

“After the zombie apocalypse, you can choose to save an oil well or a violin. Explain your choice.”

I'll leave that there for a moment. Write it down. Use the time it takes for the rest of this talk to come up with as many answers as you can. Put your answers in the chat if you want. Write them on scraps of paper. Or just play with ideas in your head. Use the talk as background for thinking about the question, or use the question as background for thinking about the talk.

It's a cliché that if you ask 100 people the same question you will get at least 101 answers. But of course it's not true. What you actually get is more people giving the same answer, meaning if you look to a wider group to help you decide what to do when you're faced with a particularly hard problem, you are more likely to take a course of action based on exactly the same ideas and assumptions that led to the group facing the problem in the first place.

Let's go back to the question.

This question is typical of those posed by the card game Mycelium, which I devised as a way of helping people think more creatively, and which won the 2017 Oxford Humanities Innovation Challenge. Questions ask players to find as many original ways as possible to connect, in various ways, two randomly chosen objects. The more people in the group playing who come up with the same idea, the fewer points that idea scores.

It was designed to capture two elements that make up the essence of creativity: the raw material - knowing lots of things about lots of things; and being able to form connections fluidly between those things.

Understanding that creativity is as simple as this use of existing knowledge to form new things is a powerful way of understanding knowledge and memory. It shows that the value of knowledge is not in the sum of the things you know, but in something far greater: their product. And it is a reminder that we learn things not so that we can recall them, but so we can use them - endlessly combining, testing, playing, untangling and recombining them in ways that have never been imagined before. The creative mind doesn't converge upon ideas - it takes those ideas as starting points and diverges among the many possibilities they offer. This is why creativity is essential for solving the world's problems, finding answers that exist outside of the structures that created the problems.

I devised Mycelium to help develop both of these elements of creativity, and did so combining what I'd learned in my doctoral research in Theology about early modern ways of cataloguing and using knowledge, and developments in the neuroscience of creativity.

I studied Puritans, and the way they thought about the imagination. And that led me to look at the systems they turned their backs on,

in particular memory palaces, and other visually based systems. These techniques, which are thousands of years old, work by associating images of things you want to learn with things you already know, like the rooms in a building, or the orders of angels, or the signs of the Zodiac. This forming of associations is itself creative. And recent neuroimaging studies have shown that it actually changes the structure of the brain in the same way that black cab drivers who study The Knowledge have the structure of their brain altered, making their brains more like the brains of high profile highly creative individuals whose brains were imaged in a study by Nancy Andreasen.

But early memory techniques more than about just employing creative means of remembering. They were designed for creative purposes. They were toolboxes, used by the likes of orators and writers to help them bring information together in new ways, to marshal materials into rhetorically convincing forms.

The most creative of all were the memory wheels of fourteenth century monk Ramon Llull, which provided ways for the ideas being learned to attain almost a fluidity through their associations. These were essentially post-it notes - powerful tools that enabled you not just to learn a vast number of ideas, but to cut them up, reorder, reconnect them at will to create endless new combinations.

Neuroscience also offers us an insight into the second element of creativity, the fluidity that enables us to move effortlessly between ideas.

Two really interesting sets of experiments involve groups of adults whose job is to be fluent in the art of coming up with new and often outrageous ideas: jazz musicians and rappers, people whose trademark is being able to do things on the hoof. Charles Limb with jazz musicians and Siyuan Liu with freestyle rappers did the same thing. They put them in an fMRI machine and told them to start improvising. In the case of jazz musicians this was done with a keyboard held outside the machine – trombones don't really lend themselves to this kind of thing!

What both studies found was that as soon as the artists started improvising, the frontal areas of the brain associated with executive functioning and self-censoring – those bits of us we evolved to give us a little nudge from time to time and say, “come on, that's not a good idea” – stopped being active, and activity was driven just by the motor areas. To put it in really unscientific terms that would work for a TED talk – they forgot to get embarrassed and went onto autopilot having fun.

By rewarding the ridiculous, by giving more points to the most outrageous ideas, the aim of a game like Mycelium is to use the dopamine system to help us become better at switching off our self-censor, less embarrassed to explore pathways our preconceptions tell us are daft, or go nowhere.

