## Literature Review

In 1908, the British psychologist Sir James Fraser showed that a line made of small tilted elements appears to be tilted, in the same direction of the elements. This illusion was then modified and recreated using another kind of elements: Gabor patches (Fig.1). While the Fraser illusion lead to the conclusion that the local orientation of the elements influences the global orientation of the line, the collinear Gabor patches, being vertical, did not show any local tilt. However, by inducing a phase-shift along the patches, a certain global tilt is created, causing the ‘Popple Illusions’. They form a set of optical illusions where phase-shifted elements, even though perfectly straightly vertical, produce tilted-looking lines, or circles not looking quite circular.

Ariella V. Popple studied these illusions – hence their name – and showed some results after varying their parameters and measuring the illusory tilt. This exact illusion having not been studied yet – or the paper has not been publicly published – the results concern tilted-lines illusions.

The first paper (Popple, A.V., Sagi, Dove, Vision Research 40, 2000) relates an experiment about lines made of Gabor patches, shifted by a quarter of cycle, leading to the fact that these elements do produce an illusory tilt. In another paper (Popple, A.V, Levi, Dennis M., Vision Research 40, 2000) parameters are varied in order to assess the illusory tilt, measured in degrees. The chosen parameters are the number of patches in each row, as well as their separation. While the former gives rise to an increase in tilt illusion, the latter leads to the opposite. A possible conclusion is that our visual system can ‘integrate information over large (>10°) strips of the central visual system’.

A third paper (Skillen, Jennifer, Whitaker, David, Popple, A. V., McGraw, Paul V, Vision Research 42, 2002) relates a certain interaction between 1st-order processing (namely luminance-defined) and 2nd- (contrast-defined) in orientation processing. The illusion perceived depends on the relative scale of the carrier (radial on the figure) and the envelope (squares). When the carrier’s scale is relatively large, the global perception leads to the Fraser illusion, and when it is small, one can see the Zöllner illusion (edges of the squares bowing inwards).

These are mere examples of similar illusions, or similar patterns giving rise to an illusion looking like ours. While we can speculate about a possible explanation of its effects, a thorough analysis will only be possible once we manage to show our illusion’s versions – the stimuli – to the subjects and collect the data.