# Could a Created Being ever be Creative? Some Philosophical Remarks on Creativity and AI Development

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**Abstract:** This paper allots creativity a central role in enabling human beings to develop beyond the undertaking and/or fulfilment of simple primary functions. This contention is significant for Artificial Intelligence development since attempts to imbue artificially created-beings with ever greater levels of autonomy necessarily raises questions about the potential for creativity. This paper begins by highlighting key problems which occur as a result of attempts to offer definitive criteria for creativity, and uses this as a springboard to show that whilst certain AI programs may *appear* to present elements of creativity, the notion that these programmed acts could be creative in the sense in which we use and understand this term, is in fact mistaken. If we consider notions of creativity from a Wittgensteinian perspective we may yet achieve clarity about a subject which is often considered intangible and mysterious, whilst also coming to see its inherent irreplicability.

## 1 INTRODUCTION: A VAGUE DEFINITION?

It is of no small significance that to begin a paper on creativity requires creative thinking. A simple way to begin would be to identify possible definitions of creativity; however, such a task is made impossible by a general divergence of opinion not only on the content and structure of creativity, but even on its availability. For example, Martindale (1999) suggests it to be a *rare trait* because, he claims, 'it requires the simultaneous presence of a number of traits' (137). In a similar vein, Johnson-Laird (1988) maintains that inventions of new genres or paradigms are rare since '[t]here appear to be no common principles that account for such transitions within a field' (217). And even where creativity does occur, it seems the creative person may be in no position to offer any guidance on what took place since major innovations often depend 'on events of which the individual creators (and everyone else) is entirely ignorant' (217). If we follow Johnson-Laird's assessment, then a consequence of these facts for an enquiry into creativity (and the processes it follows) would be for there to be 'no general criteria or principles that underlie all and only the successful major transitions in a particular domain of art or science' (217). Ward et al (1999) offer a less pessimistic perspective however, and suggest that 'the capacity for creative thought is the rule rather than the exception in human cognitive functioning' (189). This divergence of opinion on the fundamental nature of creativity should not surprise us however, and I will argue in this paper, it is due to a common misunderstanding of the role terms such as creativity play in language. To explain this further it will prove useful to consider some typical definitions of creativity.

Common to most definitions is the assessment of creativity based on three specific criteria. Firstly, questions are often raised about the content and context of a creative idea or act, for example: is something creative *only if* it has been plucked out of the void (if that is even possible) or whether it is (could only be) the re-combination of a number of already existent elements? Secondly, questions are asked about the *value* of the creative product, for example, whether it is interesting or useful. Finally, weight is given to the question of intention and process: is the idea or act creative by virtue of what has been produced, by virtue of the process undertaken, or a combination of the two?

Martindale (1999) argues that the creative act involves the 'discovery of an analogy between two or more ideas or images previously thought to be unrelated. This discovery does not arise from logical reasoning but, rather, emerges as a sudden insight' (148). In addition to this, he notes creative inspiration 'occurs in a mental state where attention is defocused, thought is associative, and a large number of mental representations are simultaneously activated' (149). This is a definition which is shared to a greater or lesser degree by a great many commentators. Other definitions hold creativity to be 'the ability to produce work that is both novel (i.e. original, unexpected) and appropriate (i.e. useful, adaptive concerning task constraints)' (Sternberg, 1999: 3). Boden (1999) elaborates on this description,

> '[T]he generation of ideas that are both novel and valuable. *Ideas*, here, is intended in a very broad sense to include concepts, designs, theories, melodies, paintings, sculptures, and so on. The novelty may be defined with reference either to the previous ideas of the individual concerned or to the whole of human history.' (Boden 1999: 351)

Creativity has also been defined as 'the capacity for *variable focus*' (Gabora, 2002: 129), whereby 'creativity is associated with, not just high conceptual fluidity, nor just extraordinary control, but both'. In simple terms, association with the capacity for *self control* is as important for creativity as the capacity for remaining flexible. Each holding more or less favour as the situation requires. Other definitions of creativity include emphases on:

- Individuality, potential, personality, unpredictability, unique, surprising
- Interest, concern for, drive, judgement, motivation, cultural context

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- Originality, seeing things in new ways, freedom to be unbounded by convention and tradition, can change direction and approach, unfixed
- Inspiration, answering adversity, knowledge, relevant skills

But this list is by no means exhaustive. It is clear that trying to define this term is not getting us very far. Saunders (2002) highlights the problems associated with attempts toward definitions, remarking that

> The apparent need to define the nature of creativity has haunted most attempts to develop models and theories of the processes involved. The difficulty of this task is clear from the number of definitions that can be found in the literature – Taylor gives some 50 definitions. Some researchers have concluded that trying to develop a single definition of creativity is a fruitless task and have looked for ways to conduct their research without the need for a formal definition. (80)

