

CHAPTER THIRTEEN

CREATIVITY: HOW DOES IT WORK?

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I *Introduction*

Creativity is the ability to come up with ideas that are new, surprising, and valuable.¹ I am using 'idea' as shorthand, catchall term here. It can be a concept, a poetic image, a scientific theory, or even a particular form of taxation, all of which are commonly called ideas. But it can also mean a style of painting or dancing, a way of building a bridge or skinning a cat, a millinery design, a cooking recipe, a recipe for home-made bombs—or even a plan for delivering them to maximum effect.

As that long list suggests, we find creativity in every area of life: not just art, science, or business. Moreover, it is an aspect of normal adult human intelligence. So every one of us has it, although some of us display it more often, and more convincingly, than others do. By 'more convincingly,' I mean that some people repeatedly produce ideas highly regarded as valuable—and which, so far as is known, no one else has ever had before. (They are 'historically' creative, or H-creative.) Most people, by contrast, produce only moderately interesting ideas, many of which are already known by other people, even if new for the individual concerned. (They are 'psychologically,' or 'personally,' creative: P-creative, for short.)

What different people regard as interesting varies, so new ideas can be valuable in many different ways. Encyclopedia writers, gallery curators, chemists, sculptors, property developers, entrepreneurs, and advertising executives focus on different sorts of creative idea, different sorts of value. But for all these groups, they are most interested in H-creativity. However, if an idea is H-creative it must necessarily be P-creative too.

¹ Margaret Boden, *The Creative Mind: Myths and Mechanisms* (London, Routledge, 2004).

So the first step to understanding H-creativity is to understand P-creativity. We need to ask how someone can come up with an idea that they have never had before. Some of those ideas will turn out to be H-creative also, but the core processes—though not the details—of idea generation are much the same in all cases.

Understanding how P-creativity works would be interesting in itself, as an exercise in psychology. But it would also be useful because if we want to encourage creativity, in our schoolchildren or in the workforce, we had better have some idea of just what sorts of mental process are involved. We will see, in Section IV below, that different types of creativity can be fostered in different ways. Although all of them can be—and, sadly, too often are—discouraged in much the same way.

Some people appear to be offended by questions about how creativity works, believing that it is not possible for us to understand this. If they merely mean that we cannot usually know, in every detail, how this or that novel idea (poetic image, symphony, mathematical proof) came about on a particular occasion, then they are right. Quite apart from anything else, we do not usually know enough about the contents of the individual creator's mind—even if that individual is oneself. But if they mean that we cannot understand the general principles by which creative ideas arise, then they are mistaken. Creativity does not work by magic or by divine inspiration. We cannot explain it in terms of intuition. It is true, to be sure, that creativity involves intuition, but to say that does not tell us much, since the word 'intuition' is just a placeholder for some unknown psychological process, invisible even to creative persons. If we want to understand how creativity is possible, how human minds can come up with ideas that are both new and valuable, we cannot rely on appeals to intuition. Something more constructive needs to be said. In other words, we need to understand how intuition works.

Creativity is not the only mental ability that depends on 'invisible' (non-introspectible) processes. For instance, we are unaware of the processes that enable us, most of the time, to speak in perfectly grammatical sentences. But creativity seems especially mysterious because its results, unlike grammatical sentences, are always surprising—and sometimes utterly amazing. If one compares the surprise we experience in various cases of creativity, one will find three different sorts of surprise.

We may be surprised because a new idea is statistically unusual, contrary to commonsense expectations—like an outsider winning the Kentucky Derby. We may be surprised because we had not realized that

the new idea had been a possibility all along. For example, compare discovering a beautiful village tucked away in a hollow between two spurs of the Motorway. Its location had always been marked on the map, but we had not examined the whole map closely. Or, we may be surprised by something that we had previously thought impossible, and which we still see as utterly counterintuitive. For example, think of the very first exhibition of Impressionist paintings, or imagine the impact on non-physicists of the introduction of wireless, or television. In such cases, a particular creative idea appears as if it simply could not have arisen—yet it did. These three sorts of surprise correspond to three ways of coming up with new ideas, three different answers to our question, How does creativity work? In other words, they point to three types of creativity—discussed in Section II, below.

