Plenary panel session: What is creativity?

Riccardo Antonini, Michéal Colhoun, Sean Day,
Paul Hodgson, Sheldon Klein, Julia Lonergan,
Paul Mc Kevitt, Conn Mulvihill, Stephen Nachmanovitch,
Francisco Camara Pereira, Gérard Sabah,
and Ipke Wachsmuth

Figure 1: **Plate 1.** "What is creativity?" Panel-members: Back row (left to right): Sean Day, Gérard Sabah, Ipke Wachsmuth, Paul Hodgson, Julia Lonergan, Stephen Nachmanovitch, Paul Mc Kevitt, Sheldon Klein, Front row (left to right): Riccardo Antonini, Francisco Camara Pereira, Michéal Colhoun, and Conn Mulvihill.

Conn Mulvihill asked a number of questions on creativity in the call for papers, as given in the introduction to this book, the central one being, what is creativity? He also contributed a paper on creativity and asked the question, is creativity algorithmic? Conn also used these two questions to kick off the panel discussion as well as singing the song "Raglan Road" the words of which were written by the poet Patrick Kavanagh and the tune of which is "The dawning of the Day".

Conn's paper points out that any language is taken to be characterisable through form and content and creativity activity occurs where form and content mix. Paradoxes mix form and content in a special way and ambiguity and diagonalisation appear where form and content mix whereas algorithmic studies are mainly concerned with space/time metrics and not with form/content interplay. It is posited in the paper that any language supporting creativity should mix form and content and be marked by ambiguity and reflective arguments and hypertext might be an example.

Riccardo Antonini said creativity is, in his view, a form, a very special one indeed, of mastering a given language. Triviality is on the contrary the common use of such a language. For example, in his game "Let's compose together" there is a language whose lexicon is the set of all the possible objects (and their attributes: colours, sound etc.).

The syntax, that in Greek means "putting things together", is very loose there, but still there is one, since there are only some ways to compose the objects together, while some others are not possible. For example, we cannot overlap objects one inside the other (we may of course, but we do not allow the people to do it). With such a lexicon and syntax, a trivial game is putting objects together at random. A creative way of putting them together is, on the contrary, for example, creating an alley, in which while you walk you listen to music, and watch the pictures and animations associated. The syntax is a constraint, the lexicon is the raw material, and the creativity is the capability of building non trivial phrases in this (or any other) language.

Sean Day said: as to whether an algorithm could be written for "creativity", I would have to say "No". It is possible to write algorithms that produce creative things - this is done all the time. Likewise, it is possible to be creative via algorithms - such is virtually a basic requirement of being creative. However, "creativity" in of itself is, by definition, un-bounded, infinite. "Creativity" is the essence of Gödel's Theorem - there will always be something, undefined and perhaps eternally indefinable, beyond the realm, transcending it. Thus: It is possible to shape algorithms for a computer/robot/android who could become highly creative, and quite probably could eventually (self?)-evolve creativity in wholly non-human forms. However, neither this nor any other entity nor algorithm can encompass the whole of "creativity", which is infinite.

Sheldon Klein commented: I think of creativity in the context of the cognitive worlds created collectively by groups of humans some 40,000 years ago, at the onset of the Upper Paleotlithic, when, after an archaeological record of more than a 150,000 years of unchanging technology, humanity embarked upon the exponential growth of creativity in the arts, technology and social organization that continues to the present day. I suggest that the source was in the invention of global classification schemes, in combination with analogical modes of reasoning. Semantic features may be viewed as an alternate notation for

class or category memberships. If complex set memberships are represented by boolean feature vectors, the vectors may also be interpreted as binary integers, and the minimum number of features needed appears as the number required to give a unique identifier to every element in the cognitive universe. If a 'hashing collision' occurs when a new entity is encountered, then adding a single new feature to the category system system can remove the ambiguity. But this addition doubles the size of the potential universe, and creates a vast domain of potential concepts that may be explored, at low cost, by analogy. The process can accelerate the discovery of new phenomena and the need for more features, with the result that exponential growth of the cognitive universe becomes a self-sustaining process.