This last point is an important one, and one I shall give further consideration to at the end of this paper. Part of the problem of defining a term like creativity is that (in everyday use) we might be unclear about what criteria applies in a given situation, yet in spite of this, still be able to use the term meaningfully. This aspect should not be overlooked in trying to get to the bottom of the creativity question. It is a direct consequence of this that we have been unable to offer a clear definition, and yet this failure is not to be attributed to faulty reasoning or a yet unsolved puzzle. Rather it shows something quite profound, namely that we are dealing with a concept that appears to have contingently vague elements at its core. Attempts to define the term conclusively serve only to highlight this insurmountable dilemma. Yet in spite of this linguistic difficulty, my paper begins with the premise that creativity (understood in simple terms) is the single most important aspect of our ability to develop beyond primary functions—it is the fire which fuels our potential—even if it remains one of the more elusive aspects of our being. What we need to understand therefore is not why it is important (since this seems rarely to be doubted), but why it should appear elusive.

I begin an answer to this question by first making clear that the accounts offered above share one common premise, namely that creativity can *in principle* be defined *in and of itself*. It is this factor above all others which has led to this sense of its meaning being elusive. This is in part due to its inherent complexity, affected as it is by multifarious factors. It is not that any of the terms used above to describe it are *wrong* or deficient, but rather that no single term on its own is either sufficient or definitive. The fluidity of terms with which we could describe creativity is therefore a reflection of its own status as a particularly fluid term, all of which results from its application in a multitude of different language-games.[2]

Neglecting these language-games, or contexts which give meaning to the term, and attempting to analyse it within theoretical mediums is doomed to fail. As Wittgenstein explains, often it is as simple as accepting that 'the meaning of a word is its use in the language' (2001: §43). Positions which define terms separate from use belie metaphysical ambitions. They assume we can adopt a position *outside* our habits and practices, aims and abilities, and from this position offer a meta-theory which encompasses all content and structure. As the lack of consensus above shows however, this does not work, and the reason I am suggesting for this is that it is simply impossible to capture the meaning of a word separate from an understanding of the language-game within which it has meaning. In the same way that one comes to understand what 'pain' is within the different contexts that the word is used (I have a pain *here*, or this causes pain, and so on) creativity *means*, and comes to have meaning, through its *use*. Thus there is no essence to capture, or that might be captured, in attempts that offer a singular definition. And if the above shows anything it is that 'clear cut' definitions are unlikely to account for all actualities. The same problem occurs when we try to define a word like 'game':

> How should we explain to someone what a game is? I imagine that we should describe *games* to him, and we might add: "This *and similar things* are called 'games'". And do we know any more about it ourselves? Is it only other people whom we cannot tell exactly what a game is?—But this is not ignorance. We do not know the boundaries because none have been drawn. To repeat, we can draw a boundary—for a special purpose. Does it take that to make the concept usable? Not at all! (Except for that special purpose.) No more than it took the definition: 1 pace = 75 cm. to make the measure of length 'one pace' usable. And if you want to say "But still, before that it wasn't an exact measure", then I reply: very well, it was an inexact one.—Though you still owe me a definition of exactness. (§69)

Substitute 'creativity' for game here and you have a fair description of what the theorising described above has led to. Just like a 'game', to be 'creative' means any number of things, in any number of contexts. This is not to say that definitions of creativity have no place in analysis. Indeed I have made much use of it in this work, and it is of particular use where it serves the purpose of explanation, or so that judgements can be made about claims to creativity. Rather it is the definition which claims to be comprehensive of which we should be suspicious, since it will necessarily exclude more than it includes, and thus offer us an impoverished account of things. The consequences of this argument for AI development and creativity are significant, but before I come to this there remains one further aspect of creativity which requires some consideration, and that is its status as something 'mysterious'.

## 2 CREATIVE MYSTERIES

Profound questions arising from aspects of what the creative process appears to entail often claim creativity to be arbitrary, and it may be partly due to this that the entire process has traditionally been construed as mysterious. The first point is one to which I shall return shortly, but before I do, it seems prudent to first consider the claim to mystery that creativity has been accorded. Materialist accounts of mind would hold creative processes to involve brain functions not dissimilar to any other,

[2] Language-game is a term which brings 'into prominence the fact that the *speaking* of language is part of an activity, or of a life-form' (Wittgenstein, 2001: §23)

whilst those with metaphysical tendencies would contend that it is in fact *inherently* mysterious, and might conclude from this that it is thus, by its very nature, fundamentally unreplicable.