Another kind of surprise focuses not on the nature or likelihood of the idea itself but on its being offered to us as something valuable. As remarked above, values in many areas are disputable—and even highly changeable. Sometimes, they can change virtually overnight—due to commercial decisions in the fashion industry for instance (enticing the public to buy new clothes even though they are not strictly needed), or to what some widely admired ‘celebrity’ happened to wear to a high-profile party. At other times, the change may take years to happen. The first Impressionist paintings had to be shown in a special hall because the official exhibition would not accept them. After having been nearly universally rejected at first, they can now be seen every day on birthday cards and boxes of chocolates. This gradual change from disgusted rejection to clichéd acceptance is a special case of the value-change that typically accompanies the third type of creativity discussed below.

There may, of course, be some universal (or nearly universal) values, more resistant to cultural change. Two possible examples are the preference for symmetry and shininess. Quite apart from their cross-cultural popularity, there are good biological reasons why valuing these two characteristics has evolved.² In addition, psychologists have identified other naturally evolved tendencies to favor perceptible features, and behave towards them in a particular way; certain shapes or textures, for instance, suggest opportunities for locomotion, feeding, holding, stroking, or courting. These nearly-universal values are prominent in

² Margaret Boden, *Mind as Machine: Myths and Mechanisms*, two vol. (London: Routledge, 2006), vol. 1, 553–556.

craftworks, which is why the crafts are readily intelligible across cultures.³ But even biologically based values can be deliberately transgressed and their opposites admired in their stead. Think of the highly asymmetrical architecture of Daniel Libeskind, for example.

In short, the surprise we feel on encountering a creative idea is sometimes due, in part, to the unfamiliar values that we are being invited to adopt. Mostly, however, it is due to the novelty of the idea in itself. We are surprised that it even happened, regardless whether it is obviously 'valuable.' Here, the three sorts of surprise listed above correspond to three different ways of coming up with new ideas, three different answers to the question, How does creativity work?

II *Three Types of Creativity*

Three types of creativity are combinational, exploratory, and transformational.⁴ These types are distinguished by the types of psychological process involved in generating the new idea. The exercise and appreciation of each of these forms of creativity depends upon specific cultural knowledge. Someone from a different culture may not even be able to recognize the novelty involved, and *a fortiori* may not be able to understand or value it. The 'someone from a different culture' need not be a foreigner: they may be your next-door neighbor, equipped with a range of knowledge and cultural interests different from yours. If so, they will have to undergo a learning process if they are ever to understand the novelty and to appreciate its value.

Combinational creativity involves the generation of unfamiliar (and interesting) combinations of familiar ideas. In general, it gives rise to the first type of surprise mentioned above. Just as one does not expect the outsider to win the Derby because that is, statistically unusual, so one does not expect ideas *X* and *Y* to be combined. On the contrary, they are normally regarded as being mutually irrelevant.

Everyday examples of combinational creativity include visual collage (in advertisements and MTV videos, for instance), much poetic imagery, all types of analogy (verbal, visual, or musical), and the unexpected juxtapositions of ideas found in political cartoons in newspapers. Each of

³ Margaret Boden, "Crafts, Perception, and the Possibilities of the Body," *British Journal of Aesthetics* 40 (2000): 289–301.

⁴ Boden, *The Creative Mind*, chap. 3–6.

these can sometimes be both startlingly novel and hugely appropriate—highly creative. Think of the most telling images in your favorite poetry, or of the last newspaper cartoon that made you laugh aloud on your train journey. In either case, the two (or more) conjoined ideas are not obviously relevant to each other—hence part of your surprise. Yet, on further consideration, you can see that they allow an interpretation wherein they are closely, perhaps very closely, linked—hence the other, and especially satisfying, part of your surprise.

Many attempts to define creativity, even within the specialist psychological literature, confine it to this first type alone. Thinking that forming unfamiliar combinations is the only creative game in town is a mistake, for exploratory and transformational creativity are different. They are both grounded in some previously existing, and culturally accepted, structured style of thinking—what one can call a ‘conceptual space.’ Of course, combinational creativity depends on a shared conceptual base—but this is, potentially, the entire range of concepts and world knowledge in someone’s mind. A conceptual space is both more limited and more tightly structured. It may be a board game, for example, or a particular type of music or painting, or a way of visualizing the structure of molecules in chemistry.

