

## **Visuelle Welt: A Windows™ program for demonstrating visual-perception phenomena**

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**Abstract**—The Windows program *Visuelle Welt* allows the demonstration of various visual phenomena such as geometrical-optical illusions, subjective contours, apparent movement, and Gestalt principles. One of the program's most interesting features is that the illusion-inducing context can be switched off, and in addition for many phenomena parameters can be varied interactively.

### **DESCRIPTION**

For teaching and for learning theories about visual perception, it is often helpful to demonstrate effects or phenomena such as illusions. Some phenomena, like effects of lightness contrast or subjective contours, can well be demonstrated with textbook figures (Shiffman, 1990). However, if one wants to vary some of the stimulus parameters or to modify the visual context, then the number of possibilities are restricted by using static figures; computer programs are more appropriate. There are programs available for demonstrating color-vision effects (Irtel, 1992), subjective contours (Dougherty, 1990), and geometrical-optical illusions (Carreras, 1993). However, there are still a number of important and interesting phenomena which cannot be demonstrated with these programs or by textbook figures. One example is apparent movement or the 'phi-phenomenon'. Although a movie could be shown to demonstrate this effect, the demonstration would be restricted, since neither the parameters nor the context can be changed interactively.

*Visuelle Welt* (Hübner, 1995) is a computer program for demonstrating phenomena from many areas of visual perception, including the phi-phenomenon. It allows the demonstration of a range of perceptual phenomena, whose appearance can be controlled. Included are the following:

- geometrical-optical illusions (e.g. Müller-Lyer, Delboeuf, Hering, Orbison, Zöllner);

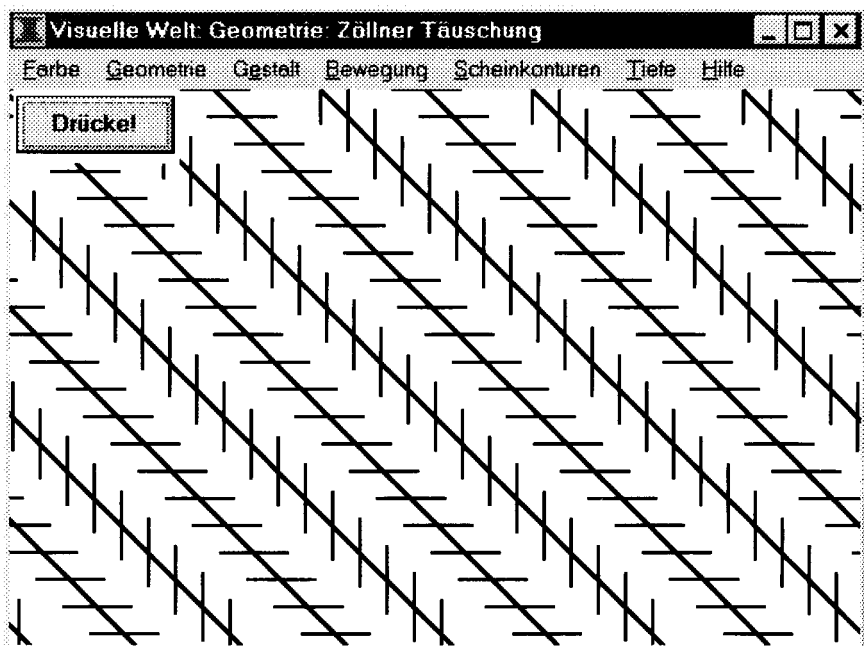
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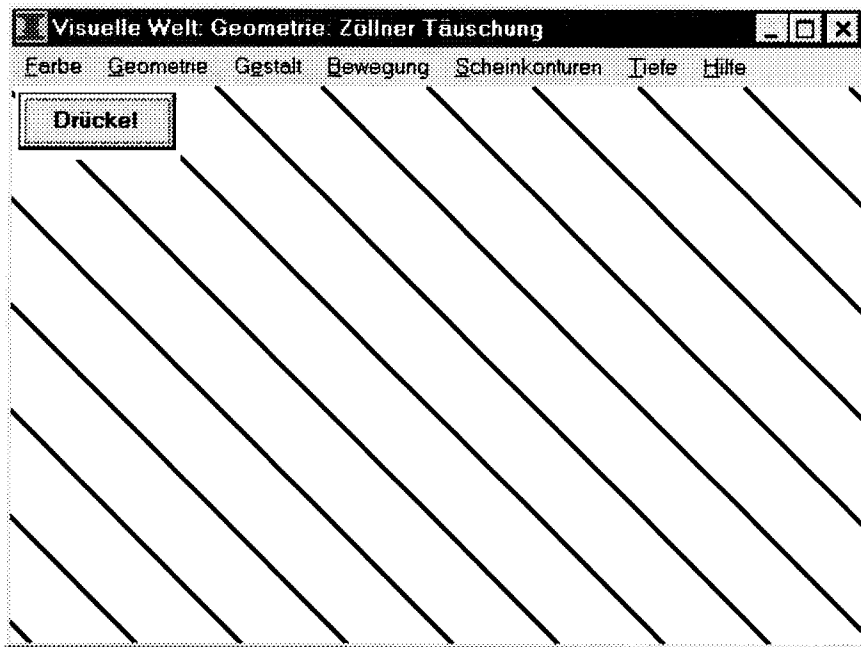
- subjective contours (e.g. Kanizsa-triangle, Kanizsa-square, contours induced by shadows);
- Gestalt perception (e.g. grouping by proximity and similarity, common fate);
- apparent movement (e.g. phi, Ternus, waterfall illusion);
- color phenomena (e.g. Glass suite, color mixtures, color contrast, assimilation);
- contrast phenomena (e.g. Mach bands, Hermann grid);
- monocular depth perception (e.g. gradients, occlusion, rotating Necker cube);
- binocular depth perception (anaglyphs).

*Visuelle Welt* runs under Windows 3.1 and requires a 256-color graphic mode since many effects rely on palette animation. For most illusions the requirements allow the user to switch off the illusion-inducing context. For example, Fig. 1 shows the program window displaying the Zöllner illusion. In the figure the tilted lines do not appear to be parallel. However, by clicking on the button 'Drücke!' ('press') one can switch off the small horizontal and vertical lines to convince oneself that the tilted lines are, indeed, parallel (see Fig. 2). By clicking a second time, the small lines reappear.

One of the most interesting features of the program is that for many phenomena parameters can be varied interactively. For instance, apparent movement is demonstrated by presenting simple objects in rapid succession at different positions. By changing the size of the display window one can modify the size of the objects and their distance; also the time interval between the object presentations, as well as the



**Figure 1.** The program window showing the Zöllner illusion.



**Figure 2.** By pushing the button one can instantaneously switch off the illusion-inducing lines to convince oneself that the tilted lines are truly parallel.

color and form of the object at one position. The latter leads to the illusion that the object changes its color and/or form during its (apparent) movement.

For each phenomenon there is an on-line description which includes references to the literature. The menus of *Visuelle Welt* and the descriptions are in German. However, since most phenomena are self-evident, i.e. can be experienced without explanation, and are well documented in text books (e.g. Shiffman, 1990), the program should be of more general value.

It should also be mentioned that there is a freely available Windows program, *VIAT* (in English), which serves to demonstrate various phenomena of visual attention (Hübner, 1996).

*Conflict-of-interest statement.* The described program *Visuelle Welt* is published by 'Spektrum der Wissenschaft', the German branch of Scientific American. The author has commercial interest in the product.

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