The "Stepwise-Constancy Illusion" *(SCI)*

Constancy performance in the visual periphery is accomplished in 70ms steps

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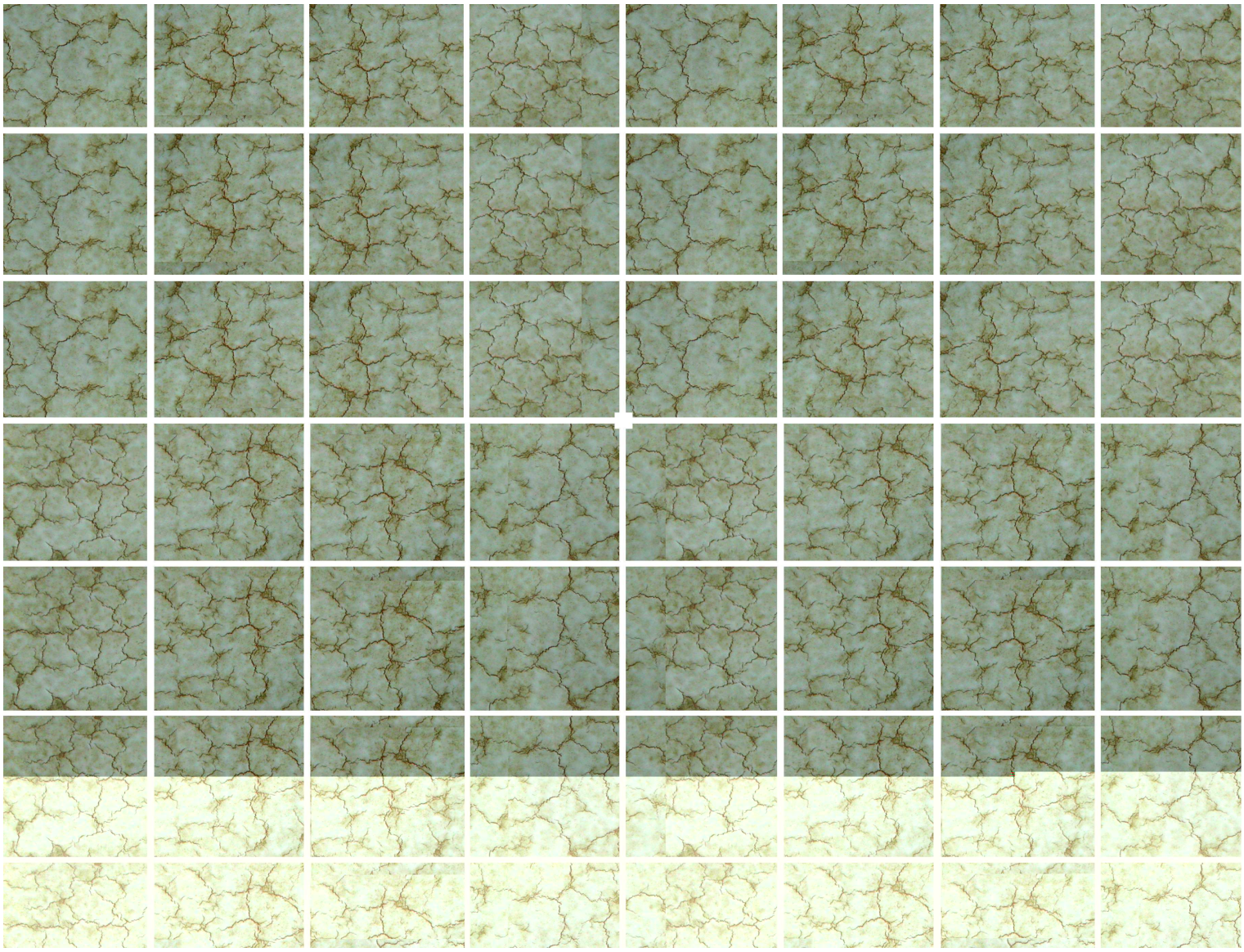
What to do:

- To provide for a large visual field, you might have to put off your glasses
- Stare at the red fixation point from a distance of 30 cm
- *Move your head smoothly backwards by about 30cm, and then forward to its initial position within a total of 3s*
- While you keep staring ahead in a relaxed way, direct your attention to the *visual periphery* and concentrate on the perceived motion of the white joints between the tiles in relation to the general optical flow



The illusion to be seen:

- While you approach the tiles, the area between the joints perceived in the visual periphery (between 20° and 51° eccentricity) paradoxically seems to *shrink stepwise* at about 14 Hz (as determined by the equalisation with the flicker of a stroboscope), i.e. *in the direction opposite to the motion that actually takes place on the retinal image*
- Both the vertical and the horizontal joints seem to jerk *stepwise* in the opposite direction of the general optical flow: their images virtually stay at the same site in the retinal image, in spite of actually changing their position
- The illusion appears at angular velocities between 1.5°/s and 11°/s, i.e. when you frontally approach the tiles at velocities between 5.5 and 40cm/s, and is enhanced by a low- contrast random pattern of the tiles

Conclusions:

- The perceived images of the jerking joints do not appear on the retina, but *if they were there, where they seem to be, they would turn out to be virtually retina-stabile*
- As two or more successive joints can be seen to move simultaneously in that paradox way, the illusion must be produced in a large region of the peripheric visual field and thus cannot be due to a local change of some retinal algorithm. Rather, there seems to be a local plateau as described by H.Strasburger (Indirektes Sehen. Hogrefe, Göttingen 2003, pp. 31 and 167)
- While the retinal image of the tiles is shrinking, constancy performance makes us perceive that their sizes remain the same. The SCI indicates that in the peripheric visual field the result of constancy performance is updated every 70 ms only
- Time resolution of *flicker* is *higher* in the visual periphery than in the center but, obviously, time resolution of *moving edges* is *lower*. It might be hypothesized that this feature of our visual system improves the well-known sensitivity to moving objects in the peripheric visual field, in spite of its low spatial resolution