In exploratory creativity, the existing stylistic rules or conventions are used to generate novel structures (ideas), whose possibility may or may not have been realized before the exploration took place. To continue the analogy mentioned in Section I, you may or may not have had some reasons to expect to find an unknown village nestling between the Motorways. The vast majority of creative work in the arts and sciences is of this kind (philosophers of science call exploratory creativity ‘normal’ science).⁵

Exploratory creativity is not to be sneezed at. There are three reasons for this. First, most artists and scientists spend their working time engaged in exploratory creativity. Only very few go beyond it, and they do so only occasionally. Second, exploratory creativity can produce highly valued (beautiful, useful, interesting) structures, or ideas. Even if you were already familiar with nineteenth-century Impressionism, upon entering a room full of previously-unseen Impressionist canvasses, only a mind-numbing glut of chocolate boxes would lead you to say “Oh no! Not more Monets!”

⁵ Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, Ill., University of Chicago Press, 1962).

Finally, exploratory creativity can often offer surprises deeper than merely seeing the previously unseen. For it need not be a matter of adopting the current style unthinkingly. It can also involve the deliberate search for, and testing of, the specific stylistic limits concerned. To do that is to discover just which types of structure can be generated within this space, and which cannot. If you have ever visited a retrospective exhibition of a painter's life-work, with canvasses arranged chronologically, you will have seen this process. (Had it not, there would be little interest in showing the years-long collection of work. Only a doting family member, with more money than sense, would have arranged such an exhibition.)

In testing the potential and limits of the adopted style, exploratory creativity sometimes involves varying it too. Some of the rules, conventions, or constraints that define the style can be slightly altered or 'tweaked' (again, this is readily visible in a retrospective exhibition). In that case, the new ideas that arise would not—could not—have arisen without the tweaking. Nevertheless, they will clearly be 'of a piece with' (in the same general style as) the earlier, more familiar, examples. As such, they will be readily intelligible, in terms of the methods of interpretation already in place to understand the style. They may cause an extra frisson of excitement, but no amazement—and certainly no bewildered incomprehension. Instead, amazement, bewilderment, and incomprehension are caused by transformational creativity. For it is this which leads to 'impossibilist' surprise because some deep dimension of the thinking style, or conceptual space, is altered—so that structures can now be generated which could not be generated before, and which are not all of a piece with the previous style.

Imagine altering the rule of chess that says pawns cannot jump over other pieces so they are now allowed to do this, as knights always were. The result would be that some games could now be played, which were literally impossible before. Similarly, to start painting abstract pictures, where previously the paintings had all been representational, is to invite incomprehension as well as to cause surprise. The greater the alteration, and the more fundamental the stylistic dimension concerned, the greater the shock of impossibilist surprise.

The distinction between tweaking and 'transforming,' and therefore between exploratory and transformational creativity, is a matter of degree. After all, I said above that the novel ideas occurring after the exploratory tweaking 'could not have arisen' before. However, in exploratory creativity, the variation in style is relatively minor and relatively

superficial. That is why the result is readily intelligible, even though it is a novel variation as well as a novel structure. It is also why the result is immediately accepted as valuable, not rejected as disturbing—still less, as absurd.

Transformational creativity is different, because here the variation is greater and the stylistic dimension being varied is deeper. The resulting change is so marked that the new idea may be difficult to accept, or even to understand. Sometimes, many years will have to pass before it can be valued by anyone outside a small group of aficionados. Picasso's pioneering cubist canvas of *Les Femmes d'Alger*, for instance, was initially spurned even by his close circle of fellow artists. He kept it hidden in his studio for several years before exhibiting it.

Even in transformational creativity, not every dimension of the style will have been changed. So there will be both structural continuities and structural discontinuities between the untransformed space and its seemingly impossible successor. The nature of these continuities and discontinuities will affect the valuation of the new idea. Consider our example of the transformed chess game, for instance. If some feature of the game, which you had enjoyed before the change, is retained, then you will find something to enjoy in the transformed version. You may, however, be so averse to jumping pawns—perhaps doing so makes you feel giddy—that you decide to revert to old-style chess. Transformationally creative thinkers may add new rules and drop or vary old ones. They may then engage on a lengthy process of exploring the new style more fully.

One illustrative example concerns the composer Arnold Schoenberg.⁶ He transformed the space of Western tonal music by dropping the fundamental home key constraint: no longer did every composition have to favor one of a finite number of sets of seven notes (the major and minor scales). Atonality was born. But besides dropping this constraint, Schoenberg experimented by adding new ones. At one point, for instance, he said that each composition should contain every note of the chromatic scale. Musical exploration could then ensue on this basis. But the more radical transformation was the decision to drop the constraint of a home key. In general, transformational creativity is valued more highly than the other two types. (That is less true in literature than the other arts because language offers scope for especially

⁶ Charles Rosen, *Arnold Schoenberg* (New York: Viking, 1975).

rich creative combinations the theme of human motivation offers huge exploratory potential.)