Schank (1988) disavows any notion that creativity is *inherently* mysterious, exclaiming that to an AI researcher this simply means that 'there seems to be no algorithm behind the creative process', but 'that such an algorithm must exist, in principle' (220). Boden (2004) echoes similar sentiments, and in this vein she also offers an argument against the notion of *intuition*, in this particular case as playing a role in aesthetic judgement, which might prove illuminating to our discussion here:

> to say that we do something intuitively does not mean that some power of intuition is involved. It means, rather, that we do not know how we do it. 'Intuition' is the name of a question, not of an answer. Moreover, it is a question that can sometimes be answered with the help of computer models (1999: 362).

There are two contentions to raise here, the first concerning the actual processes, and the second concerning the terms themselves. On the first account, Boden's assessment would seem plausible if intuition were said to be *undiscoverable*. In that case her claim for this step being pre-emptive would stand. In fact, her claim is stronger than this, and belies tendencies in the scientific approach to assume that many folk psychological terms such as intuition or belief may be eventually explainable (seen also in Schank's comments above, and Churchland, 1988). The problem with this idea is that it relies on the notion that *all things* will be ultimately explainable, and follow a logic which is in some way comprehensible. I would not claim that these beliefs are mistaken *per se*, or that there will never be discoveries which might account for what we consider intuition to be, but rather that it might be as likely that we will find answers for such questions, as that there might also be none. Or, at least, none that would fit any standard conception of what an answer in strictly scientific terms might be. If, for example, it came to light that intuition is in fact a term made from a complex of components, any of which might alter without having any significant effect on the intuitive capacity itself, then it would seem difficult to answer precisely *what* intuition might be.

The second contention concerns the same issues raised in the analysis of creativity above. Simply put, intuition, like creativity, is a term which refers to concepts that have meaning in particular language-games. In which case, intuition *means* little more than having a sense of what something is or might be, seemingly with little or no explanation as to how, where or to what this sense might be attributed. As such, this term would appear to be *necessarily* vague, since to be anything else would be to change the meaning of the word. The same can also be said of creativity. On this account, if we could answer Boden's question we would necessarily be discussing something that had nothing to do with intuition. This is not to claim that we might never be wrong in our reference to 'intuition', but rather that when we are wrong this shows not that our use of the word *itself* was wrong but rather that we were mistaken in our application of it. In addition to this the compositional nature of ideas can make them difficult to chart in any *mathematical* way. On this Gabora (2002) asks:

> Is it possible to mathematically model the creative process? One big stumbling block is that a creative idea often possesses features which are said to be *emergent:* not true of the constituent ideas of which it was composed. For example, the concept *snowman* has as a feature or property 'carrot nose', though neither *snow* nor *man* does. (130)

In light of these arguments it therefore seems peculiar to search for the meaning of a word which already lies open to view. An investigation of this nature assumes that a meaning is lacking and can only be found empirically. Instead, a simple re-assessment of how these terms have meaning shows that they do in fact stand in good order precisely as they are. There is nothing mysterious about the word 'creative' when I say that someone or something shows creativity, for if there were, how would you ever understand what I mean? Trying to answer the question of what creativity or intuition is, without recourse to standard definitions—since these definitions are at best vague—implies that vague definitions are *ipso facto* in need of clarification. And yet, being vague or unaccountable seems to be significant in what these concepts mean. Accordingly we could then attribute the 'mysterious' element of such terms to little more than a misunderstanding of language, and attribute this mistake to our language being 'on holiday' (Wittgenstein, 2001: §38). In fact, the process of being creative might prove no more or less mysterious than any other given psychological term (what it is to *believe*, for example). What we must now consider is how we might, if indeed we can, set about replicating such vague concepts in AI programming.[3]

## 3 CREATIVITY AND AI DEVELOPMENT

AI development has struggled to replicate human creativity in its entirety. As already noted, this has been due in part to our own difficulty in understanding what this term might consist in, as well as a general inability to offer criteria for what should and what should not be called creative. These aspects prove significant for attempts to imbue AI with the potential for creativity, but before I consider this further I need first to analyse some perceptions concerning the *content* of creative ideas, and to do this I will make use of two categories of creativity offered by Boden (1999). She divides creativity into two types: exploratory (E-creativity) and transformational (T-creativity). From these there can also be a combination of the two, which she terms ET-creativity. She explains that in AI it has been easier to model E-creativity rather than T-creativity (353). One example she offers to support this claim is with the BACON program. She says,

> BACON and similar programs can find linear (and other) relationships between measurements. But they have a built-in expectation that such relationships may be there to be found. In the history of science, the mere idea of asking such a question was a very creative (very significant) step.' (Boden, 1999: 359)

As such, the creativity displayed is exploratory (undertaken within given perimeters), rather than transformational, which

[3] Whether replication is a useful tool in artificial creativity development is another question and one to which I return at the end of this paper.

would, on this account, have more claim for being unbounded. Another pertinent example she cites is with the AM program, a T-creative program working on mathematical problems which includes 'heuristics for altering concepts'. There are, however, problems with some of the creative aspects since 'AM has picked out an enormous number of ideas that human mathematicians regard as boring, or even valueless' (365). Furthermore, 'AM is unable to change its own values: its criteria of what is 'interesting' never vary' (Boden, 1999: 365). What seems to be missing in these programs is the potential to change tact and to *choose*, and it is to these aspects that I will turn in the proceeding section.[4] Before I do however, are some reservations about Boden's account which require some attention.

