Travelling waves of activity in primary visual cortex during binocular rivalry

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Supplementary Legends

Supplementary Figure 1. Stimuli and percepts. (**a**) Temporal sequence of visual stimuli presented during the rivalry experiment. (**b**) Example of the temporal sequence of visual stimuli presented during the replay experiment. (**c**) Example of the temporal sequence of an observer's perceptual experience during both the rivalry and replay experiments. The particular sequence shown here depicts a case in which a perceptual wave propagated all the way to the bottom of the annulus in the right hemifield but no further than the horizontal meridian of the left hemifield. Note that perceptual travelling waves occurred during rivalry even though there were no wave-like changes in the stimulus itself during rivalry.

Supplementary Video 1. Demonstration of the perceptual travelling waves. View with red-green glasses. Monitor dynamic perceptual events occurring around the annulus while fixating the center of the display. In some trials, a perceptual wave will be perceived in the left or right halves of the annulus region. In other trials, a perceptual wave may bifurcate at the top and travel in both directions at different speeds. To experience better travelling waves, you may change the eye assignment by flipping the red-green glasses left to right. Note, however, that there are no wave-like changes in the stimulus itself. The temporal sequence of visual stimuli, which is the same as that illustrated in Supplementary Figure 1a, can be seen by removing the red-green glasses. First, the low-contrast grating is shown to one eye (with a green filter), immediately

followed by the high-contrast grating to the other eye (with a red filter). This sequence promotes exclusive dominance of the high-contrast grating. Shortly thereafter, the contrast in a small region of the low-contrast grating at the top of the annulus is increased briefly, then returned to its original low-contrast value. This contrast pulse typically evokes a perceptual travelling.

Supplementary Video 2. Demonstration of the cortical travelling waves. **Right**, Example of the temporal sequence of an observer's perceptual experience. **Left**, fMRI responses. Gray scale, anatomical image passing through the posterior occipital lobe, roughly perpendicular to the Calcarine sulcus. Yellow highlights, V1 gray matter regions exceeding 75% of the peak response. Pay attention to the left hemisphere. The lower lip of the Calcarine sulcus responds first followed by the upper lip of the sulcus. Then the activity in the lower lip of sulcus subsides before the activity in the upper lip does so. The same would be evident in the right hemisphere, but in a different slice through. Red curve, fMRI responses measured from a subregion of V1 (lower lip of the left hemisphere Calcarine sulcus) corresponding retinotopically to the upper-right quadrant of the stimulus annulus. Green curve, fMRI responses measured from a subregion of V1 (upper lip of the Calcarine sulcus) corresponding retinotopically to the lower-right quadrant of the stimulus annulus. Yellow again indicates when the responses in each subregion exceeded 75% of their respective peaks. The green curve is delayed in time and larger in amplitude than the red curve, as expected from a travelling wave (see text).