However, novel transformations are relatively rare. We usually remember artists and scientists whose names are recorded in history books above all for changing the accepted style. (Again, that is somewhat less true of writers.) The three types of creativity are analytically distinct, in that they involve different types of psychological process for generating P-novel ideas. But these processes sometimes occur together. For instance, an advertising graphic may both explore a recognizable visual style (specific to the brand concerned) and combine two or more images normally kept apart. That is partly why it is usually more sensible to ask whether this or that aspect of an artwork or scientific theory is creative, and in what way, rather than asking, Is this new idea creative: yes or no?

III *Creativity in Computers?*

If we could say ‘just which’ psychological processes underlie creativity, we should be able to model them in computers. Indeed, over the last twenty years, an increasing amount of work has been done in this area.⁷ I am not referring to computer art, which began during the late 1950s and has burgeoned since then. For computer art (with a few exceptions) is done only with the aim of producing something visually/musically interesting, not with the aim of understanding how human artists’ minds work.

Modeling creative processes as such is a different enterprise. All three types of creativity have been modeled in this way. The most successful examples concern exploratory creativity. This requires, of course, that the programmer, or a close collaborator, knows enough about the domain concerned (math, chemistry, graphics, music) to be able to identify the constraints that define the style being investigated. For example, only someone very familiar with Bach fugues, and preferably with what musicologists have written about them, could write a plausible fugue-generating program. Many people believe that no program could possibly generate ‘plausible’ Bach fugues, or Chopin nocturnes. They are wrong. The composer, David Cope, wrote a program in the

⁷ Boden, *The Creative Mind*, chap. 6–8, 12; Boden, *Mind as Machine*, vol. 2, 1059–1068.

1980s, which could produce very convincing pastiches of a wide range of famous composers. Indeed, it is not clear that ‘pastiche’ is always the right word. For when these pieces are played by human musicians in the concert hall, they often ‘fool’ even the best musical experts.⁸

Similarly, an architectural program based on Frank Lloyd Wright’s Prairie House style has come up with every one of the 40-odd houses he designed, plus others—clearly within the same general style—which no one, Wright included, has ever seen before.⁹ One can certainly say that these house designs and musical compositions are new. That is, they are newly discovered structures within the space of possibilities defined by the style concerned. Moreover, they are valuable: after all, exploratory creativity in general is grounded in some already accepted (valued) style.

But the style itself is not new. In other words, these programs model exploratory, not transformational, creativity. Whether a computer could ever come up with a new style is a hotly disputed question. It is not obvious that it could not, because some programs are able to alter their own rules in unpredictable ways, so that they can generate structures on Tuesday, which they could not have generated on Monday. These are the so-called evolutionary programs, which contain mechanisms—‘genetic algorithms’—that can make random changes in the program’s rules and select the most promising for further ‘breeding.’ Sometimes, the selection is done at each generation by a human being. But sometimes, the programmer chooses a list of criteria—the ‘fitness function’—by means of which the program itself selects the winners automatically.

There are three problems with these self-transforming programs, however. First, if the ‘mutations’ allowed are so radical that a seemingly new type of structure does result then it may be so different from what went before that the human beings using the program see it as having little or no value. Second, radical transformations will not lead to a sustained new style (unless the transformed program is immediately ‘frozen’ by the programmer) because another, very different, radical change may happen within a few generations. Third, some people argue that genuine novelty is not available even from evolutionary programs, because every structure generated by the computer must lie within the

⁸ David Cope, *Computer Models of Musical Creativity* (Cambridge, Mass.: MIT Press, 2006).

⁹ Hank Koning and Julie Eisenberg, “The Language of the Prairie: Frank Lloyd Wright’s Prairie Houses,” *Environment and Planning* 8, no. 3 (1981): 295–323.

possibility-space defined by the program itself. (If the program is allowed to interact with the physical world, however, a genuine novelty may arise: for instance, a new—not merely an improved—type of sensor.)¹⁰