The central objection is that this account premises exploration and transformation to be the most significant defining aspects of creativity. As Novitz (1999) points out: 'not all radically creative acts involve deliberate attempts to transform conceptual spaces' (pp.71-2). To this comment I would add that it does not follow that those that are not T-creative are necessarily E-creative by default. Both these terms are themselves complex and beg further questions, besides which it is often the case that what we consider creative remains open to debate and alteration. Nowhere is this more apparent than in the second criteria I noted at the start of the paper concerning *value*.

Novitz (1999) suggests that value has a key role to play in whether we consider something to be creative or not. For him it is requisite that 'a creative act be of real value to some people', and further that a 'recombination that appears to be valuable, yet is later found to be thoroughly harmful and of no lasting benefit to anyone, will not be of real value and so will not be creative' (77-8). This claim is a complicated one, and while it offers some support to my claims here, it is also problematic. In making this claim Novitz applies normative conditions to notions of creativity which are not dissimilar to those advanced by this paper, yet, in the manner in which he achieves this, he effectively rules out any possibility of claiming anything to be creative beyond claims for its *current* status. It is clear (as already noted) that what we consider valuable or what we consider harmful are dynamic concepts, and often in their application we make judgement calls which may stand or fall at any given moment (what we think good for us today is as likely to be considered bad tomorrow as to remain a good). On his account, the application of the term 'creative' would seem to rely on an unknown future factor, and thus would remain perpetually uncertain. Simply, we could never consider something creative with any certainty on account of our not knowing whether it was a *definitive* good. While 'value' is an important tool in assessing claims to creativity, it is by no means certain that claims for creativity would always be rescinded following shifts in perception of value. It seems that attempts to pin creativity down have been thwarted once again, and while both the accounts offered here have merit, they both also suffer from the same restrictive tendencies. These objections will have significant impetus for the question raised in the title of this paper, and it is to this that I now turn.

The question whether computers could be considered creative over and above notions which hold them to simply replicate the originality of the programmer is a serious one, but interestingly it is often dismissed by programmers as having significance only within philosophical settings. Boden (1994) claims that since it is 'not a scientific question' it can be ignored, since it is 'in part a philosophical worry about 'meaning' and in part a disguised request for a moral-political decision' (85). The problem with this way of thinking is that even if the question is ignored, this does not remove the difficulties associated with affixing terms like 'creativity' to machines *without* first getting clear about what we mean by creativity. For example, Boden poses the question above in terms of 'genuine creativity' (1990, 286), but this belies an assumption that there might be 'false' creativity. As this paper has shown, what we consider creative depends on a multitude of competing factors, and the term is assigned on condition that certain criteria are met, as specified within particular language-games. What *genuine* creativity is within this is just what is *accepted* as creative under any such criteria. This is not to say that we might not be mistaken about whether something is or is not creative, nor that we might not change our minds, but rather that something either is or is not creative according to the use of this term in language, and that as such, to assert creativity is to make use of a term which holds for those language-users who share our games. In the same way that if a lion could speak, he would not speak *our language* (and I will explain what I mean by this a little later on), even if a machine could be imbued with creative abilities similar to our own, they would not be *ours*. The computer, like the lion, does not share our form of life, and therefore cannot share our language-games.

Before I move on to questions concerning arbitrariness in creativity I have one final reservation that needs addressing regarding AI and creativity, and this concerns the notion of rule-following in relation to programming. Programs rely on systems within which symbols are manipulated according to formal rules. These, in turn, encode a set of properties. The problem for the replication of creativity within such systems becomes apparent when we consider this process in relation to Wittgenstein's remarks on rule-following. He explains that a rule may not be understood separate from its context (*our* context), and from this we can surmise that codifying a rule would not therefore be possible *in advance of* the practice in which it applies. Rules adopted in practices or judgments of creativity are only signs, they don't tell us *which way to go*, thus:

> A rule stands there like a sign-post.—Does the sign-post leave no doubt open about the way I have to go? Does it shew which direction I am to take when I have passed it; whether along the road or the footpath or cross-country? (2001: §85)

Often a misunderstanding of the nature of rules has led to serious errors in how we come to understand the creative process, for example, Jonson-Laird (1988) states,

> It is often claimed that a creator 'breaks the rules' in order to produce a more original work of art, Likewise,

[4] Since what drives creativity encompasses a wide variety of values, it is likely that tensions between competing factors may sometimes occur. For instance, if creativity is aroused in order to fulfil a particular need, and where the fulfilment of that need is detrimental to some other equally important need, then decisions will need to be made concerning the claims to value of these two competing needs. This, in turn, may result in important decisions being taken. The generation of such conflict (where it occurs) might therefore prove an important aspect of creative thinking. As Johnson-Laird (1988) point out, key factors often 'cannot be foreseen at the time of the innovation' (217).

