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# Sierpinski triangles as a tool to introduce fractal geometry to children and their parents

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There are currently two somehow contradictory trends in the public debates involving scientific issues. On the one hand there is a need to address topics of increasing complexity, while on the other hand simple(istic) solutions are suggested by numerous people (including high level ones). Meanwhile there seems to be growing defiance towards science findings. Such problems are faced in numerous fields including geosciences where famous examples are the debates dealing with climate change, or water / air contamination. Such unfortunate trends means that the input of scientists in the society and public debates is strongly required. Although it not actually their job, scientists should get involved as a citizens.

They should try to explain the complexity of the issues at stake, and take the necessary time to achieve this; not all problems can be explained with the help of a 140 characters tweet! Rather than hiding the uncertainties, they should try to explain this notion often not well understood, and admit the current limitations of knowledge. In the meantime it would be positive if this dialogue could help children and their parents to get familiarized with science and scientists, show that science is not obscure and actually present in everyday life. Scientists obviously also have the hope of fostering a desire for understanding, enhancing scientific culture and even promoting careers in this field.

Fractals and fractal geometry are actually a rather good tool to achieve this. Indeed through numerous iterations of a simple process, one can easily obtain a rather complex shape, exhibiting some of the features observed in the nature. Fractal shapes are scale invariant, i.e. the more you zoom in, the more details you see; a portion of the shape is similar to the full one. This paper aims at presenting a series of activities presenting fractals to young people developed primarily around the famous Sierpinski triangles. Two types of activities were carefully designed:
(i) Classroom introduction to fractals. The idea here is to use children rather than computers to carry out numerous iterations of a process (:-)), i.e. each child does a small part of a greater shape. Fractals are intrinsically build this way. Such activities were implemented in 4 class of children between 4 and 10, with means of drawing or collage according to their age. Activities were prepared in collaboration with the teachers.
(ii) “Fract’art : randomness and geometry for all”, an open workshop in the science museum “L’exploradôme” in Vitry. Target audience was 8-12 years children (and their parents were welcomed!). Randomness, a unfortunately much neglected notion, was introduced within the fractal shapes. The use of random fractals and colour gave an aesthetic aspect to the studied shapes. A user friendly software was created for this workshop so that everyone was able to create its own fractal shape starting from well known simple shapes (triangle, rectangle, segment, circle). After a very short introduction, people were able to plot their own shapes and print them. An exchange during the implementation phase lead to questions on how such shapes are used in geosciences. An evaluation quizz was distributed at the end of the two sessions of this workshop.

This paper will discuss and analyse the preparation and outcome of these activities.