Julia Lonergan said that Creativity and Natural Language Processing (NLP) have an objective in common, both seek for ways to represent meaning outside of natural language. Machine Translation has as its aim the representation of the meaning in natural language in an alternative form, usually called an interlingua. This form consists of defining the computational elements of language with a system of language independent symbols. In the case of famous literary works, such as Finnegans Wake, James Joyce relied on metaphorical extensions of meaning, idiomatic comparisons, and phonetic similarities to create riddles that also encode meaning in language. In both cases, the meaning is hidden in the deep structure and relies on the background knowledge of the recipient to decode the content. Theatrical compositions function similarly. In dance, for example, mime, gesture, music, and movement convey a story independent of language.

Thus, as a lexicographer, who has been trained to transfer the english language into its interlingual symbols NLP, and as an artist, writer, and dancer, who has given language related realities a form of expression outside the use of natural language, she finds that NLP and creativity converge at the point that both seek to capture and represent human expression in alternate ways.

Paul Mc Kevitt said that Conn asked two questions and with respect to the first one (what is creativity?) Geraint is right (Geraint Wiggins, a workshop attendee had made a point about creativity and the unexpected), in that the unexpected or surprise is interesting and hence creativity is surprise and in particular creativity is an emergent property of Free Play; Paul then played "The dawning of the day" on Ipke's tin whistle.

Stephen Nachmanovitch responded: Can creativity be taught? Are there algorithms for creativity? This is a very a important question, but it is important to turn it upside down. What one can teach is not creativity but the disinhibition of creativity. Every human being is born creative, is potentially creative all the time. Every one of us has created several billion cells just today. We are talking together in this room thanks to the creativity of the settlers of this island, of the people who built this building, of the people who evolved our languages. We exist in an environment of overwhelming, continuous, all-around creativity. Creativity is never a problem. The problem is the inhibition of creativity, which usually comes about through fear. Fear of embarrassment, fear of not being in control, etc. The algorithm that most affects my creativity is other people. That's why it's great to be speaking together today. I think that the formula for changing one's creativity is inviting another human being, with a somewhat different mind, into your

creative space, and - boom! something will happen. If beings are brought into apposition with other beings, who have other operating systems and other biases, and if you cross the biases, bringing together what James Joyce called their intermisunderstanding minds, then powerful combinatorial and synergistic effects take place. This can be done with ideas, even machines. My preference is to do it with other human beings. They're the most fun.

Francisco Camara Pereira pointed out that there are two issues upon which he'd like to state some comments. Sometimes, he sees much confusion among them: Creativity with Computers and Computational Creativity. The first one, very common, is mainly Human Creativity - one uses a program to create and develop his/her ideas. The major parts of the process are controlled by the Human (specially, the evaluation). The second issue, to which he (and others) call Computational Creativity, is indeed a very interesting subject of study. It centers mainly in the quest for methods/frameworks that accomplish in some way the task of automatic resolution of problems in a creative fashion. He sees this "creative fashion" as the way we tend to solve problems when common or routine solutions don't work. Although vague this may seem (isn't any definition of creativity?), he believes we can (and will eventually) develop models that can be considered creative in that sense. Such a system would be able to generate its ideas and be able to evaluate them at some degree of complexity. He believes this can be a very important path in AI, and we still have much to learn from Psychology and Philosophy.

Inspired by the place, Ipke Wachsmuth, from Bielefeld University, took a creative approach to express his sentiment about ingredients of creativity. He took:
'C' for Compassion, to say that it needs a sympathetic attitude for creativity, that feels for a matter in devotion;
'R' for Rhythm, to say that creativity often leaps in alternating periods of tension and relaxation;
'E' for Exposure, since he thinks a system can only be creative when opening up to, and interchanging with, its environment;
'A' for Art, to say that as much as art is an expression of creativity, enjoying art fosters creativity;
'T' for Travel, to say that it needs to go and see persons and places to enrich your creative pool;
'I' for Impulsiveness, to say that a creative act often springs from the minute idea;
'V' for Vitality, saying that as much as a vital system is necessary for a creative act, vitality also grounds on creativity;
'I' for Imagery, to make the point that, more than reasoning, it needs imagery to conceive the new;
'T' for Tree, to refer to the impact of a creative idea that has the potential to have many branches, like a tree;
'Y' for Yi-jing, leaving it to the audience to understand in which way this should be relevant.