> although a grammar may capture a genre, individuals have their own unique styles. Both these objections are instructive, but not decisive. If a creative process breaks the rules, then either it must make a choice at random regardless of the consequences or it must be governed by yet further criteria. These criteria can in turn be captured in a grammar. Hence, the breaking of a rule can be described by yet another rule (or else it is merely an arbitrary infraction). If an individual has a unique style, then it must depend on idiosyncratic biases in choosing alternatives. A grammar can likewise be framed to capture this style. (212-3)

Although working along similar lines to those I advance in this paper, the above remark shows a key difference in the conclusion reached. As discussed above, a rule can be understood only within context, but furthermore, it is something that can in principle be explained (or defined), otherwise what is described as a rule would in fact be better considered a way of doing things. Equating a 'style' with a grammar or a rule implies that the style is more regulative than it need be. Often a style can diverge from the usual, and may offer no more evidence of its heritage than a few minor traits which belie the stamp of its creator. Furthermore, as already noted, rules cannot be accounted for *in advance* of the practice, but are in fact tied up within it. It seems problematic therefore to rely on rules in order to predict which way the style will go. Rules are merely signs after all, and do not tell us where our journey should lead us. In this respect the notion of family resemblance might prove more useful here than that of rule-following. Particularly when the search for 'rules' is likely to slow down attempts toward understanding what creativity is in practical terms, as well as broader notions of how creativity *works*.

The problem is that programs which attempt to account for creativity appear to do just this. The rules upon which they are founded would need to encode a never-ending list of associated rules, and furthermore, there would seem to be the need to encode rules which would exist only in order to break other rules that may come up, as the above remark by Jonson-Laird makes clear. To do this however means we would need to understand a rule in advance of its practice, since an element of prediction seems necessary if we are not simply to generate random data. In fact, even if creativity has elements which are rule-based, this would not necessarily mean these rules could be codified, attempts to do so rest on a misunderstanding of what a rule is. Claims (cited in the section above) that the random element in the creative process is irrelevant seem fair in the sense that, for example, we often use the rule that *intention* should be part of a creative act, yet even here we cannot say that such rules could be codified, not least because it is difficult to offer certainty about what that intention must consist of.[5] I will return to these issues in the final section of this paper, but for now what is clear is that these reservations regarding rules and attempts to define perimeters of what we would call creative, echo those issues raised in the preceding sections about definition and language-games. Rules have meaning only within the structure that they are applied and followed, and it seems unlikely therefore that a set of rules about what creativity is could be designed and implemented outside of this structure.

## 4 FREEDOM AND CREATION

Johnson-Laird (1988) suggests that there are certain necessary factors which have significant effects on creativity. He contends that there needs to be a certain amount of freedom, which in turn allows one to choose to make arbitrary decisions: 'creativity depends on arbitrary choices and thus on a mental device for producing, albeit imperfectly, nondeterminism'. What this means is that given the same situation, 'a genuine process of imagination could deliver a different response the second time around'. Freedom is key in this because one 'demonstrates freedom (if not imagination) in acting arbitrarily' (207). He further claims that '[b]ecause the creation of new genres and paradigms is so difficult, it might depend on an essentially arbitrary or random generative process' (217). The potential for making arbitrary decisions pose few problems for AI development, since this has proven to be easily replicable. As such I shall focus here on the notion of free-will in relation to such decisions, although it still remains to be seen how a term like 'arbitrary' factors into what creativity is.

Johnson-Laird's account implies that a certain amount of autonomy is requisite for creativity to be genuine. Despite this, many accounts of creativity also claim that significant portions of these processes occur at unconscious levels, aspects of which the creative person herself would be unable to account for or explain. The problem with this scenario for AI development is to try to evaluate where the balance of favour lies. Is creativity primarily a conscious or an unconscious act? And to what degree is either aspect contingent for true creativity to occur? If, for example, a composer claims to have awoken from a dream with a melody fully formed, and claims this in earnest, would we really want to suggest that she has been creative? Let us suppose that on waking, the composer merely copies that which she had heard in her dream, and more importantly, to this she makes *no alteration*. Can we truly say that what has occurred is *creativity*? We can also imagine a contrary process, whereby a poet is instructed to write a poem following very strict guidelines. He diligently sits at his paper and writes the first words that come to mind, with entirely arbitrary choices for which words he writes, and no structure to these words. He then cuts each word into a small strip and puts these into a hat. After mixing these around, he pulls each word out individually, and writes them on the paper in the order in which they come. Let us suppose (however far-fetched) that this jumble of words is included in a poetic anthology of more traditionally composed poetry, and that it achieves some acclaim. It is successful in poetry terms. Since some of the criteria for what creativity is often claimed to be has been met (novelty, value) would we therefore want to ascribe the term 'creative' to the poet, poem, or even to the process by which the final result was achieved? These are the questions we face when we consider the AARON program.