One might think that there would be no problem modeling combinational creativity on a computer. After all, a computer program could come up with novel combinations of ideas until kingdom come. It could even do this by using mechanisms broadly comparable to associative memory in human beings.¹¹ Here, however, the problem—again—is the assignment of value. Most of the associations produced by the program will have little or no interest for human users. Conceivably, someone looking for novel ideas for an advertising campaign might find it worthwhile to sift through the novel associations generated by a computer—but they would probably be far better off relying on their own powers of association and world-knowledge. (Kim Binsted and Graeme D. Ritchie discuss an example of computerized combinational creativity used for generating simple jokes.)¹²

Computer models of creativity can help us to think clearly about how creativity works. That is true even in the cases where their performance is disappointing, for then we can ask just why they failed to come up with the expected results. We have seen that they can sometimes give results that match human creativity, especially of the exploratory type. Whether even those examples are ‘really’ creative, however, is a quite different question—philosophical, not scientific. Maybe only the programmers are truly creative and we should attribute any apparent ‘creativity’ in the computer to them. That very common opinion is often based on one or more of four highly controversial philosophical assumptions (about consciousness, brain-stuff, and meaning, for example).¹³ We cannot go into them here, but notice that, being ‘highly controversial,’ we cannot take them for granted. There is a fifth reason for people denying that computers can be creative, which is that they doubt whether even human creativity can be scientifically understood. If the argument of the previous sections is correct, however, they are mistaken.

¹⁰ Jon Bird and Paul Layzell, “The Evolved Radio and its Implications for Modeling the Evolution of Novel Sensors,” in *Proceedings of Congress on Evolutionary Computation, CEC '02* (Brighton, UK: Sussex University, 2002), 1836–1841.

¹¹ Boden, *The Creative Mind*, chap. 6.

¹² Kim Binsted and Graeme D. Ritchie, “Computational Rules for Punning Riddles’ Humor,” *International Journal of Humor Research* 10 (1997): 25–76.

¹³ Boden, *The Creative Mind*, 286–300.

IV *How Creativity Can Be Encouraged*

If we want to know how creativity can be discouraged, the answer is simple. Since all types of creativity involve novelty and surprise, any cultural attitudes that punish people for providing these will thereby hinder their creativity. Suppose that someone—schoolchild or adult—comes up with an unexpected (surprising) answer to a question. If their answer is immediately dismissed as a ‘mistake,’ or—still worse—if the individual is scorned as ‘stupid,’ they will be much less likely to offer new answers (or perhaps any answers) in the future.

Of course, people do sometimes make mistakes. But there are ways of conveying this without also implying that the person is stupid. Indeed, there are often ways of conveying it in a constructive fashion, so that the person can see how their (mistaken) idea could have been on the right lines if the question/problem had been slightly different. The more one hopes for truly surprising ideas, the more important it is not to undermine people’s self-confidence. Evidence suggests that what makes for an especially H-creative person is not their having any special idea-generating mechanisms in their heads. Rather, it is their motivation, self-confidence, and single-minded commitment to the domain in question.¹⁴

Indeed, high-profile H-creators are often monsters of egotism and selfishness.¹⁵ In the case of transformational creativity in particular, this makes sense. For transformational creativity (by definition) breaks the commonly accepted rules, and challenges other people to adopt new values in accepting the novel idea. It is therefore likely to meet with incomprehension, bewilderment, and even scorn.

The H-creator needs plenty of self-belief to weather such storms. Turning to the happier topic of how to encourage creativity, the answer is not quite so simple. For here, we must distinguish carefully among the three types. The sort of experience or training best suited to fostering one type will differ from that best suited to fostering another.

Combinational creativity, as we have seen, depends on two things: making unfamiliar combinations of familiar ideas, and doing so aptly, or appropriately. Several forms of encouragement are relevant here.

¹⁴ David N. Perkins, *The Mind’s Best Work* (Cambridge, Mass.: Harvard University Press, 1981); Boden, *The Creative Mind*, chap. 10.

¹⁵ Howard Gardner, *Creating Minds: An Anatomy of Creativity Seen through the Lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi* (New York: Basic Books, 1993).

The first is to enlarge the variety of concepts in the person's mind. Someone who does not possess a host of concepts, drawn from a wide range of domains, will be very unlikely to come up with startling new combinations. So an essential part of helping someone to be creative in this particular way is to widen their general knowledge, encouraging them to engage in many different interests and activities, and perhaps also to draw on more than one culture. However, there is no guarantee that a well-stocked mind will generate large numbers of novel associations.

