



Thought and Experience

Defining Creativity

Mike Beaney

Margaret Boden is Research Professor of Cognitive Science at the University of Sussex. In February 2004 I went down to interview her at her house in Brighton. She is the author of numerous books including "The Creative Mind" which was first published in 1990. A second edition came out just prior to our interview. In our discussion we focused on three things. First, her definition of creativity; secondly her responses to the three objections that David Novitz had raised to her account in the first edition of her book. And thirdly, her four so-called "Lovelace" questions concerning the relationship between computers and creativity. I began by asking her though about why she had brought out a new edition of her book and what developments there had been over the last fourteen years.

Margaret Boden

Well, in terms of the computer models of creativity there have been some very interesting developments. There have been a lot of very interesting new programs and I have talked about those in an extra chapter at the end and I have related them to the theory that is in the rest of the book and so on and so forth. So that is one thing that's new. The other thing that is new is that it became quite clear to me, given the comments and feedback that I got from the first edition, that I had not been sufficiently clear in my definition of creativity. A lot of people thought that I was saying that there was only one thing which counted to creativity whereas in fact I was saying there were three. So there is what I call "combinational creativity", what I call "exploratory creativity" and what I call "transformational creativity" and they are all perfectly respectable forms of creativity. But they are different.

Mike Beaney

Yes. I think that comes out clearly. In the new edition there is a prologue where you set out the different conceptions of creativity and then the epilogue where you indicate the extra computer programs that there are.

So maybe we could look at the issue of the definition of creativity first before coming to the central core of your work which is the role of computational psychology in helping us to understand creativity. Now it seems to me that most people define creativity in terms of three things. Firstly, originality, secondly value and then there is a certain something else: a *je ne sais quois* – which different people have filled in in different kinds of ways. Now, most people would agree that to be creative you have to produce something that is original so that it is new, novel, in some sense but you distinguish sense of that which we will come to in a minute. And secondly that it has to have some kind of value though that is much debated. And the third one, which you mentioned as important, is the condition of being surprising. In the new edition of your book you define creativity as "the ability to come up with ideas or artefacts that are new, surprising and valuable". So maybe we could just look at each of those in turn, starting first with the idea of novelty. Now you distinguish two notions of novelty is that correct?

Margaret Boden

I distinguish between what I call "psychological" creativity and "historical" creativity or "psychological novelty" and "historical novelty" and what I mean by psychological novelty is when somebody comes up with an idea which they have not had before and it doesn't matter how many times and how many other people have had that idea before, if it is new to the person concerned then it is what I call "P" creative.

Mike Beaney

Psychologically creative, yes.

Margaret Boden

That's right - psychologically creative or personally creative. Now, "H" creativity is different. "H" stands for historical. And if an idea is "H" creative that means that as far as we know at least, as far as we have got the evidence, it's the first time that anybody in the history of the human species, has come up with it. But clearly historical creativity is a special case of psychological creativity. So in that sense psychological creativity is more fundamental and also if what you are interested in, and a large part of what I am interested in is explaining creativity and how it is possible, that is a psychological question. And whether or not the idea is also historically creative is very much secondary to that.

Mike Beaney

Right. Can we move on then to the issue of "surprisingness" because the creative idea has not only been new but also surprising? Now here you distinguish three notions of surprisingness.

Margaret Boden

Well, let's put it this way. First of all I wouldn't want to say that surprisingness is a condition. I don't think of it like that. I would be perfectly happy actually to drop the notion of surprisingness from my definition. The reason I have put it in is that it maps on to the three different explanations of creativity that I give. You see you might say look, I have already got novelty in there. Right? An idea, which is creative, has got to be new. OK? So what novelty is surprising so you might say surprising is tacitly in there. But nonetheless there are three quite different species of surprise I think which we can recognise intuitively and if I distinguish between those first, at the intuitive level, then I can use them to feed in to the underlying explanation and show that there are these three different forms of creativity. And so the three different sorts of surprise are on the one hand what I call a statistical surprise, where you know something wasn't very likely. You didn't expect it and what that actually is going to map on to is combinational creativity and what combinational creativity is is coming up with a creative idea by making a novel combination of familiar ideas. One of the examples I use in the book is Macbeth at one point when he has murdered Banquo and his conscience is troubling him so much that he cannot sleep. He is desperate to sleep. And he says at one point "sleep that knits up the ravelled sleeve of care". So he is speaking about sleep as though it is an old woman sitting in the corner with a pair of knitting needles mending a jumper. Now the notion of sleep is utterly familiar. What could be more familiar? The notion of somebody knitting is utterly familiar. What could be more familiar? But the notion of putting the two together and saying that sleep is doing knitting, is an extraordinary thing to say but of course absolutely apt because what he is saying is look, sleep cures us. Rest cures us of anxiety, of trouble, of worry. It makes us feel better. I Macbeth am absolutely desperate for it. And that of course is what somebody is doing who is knitting up a ravelled sleeve.

