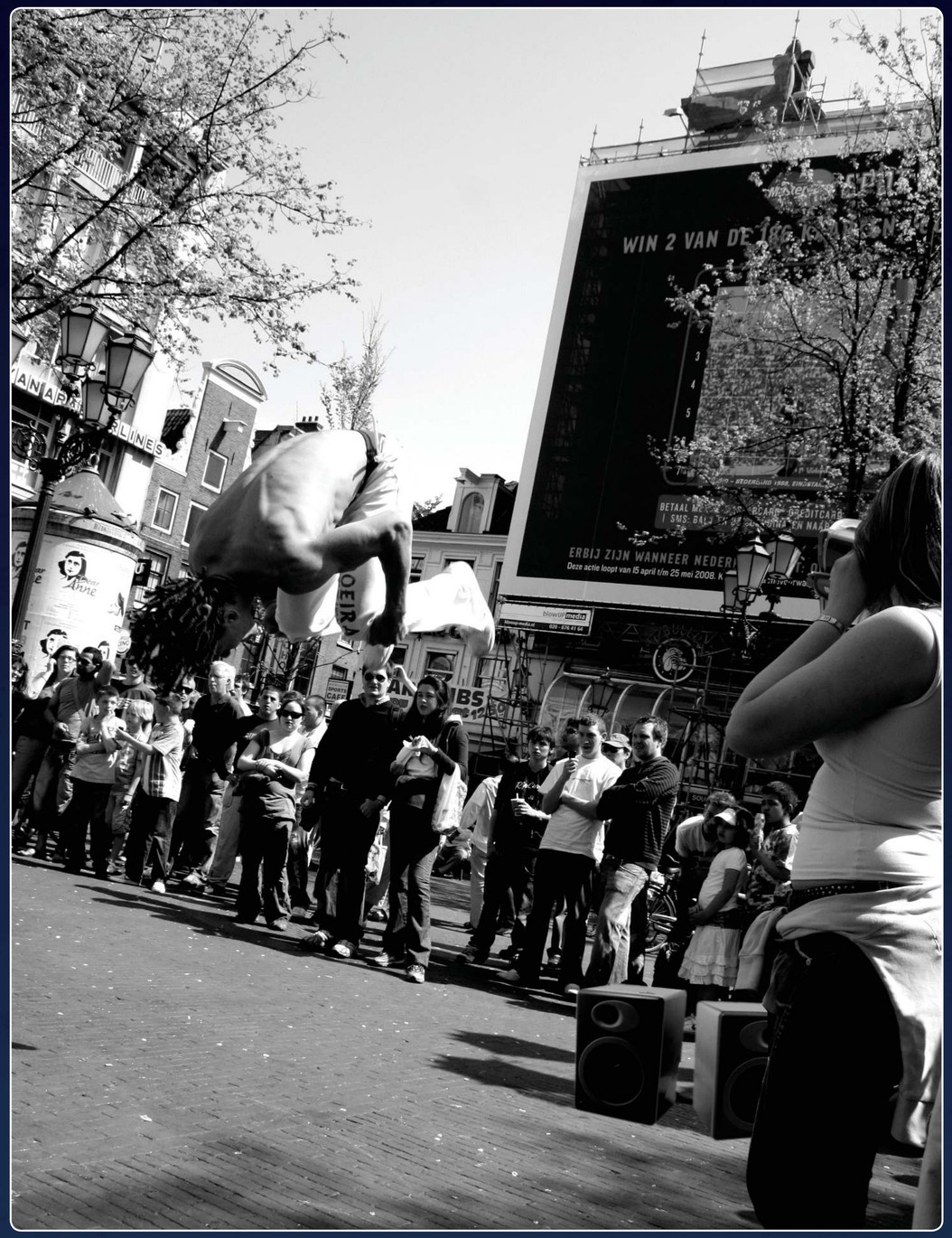


fractals in the tree

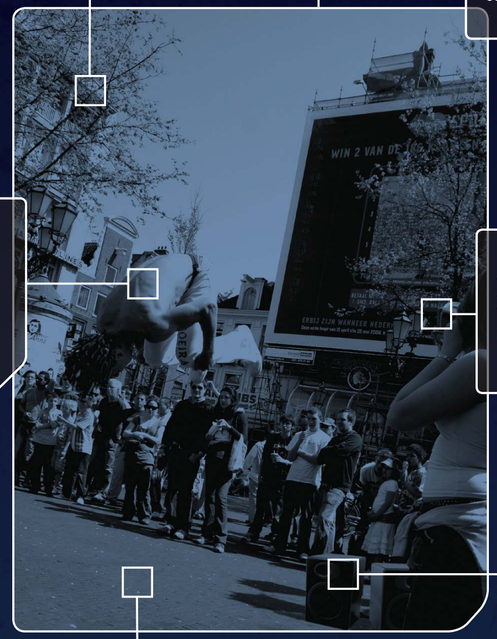
Fractals are geometric shapes with lots of fascinating properties – they also happen to be abundant in nature from snowflake crystals to lightning forks, the structure of the lungs to the branching patterns of trees. Tree trunks have branches, which have branches which have branches and so on. They are all similar but not identical.

crowd safety

The FA Cup Final and fractals represent an unlikely alliance but mathematician Keith Still has found a link. He has showed that people in a crowd do have a sense of direction but, because their line of sight is obscured, they follow other people and compete for spaces as they appear. If the crowd is moving in the right general direction, it is far easier to just go with the flow rather than fight against the tide. Modelling and predicting this behaviour has many applications, including crowd safety.

angular momentum

This dancer has a fixed angular momentum that links his radius to the speed he is spinning. This means that he can tuck his arms and legs in to reduce his radius and make himself spin faster in the air.



camera

A digital photograph involves millions of pixels, each a separate dot of colour. The position of each pixel in the photo is identified using its x and y coordinates

brick tiling

These bricks repeat the same pattern over and over with no gaps. Mathematicians have shown that there are only 17 different types of pattern that will cover the ground like this.

speakers

Digitally recorded music you can hear through speakers or headphones goes through a lot of maths to get to your ears. Fourier transforms take sound waves and translate them into number values (data). A lot of the translated values are outside the human range of hearing so can be dumped, leading to smaller data files. Hence the ability to transport thousands of songs on an mp3 player, while a conventional audio CD will only hold around 20 songs.

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