AARON, a series of programs for generating line drawings, and more recently also for colouring them, has had its 'aesthetically pleasing' works exhibited in the Tate and around the world. The creator, Harold Cohen, on being asked whether AARON was being creative in such work replies

[5] What intention might be begs further questions about aesthetic criteria, as well as broader questions about the application of psychological terms in matters of judgement, but in the interest of brevity, I shall not pursue these here.

> I think creativity is a relative term. Clearly the machine is being creative…to the degree that every time it does a drawing it does a drawing that nobody has ever seen before, including me. I don't think it's currently as creative as I am in writing the program. I think for a program to be fully creative, in a more complete sense creative, it has to be able to modify its own performance, and that's a very difficult problem.[6]

As Boden (1999) points out, 'AARON cannot reflect on its own productions, nor adjust them so as to make them better' (363), and this very crucial element is one that is often cited as evidence against the possibility of genuine AI creativity. And yet one might counter-claim that this is actually no different from the case of the composer who awakens from a dream, since she would appear to have no further *conscious* autonomy in the production of the piece of dream-music than AARON has in producing a work of art. Of course, the composer could choose not to ever write the music she has heard in her head, but this aspect does not affect the point being made here, if for no other reason than that this would be a question of free-will and autonomy more generally, and not one which has bearing on the creative act in and of itself.

It seems clear that the question which AARON's artistic powers provokes is not whether the machine has successfully created a work of art that is in some way *aesthetically pleasing*, but whether this is what it is to be creative in art. Thus when Boden discusses the different achievements of two separate genetic algorithms (GAs) in aesthetic terms, it seems the boundaries between these two aspects are problematically blurred. She states that many people see one AI model (Sims' GA) as *more creative* than another because 'it always comes up with at least some patterns they regard as attractive'. The comparison drawn is with those produced by a different algorithm—Latham's GA—primarily because these are stated to be 'strongly repellent' due to featuring images 'which resemble molluscs and snakes' (367). It seems that creativity is being (mistakenly) equated with aesthetic judgement or appreciation. An artist is not deemed to be such because of the quality of their work, but by the work that they undertake. Just as a terrible baker will still be a baker, so too a bad artist is yet still an artist. It therefore seems problematic to apply such terms in our judgement of whether or not an AI program is creative or not. Particularly since it would be difficult to say of the work of some rather acclaimed artists (Damien Hirst, Tracy Emin or Francis Bacon to name but a few) that the term 'attractive' forms any part of an aesthetic judgement of the work.

Perhaps we will be closer to understanding the reluctance to equate what might be termed AI-creativity with that of humans when we consider such undertakings in terms of *ambition* and its relation to free-will. As Boden explains, even when a Sims genetic algorithm gives the appearance of transformational creativity, because it can 'make random changes' (367), these are not *focused* attempts in the same way as those made by the creative artist or scientist (Boden, 1999). Clearly these aspects are further indications of an agent's freedom to follow their own creative urges, yet could it be argued that these aspects are insignificant psychological or social aspects of the creative process rather than contingent factors?[7] Although there are strong objections to this way of thinking, as I have already made clear and to which I shall return below, let us for the moment suppose that such claims are valid, and that all such social aspects should be dismissed as redundant. If we succeed in this it makes the claim that AI programs display 'choices' in so called 'creative' acts easier to abide. In drawing one thing not another could it be said that AARON has made a *choice*? But what other factors are important in the replication of choice?

It may transpire that replicating genuine creativity—as, for example, displayed by those successfully creative persons—is only a matter of developing programs which contain more information, are more complicated or contain a larger number of competing factors. Computer programming, as with most disciplines that follow scientific or mathematical processes, is accumulative, and therefore we might grant that it is at least *possible* that all such factors could be accounted for and codified some time in the future. Even if the creative capabilities of successive programs were to prove deficient in some way, this might prove no worse than has typically been the case in advancing the development of other sorts of ideas. The question might thus prove to be more a case of 'when', rather than 'if'.