Mike Beaney

Right. OK. So that's the first type of surprisingness. Unexpected and it connects with this combinational conception of creativity.

Margaret Boden

Yes. The second type of surprise is where something happens which you hadn't expected. And the idea comes up either in your own mind or somebody else's and you hadn't expected it. But once it's there you can see that in a certain sense you might have expected it or that it was always possible. And one of the examples I use for that is going out in the car for a drive at the week end into the countryside and you go along the motorway or the A roads you know which you are familiar with but you go off down a little tiny lane that you have never been down before. And you go down this lane and you find all sorts of little turnings and maybe little villages that you hadn't known were there and eventually perhaps you know you turn around and you get back on to the motorway. Now all of that was totally unexpected. You didn't know that those things were there but there was nothing impossible about it. It's just that you were not aware of the potential of this space. Now in that case it's a literal geographical space. But in the case of creativity an example would be painting a picture or composing a piece of music or thinking up a chemical molecule of a type which is perfectly familiar. You know, the general type is perfectly familiar but that particular picture hasn't been painted before. That particular molecule hasn't been thought of before.

Mike Beaney

Now central to this second conception is the idea of a conceptual space, which I suppose one can see as a kind of generalisation of the idea of geographical space. The conceptual space is something that can be explored and can yield up its possibilities. Now how exactly would you define a conceptual space? On occasion you also use the words “generative system” and in a sense this is the key to your work because this is where one can bring in computational psychology isn't it?

Margaret Boden

Well one can bring in computational psychology right from the start. I mean combinational creativity, when Shakespeare comes up with that image of sleep and knitting or sleep as a knitter if you like, and the question is how was that possible? So a whole chapter of my book, there is an entire chapter about a sort of approach to computational psychology using so called neural networks, where the questions are – how is it possible for those sorts of associations to happen? So I certainly wouldn't say that you need to be talking about conceptual spaces in order to profit from computational psychology. Not at all. But yes you can profit from computational psychology of a different type in talking about conceptual spaces and yes you put your finger on it absolutely Mike because it's the notion of a generative system and the notion of a generative system is just the notion that you have a finite set of rules for making changes of some sort and the potential of those rules, I mean they are rich enough, so that you can get lots of different things out of these rules. A very, very simple example would be noughts and crosses. The rules of noughts and crosses are a generative system. They tell you what you can do and how you can do it and so forth and they tell you when the game is over. That is a very boring one because there are so few things you can do. Now chess is a different matter because is also a generative system and there is only a very small number of rules and yet the number of possible chess games although it's a finite number, it's astronomically large. I mean for all practical purposes it's infinitely large. And so you will never be able to play or think about or imagine all the possible chess games, which is partly what makes it interesting.

Mike Beaney

OK. Maybe we could move to the third notion of surprising and corresponding to that the third conception of creativity, which is the transformational conception. Transformational creativity involves transforming a conceptual space; changing it in some way. Now that you seem to suggest in the first edition of your book that is the more radical form of creativity. You even call it “genuine” creativity at one point.

Margaret Boden

Well, I certainly think it's the most interesting and I think it's the one which gives you the greatest surprise and the way in which I describe the surprise that you get in those sorts of cases is where something happens which you hadn't expected and which, even after it's happened, strikes you as impossible or certainly strikes you as something which you would never have dreamed was possible. But of course it hasn't come out of nowhere. It's come from the conceptual space that was there before but by changing the dimensions of that space or changing the rules, whichever way you want to put it, in a certain way, which can be done superficially or it can be done much more fundamentally, to give you something which you just couldn't have had before.

Mike Beaney

So one example which you mentioned in your book, is the move from tonal to atonal music that's an example where we transform in this case the musical space; the generative system of music in such a radical way that an entirely new form of music emerges. So Schönberg then is someone who is radically creative in this transformational sense whereas Bach perhaps or Mozart is someone whose creativity is a matter of exploring the particular generative system of music, Schönberg comes along and radically transforms things.

Margaret Boden

He radically transforms things and I wouldn't want to say it was an entirely new form of music because the point is he has transformed what was there already and if you look at the history of western music you can see that people have been making these transformations over about two centuries and you can see that the Romantic composers, I mean people like Brahms for example, were doing things which Bach for instance would never have done and which are actually respecting the convention of the home key much less closely than Bach did or Mozart did and you can just see that, with hindsight, of course hindsight is always twenty-twenty vision, but you can see that it was virtually inevitable that somebody at some point was going to come along and say well look let's just drop this convention about the home key. And that makes a very different sort of music but not an entirely different sort of music because for example one of the things that stays the same is, and let's assume that we are talking about a piano because it's easy to think about, the notes remain the same. You have still got the same black and white notes that you are picking from if you are Schönberg. It's just that you are saying instead of just picking just eight of them we are allowed to use all twelve.