Chapter XV
Mathematics, Computer
Mathematical Systems, 
Creativity, Art

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ABSTRACT
The chapter discusses the possibilities modern IT opens for Mathematics and its applications to real life, in particular to Art – by an example of automated construction of caricatures. The research approach in math education which is based on computer modeling as a methodology of a competency approach is discussed as well as the future educational environment with free access to Internet resources and possibilities to operate software in distributive mode. Many examples are given – from simple illustrations to new math facts invented with original dynamic geometry package DG and proved with the help of computer algebra system Derive.
INTRODUCTION

Creativity as a Common Root of Producing (Discovering) New Knowledge in Math and Science and Producing New Artifacts in Art (Philosophical aspects)

The tradition to oppose Math and Sciences to Art based on dichotomy “non-creative (algorithmic, reproductive) – creative (non-algorithmic, productive)” is wrong and may be concerned only in the framework of usage of Math, and Science and Art artifacts but not in the process of their creation; the processes of constructing new artifacts (both new Math and Science knowledge and new Art products) have the same base – CREATIVITY, and both these processes are similar in both cases (concentration, meditation, modeling, associative and critical thinking etc.). In wider context CREATIVITY is the main goal of a human being, CREATIVITY is the only thing that God can justify him/her (e.g. it is his/her anthropodectium (Berdyaev N., 1931)) – each personally or a mankind in a whole; only CREATIVITY transforms a human life into a human being and approach a human to God (Berdyaev N., 1931). It does not matter in which area you are working (are you a scientist, artist, engineer, a worker, a teacher etc.) – the only thing that matters is: are you CREATIVE or not. CREATIVITY is a type of God for mankind, the only God and the entire God, the Trinity of God: the origin, the existence and the soul of being. For mankind, human activities, make sense only if they have a CREATIVE matter, are conditionally divided into distinct branches: Technologies, Science, Philosophy, Art, Ethics (in particular religion), each of which plays more or less a definite role in definite historical periods of any individuum or community (tribe, nation, country etc.). During the historical periods one of these branches in their leading role replace one other. Nowadays it seems that technologies, in particular IT, play the main role in civilization’s progress, stimulating other spheres: Science, Art, Ethics. This is why modern society is called an Information Society (I-Society). But technology itself can’t be the goal of civilization’s progress and it is obvious that this type of society will be changed by the knowledge society (K-Society), in which the main systems leading role would be played by Science, inflating and stimulating other branches of human activities. Poverty of mankind, growing the number and the scale of global ecological problems should demonstrate bounding of such models of society as I-Society and K–society and maybe Art and Ethics will be the base of a new type of society – Soul society (S–society) and the concept of a Sustainable society (economic development, social development and ecological stability) is a step in this direction. IT helps to create crucially new possibilities in all other spheres of a human being: human activities, human work, human leisure etc. In particular IT creates a base for new possibilities in Art, Science, Math. etc. (for example computer graphics is beneficial in a lot of IT applications). In Figure 1 the “magic curves” are shown and all of them are the graph of the one (!) parametric equation

\[
\begin{align*}
    x &= \sin(p \sin(t)) \\
    y &= \sin(p \cos(t))
\end{align*}
\]

depending from the only parameter – real number \( p \). What are these graphical compositions? Mathematics? IT? Art? The reader is asked to answer these questions for himself/herself and to try to estimate the approximate values of \( p \) corresponding to each of the Pictures 1– 6. Maybe these pictures are the synthesis of all these – somewhat an entity of Math, IT, Art etc. And Math, IT, Art etc., are all only the sides of this entity which may exist separately only in our heads – if our heads are not too creative, but in creative heads they all compose this entity.
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