But there is a serious flaw with this thinking since even if one could codify all that a person *knows* into a computer, it is unlikely that this artificial body of knowledge could then replicate all the different ways in which that person might connect what are sometimes (apparently) disparate pieces of information. The computer might make *better* connections, but this would still be different. This is not to say that all humans make the same connections, but rather that by sharing a common language and a form of life, we are apt to make similar sorts of connections, or at the very least be capable of understanding even those radically different connections that are made by others. Part of what it is to be creative is the ability to look at things from different angles, or as Wittgenstein suggests, to see something 'in *this* way or *that*' (2001: §74). While there may appear to be no particular, or at least no over-arching, reason for why we see things one way or another this may belie a multitude of different or competing factors. It follows from this reasoning that the earlier dismissal of so-called psychological or social factors was seriously misguided. We simply cannot get away from the fact that our creativity is shaped by the very particular ways in which we come to see things in this aspect or another.

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[6] Comment taken from the film *The Age of Intelligent Machines* by Ray Kurzweil (1987)

[7] This is also the case with respect to the urge toward creativity as response to feelings of restriction. What it is to be free is clearly measured in degrees, and it seems difficult to ascribe this to the production of creativity since doing so begs questions of how much freedom is needed in such cases. It is sometimes the case that we might be at our most creative in times of adversity and against opposition. Whether we *feel* free or not is also a significant factor in such questions (as Sartre acknowledged in his later existentialist claims). Further, as pointed out by my colleague in discussion, were one to have utter freedom, say from death in the form of eternal life, would there ever be the *need* to be creative? From this example, as with many others I have raised in this paper, we come to see that in trying to define the creative process, we often unwittingly limit what must by definition be unbounded, at least in potential, if not in reality. It is perhaps this that is most difficult to replicate. With this comes a certain amount of self-awareness and knowledge, but also a certain amount of optimism and drive. Futility is the one obvious destroyer of creativity. In all other respects, constraint may often prove just as stimulating to creative impulses as the freedom to choose.

And the reasons why we see things one way or another, or even how aspects just *do* appear to us, simply could not be codified, there would be too many variables, as this remark by Wittgenstein draws out:

> The concept of 'seeing' makes a tangled impression. Well, it is tangled.—I look at the landscape, my gaze ranges over it, I see all sorts of distinct and indistinct movements; *this* impresses itself sharply on me, *that* is quite hazy. After all, how completely ragged what we see can appear! And now look at all that can be meant by 'description of what is seen'.—But this just is what is called description of what is seen. There is not *one genuine* proper case of such description—the rest being just vague, something which awaits clarification, or which must just be swept aside as rubbish. (2001: pp.170-1)

Vagueness is thus as important here for the content of seeing, as it is to the definition of creativity. One final point about the body of knowledge claim before I move on. Langley and Jones (1988) suggest that there is a body of knowledge from which creative people create, and this would seem to support the argument I offered above for how creative choices might be replicated in AI. They explain:

> We have seen the important role that preparation plays in scientific insight, and presumably any creative act must have substantial knowledge structures on which to build. One cannot expect to be creative in any domain until one has achieved knowledge of that domain. (199)

There are two concerns which arise from this way of thinking however. The first is that it seems to suggest that all creative processes take place within the accumulative method of the sciences. This is clearly not the case, and although it is the most common form of paradigm change, it is not by any means the *only* form. This point leads on to the next, which is that it may well prove valuable (in certain situations) to look at something with fresh eyes, to not be burdened with tradition and how things *should* be. In fact, academia and vast quantities of knowledge can sometimes prove restrictive to creative thinking. Novitz (1999) makes the same point when he states (in response to Boden), 'it just is not true that radically creative human beings must always have explored and will always be familiar with the conceptual spaces that their ideas transform', since sometimes 'the weight of those domains, the pressure of orthodoxy, prevent them from noticing new possibilities, new ways of doing and conceiving' (71-2). In this respect, as in many others which I mention here, psychological factors may prove as important to creativity as brain activity (if the two can be divided thus). Thus, the body of knowledge and the problem of choice remain significant ones in creativity and AI development.

## 5 CONCLUSION: IF A MACHINE COULD *SPEAK OUR LANGUAGE…*

In *Philosophical Investigations* Wittgenstein enigmatically remarks: 'If a lion could talk, we could not understand him' (2001:190). In offering some answers to what Wittgenstein means here, I will show how his comment offers potential answers to the problems that arise when programming AI to be creative. Wittgenstein's remark is situated in a work which seeks to show how language is *used*, and in so doing, to highlight the essentially social nature of language. To use language is to be part of a group of language users (there can be no private language), so that the meanings of words and concepts found within these shared language-games are thus perspicuous and sound. It follows from this that what it means *to be creative* is in fact no different to what it *means* to be anything else in ordinary language. The term 'creative' has meaning through its use, and as a consequence it encompasses *all* of those things which I listed at the beginning of this paper, in varying degrees.

