this *tilt-induced effect* (α):

$$\alpha = \arctan(\Delta h/d). \quad (1)$$

The tilt-induced effect observed in the height illusion averaged 3.5°. For both observers, the magnitude of this illusion was comparable to the perceived tilt distortion as measured by the rod adjustment (see Table 1). That is, the Mystery Spot "frame" distorted both the height of the markers and the perceived orientation of the horizontal to nearly the same magnitude. Thus, we interpret the Mystery Spot illusion to be induced solely by a tilted frame, which causes misperceptions in spatial alignment. When two individuals move in front of a tilted environment, a height distortion will occur because the perceived elevation of their heads will appear to change with respect to the background. This finding suggests that tilted frames induce changes in the perceived spatial location of objects. At The

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Tilted ca. 10°

Tilted 5.5° (now 4°)