In addition, then, one should foster a habit of experimenting with unfamiliar conceptual 'mixtures.' For example, a child (or adult) could be given two or more ideas drawn—possibly at random—from different areas, and asked to make up a story, or compose a sentence, in which all those ideas feature. Or one could encourage the person to ask, What does that remind you of? in the expectation that at least a dozen things will come to mind. In this sort of way, the various exercises recommended in the many self-help books on creativity can induce people to think more adventurously than they normally do.¹⁶

Finally (the most difficult of all), one should help the person to learn how to judge the results, to pick out the more interesting combinations. This may involve making explicit comparisons and contrasts between the newly joined ideas, a process helped by giving the person the experience of existing examples of combinational creativity and asking them just what is 'interesting' about the different cases. Careful consideration of the imagery in poems, for instance, can awaken the reader to conceptual connections that they had not consciously realized before.

Self-help books on creativity usually provide helpful hints on how to assess novel mixes of ideas. As for exploratory creativity, mere general knowledge and richness of associations will not be enough. Persons will also need prolonged experience of, and perhaps special training in, the thinking style concerned. If that style is interestingly complex, or if it requires special skills (such as mixing oil paints, playing a keyboard, or synthesizing chemical molecules), it may take years to become competent in it, so that one can produce new structures satisfying the stylistic constraints in question. Learning how to test and tweak the style will take even longer. (Renowned composers, even including child prodigies

¹⁶ Tony Buzan, *Mind Maps at Work: How to Be the Best at Work and Still Have Time to Play* (London: Thorsons, 2004); Edward De Bono, *De Bono's Thinking Course* (London: BBC, 1982); De Bono, *Six Thinking Hats* (London: Penguin, 2000).

such as Mozart, seem to need about twelve years of total immersion in music before they can write something ‘creative’ rather than merely competent. On the other hand, even ‘ordinary’ people, if given enough training, can reach unusual heights in musical creativity.¹⁷

It follows that exploratory creativity is not primarily an exercise in ‘free thinking.’ Indeed, even combinational creativity is not wholly unconstrained, since the novel association (which may have been—though usually is not—produced by random processes) must be evaluated for aptness. In other words, the belief that one can best equip children (or adults) for creativity by encouraging them to ignore all conceptual constraints and think only ‘for themselves,’ is mistaken. As that term ‘constraints’ suggests, creativity involves personal discipline as well as freedom. Where exploratory creativity is in question, that discipline may require years of painstaking practice. Ultimately, to be sure, the style may become so familiar that the person can explore it effortlessly. But a great deal of effort will have been needed to learn it in the first place.

Transformational creativity, as we have seen, is built on the exploratory variety. For here, the style is not merely tested and tweaked, but to some extent transcended. That is done by altering, adding, or deleting dimensions of the original conceptual space, which implies that those dimensions must already have been learnt by the person concerned. Some forms of alteration will apply only to a specific dimension of a specific conceptual space. For instance, we saw in Section II that Schoenberg altered tonality partly by insisting on using every note of the chromatic scale.

Others are more general: these include the negation of an existing dimension, or its deletion, or its iteration. For instance, in discovering the structure of benzene, the chemist Friedrich von Kekule transformed his idea of a chemical molecule from an open string to its opposite, a closed string.¹⁸ Schoenberg dropped the seven-note scales that defined tonal music.

One way of encouraging transformational creativity is to present the person with many such examples, asking them to consider just what dimension/s has/have been changed, and how. Once they understand the nature of transformational creativity they will be in a better

¹⁷ Joseph H. Kunkel, “Vivaldi in Venice: An Historical Test of Psychological Propositions,” *Psychological Record* 35 (1985): 445–457.

¹⁸ Boden, *The Creative Mind*, 25–28, 62–71.

position to experiment with it. As always, however, they will also need to be able to evaluate their own novel ideas. Learners are especially likely to resist this form of creativity—perhaps rightly so: not all transformations are valuable. Whereas mere exploratory tweaking is unlikely to destroy the interest of the novel idea (although it may lessen it), a radical transformation can do so.

It would be helpful, too, if the ‘transformational’ creator could be encouraged to present ideas in ways that will help other people to understand and accept, them. Understanding requires a realization of the similarities between the new style and the previous one, and a sensitive explanation on the part of the originator should be able to provide this. Acceptance is even more elusive, and may require additional persuasion on the part of the creator, for which there can be no set formula.

Here we come full circle, for the self-confidence needed to persevere—and perhaps eventually to persuade—in transformational creativity is the greatest of all. Whichever form of originality we are trying to encourage, however, the person’s motivation must be fostered in addition to their ‘brain power.’