Since language is embedded in a way of life, and because what a word means is dependent on the language-game from—and within—which it derives meaning, it stands to reason that the component parts may change, and the balance will shift in favour of one aspect or another at any given time. Simply, creativity means different things in different language-games, and these games are linked by a notion of family resemblance (whereby two or more things can be connected by varying amounts of similarities). On this reading, we can easily accept that the type of creativity apparent in the composer example noted above is indeed *different* from that of the guided poet example, by virtue of many determinate and random factors. This is not to say however, that one should be pitted against the other with claims that one or other offers a more or less definitive account of creativity, but rather that they both share and diverge in different ways from a general notion of what it is to be creative. Any criteria we might give depends on the given individual language-game, and thus is open to change and regulation, in so far as normal language *always is*.

From this we might conclude that it is not an answer to the question posed in the title of this paper that we should seek, since the answer is likely to be negative, but rather a re-evaluation of what we hope to achieve in asking this question. Simply, it is not about asking whether a machine *is* creative, for the arguments I have offered make such claims impossible. A machine could not be creative *in our terms*, for the same reason that if a lion could talk, it could not speak our language because it does not occupy our form of life. Once this is accepted, and the temptation toward replication of human creativity is resisted, focus can instead turn to consideration of what it would mean for an AI program to be creative in *AI terms*. This need not mean any more than it does in the example given earlier of the composer and the poet. The composer might not be creative in the same way as the poet might claim to be, and yet they may still share some aspect of what it is to be creative in broader terms.

On this account, it seems that the question posed in this paper is not merely 'a philosopher's question' (Schank, 1988: 220), but is in fact a rather important one, and one which is open to all language users who seek to understand what particular words mean in particular situations. Accordingly, this question has as much significance for developers of AI as it does for philosophers. The replication of concepts will always require deeper analysis than the replication of objects, if only because there is no physical manifestation which can be consulted.

In this paper I have claimed that definitions are often too rigid, and are neither conducive nor helpful to understanding or making use of creativity. A more holistic approach to

understanding creativity as a family concept which gains meaning within particular language-games is offered as an alternative to this way of thinking. In a now famous example, Wittgenstein remarks that if we boil a person down to ash, this would not comprise all that that person is, or was (1966: 24). The point made illustrates my argument nicely, for even if we locate aspects of the creative within brain processes, or particular actions, this is not to define what creativity *is* in the same way that neurophysiological analysis that explains which parts of the brain govern language use will not tell us what language *is*.

Even if we replicate apparently creative processes in AI programs, and *even if* we create something which to all intents and purposes *appears* to have the same creative outputs, this in no way accounts for all aspects of what it means to be creative. Indeed, some aspects such as the aesthetic might prove to be elusive for no other reason than that aesthetics seem not to be bound by clear rules or boundaries. To be sure, there are certain methods that one might follow, guidelines for taste, and ways in which we can anticipate reactions. We might even be able to predict with some accuracy what will be successful (such as critics are often wont to do). Yet, this does not *fully* account for the apparently random nature by which we come to say of one thing that we like it, and of another that we don't, even where they might be very similar things. It may turn out that all such decisions are in fact as arbitrary as the mystery which we so frequently ascribe to them, but this would be beside the point.

The debate is a stimulating one and it seems clear that the nature of the creative is by no means settled. Yet, without this agreement it would seem impossible to ascribe to a being different to ourselves (by which is meant a non-human about which aspects of being cannot simply be taken for granted) the function of creativity. This need not, however, be a stumbling block for research into what creativity is, or even where it might be located. Nor should it provoke suspicion concerning the probability of success in the creation of any sort of artificial intelligence which replicates some aspect which we are willing to accept as AI creativity. Rather, what is key is to recognise that the application of the term 'creative' to a computer program, or even to ourselves, is to make use of a word which has meaning in very particular language-games.

On this account, *replication* (as a measure for success in AI development) is a limiting concept, and proves impossible for the simple reason that what creativity means is dependent on a (potentially unquantifiable) number of variables. That there are different forms of creativity *already* constitutes part of how we perceive creativity, and this argument might prove most fruitful for claims that aspects of non-human creativity—though they may be particularly or even substantially different from our own—should nevertheless be considered *creative* in some way. As AI programming becomes more sophisticated, and the data more extensive, it follows that the creative scope of an AI machine might move closer to what we understand our own creative abilities to be, all of which could be achieved without making metaphysical leaps. It is clear however, that even in spite of this, it is impossible that machine creativity (whether superior or inferior to our own) could ever be on a par with human creativity. My suggestion here is that coming to a better understanding of how creativity comes to have meaning will free AI developers from the need to try and *replicate* human creativity, if for no other reason that that would be as likely to succeed in this as they might in teaching a lion to talk.

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