But this talk isn't just about creativity

Whether it's a dance, a double helix, or just a Nora Ephron film, the most interesting journeys, like Mycelium, often take the form of two subjects on different but related paths that never quite intersect but can't be properly understood except in relation to each other. They enrich each other through the shadows cast by their light; their gravity teases each into shapes they could not make on their own; the narrow tantalising gap that never closes allows your imagination to fill the space between them.

Creativity's dancing partner in this talk is neurodivergence. We will film this dance from many perspectives. It is the intricacies of these steps I tried to capture in our mission statement when I founded Rogue Interrobang: Empowering Institutions to Empower Individuals to Empower Institutions.

People often talk about neurodiversity and creativity together. In fiction, the trope of the magical autistic child is frustratingly common - they're - or too often "he's" - the quiet one in the corner, impenetrable to the neurotypical, magic-free world of the opening narrative. But when the story crosses through the portal, the group of neurotypical friends suddenly find the one of their number they'd always resented having to include because he's the leader's brother and his mum insisted can flow intuitively through this new, magical world in which they are hopelessly lost - like a penguin in a murmuration of starlings plunged for the first time into the sea.

But these tropes are not only trite and oversimplistic. They miss so much of the neurodivergent experience, so many of our needs in a world not configured to the way we work.

And the trope of the neurodivergent individual who struggles to fit within what is seen as "reality" but somehow also occupies a space in which they have remarkable abilities follows us from fiction into our own world. It's a trope that has important truths behind it but pays little attention to the complexities of neurodivergent life, or to the arbitrariness of neurotypical norms.

But the failure of tropes often to be more than, well, tropes shouldn't stop us recognising genuine differences of perspective, of processing and interpreting and communicating information, that are more prevalent among neurodivergent populations. And yes, some of those differences overlap with what the neurotypical

world frequently calls creativity - if for no other reason, sometimes, than that to many in a neurotypical audience they are new.

And the neurodiversity movement has seen organisations seek to harness, even if often in clumsy or patronising ways, these differences.

GCHQ recently launched a very high profile campaign to make its recruitment more accessible to dyslexic applicants, recognising the increased levels of pattern spotting ability in the dyslexic community. And the banking sector, in particular investment banks like J P Morgan and Goldman Sachs, have sought to benefit from a high prevalence of detail spotting in autistic communities.

Greta Thunberg has made the public more aware of autistic individuals' ability to see through neurotypical codes, of the experience of cognitive dissonance when encountering contradictory rules or beliefs, or the difference between words and deeds - and the values this has in surfacing many of the lies society tells itself that hold back progress. And through the likes of Dara McAnulty we have seen how autistic or ADHD hyperfocus can excite people about vital subjects for our future.

Indeed, this increased recognition of the value of neurodiversity goes far enough that it is possible to talk about a Neurodiversity Movement. Books and speakers make the case for workplaces to include more neurodivergent employees for several reasons. There are fundamental moral, and legal issues around accessibility, and the value of every human being's life, the importance of empowering everyone to achieve their potential. And both of those matter within academia.

But the examples we have seen also demonstrate a very simple business case - and the more an organisation deals with complex, urgent, or existential problems, the more it deals with questions at the edge of human experience, the more it seeks to explore and shape the possibilities of our collective future, the more imperative this business case becomes. If we believe that research falls into any of those categories, and I would argue that it epitomises them all, the more it is clear that we cannot avoid the business case for neurodiversity.

That case is very simple - neurodivergent people bring perspectives that others do not. And there are skills within the autistic, the dyslexic, the ADHD or dyspraxic communities that are more widespread.

A problem with that business case is that many of us in this community also have needs that are more prominent than in our neurotypical counterparts. And just as the academy's neurotypically-dominated structures mean that it cries out for our skills and perspective, so they also make it poorly placed to provide us the support we need in order to best use those skills and perspectives.

And the solution most commonly proposed for enabling us to fit within the academy - that we lean in and learn to adapt ourselves to its ways of being - is, to the detriment of us, of the academy itself, and the world that looks to research to enrich it and even

to rescue it, almost custom-built to strip us of the qualities that make our contribution valuable in direct proportion to the extent to which it allows us to survive in this environment.

Let's return for a moment to our question.

This kind of question both makes you more creative, and illustrates how creative a group is at the moment - the number of unique responses in a group shows how homogenous or otherwise your group is - in many groups, the more people, the more answers cluster. In the most diverse groups, more people just means more answers.

We expect to find ideas and topics on a linear path - oil wells and violins have associations for all of us. And while some of those associations will be personal, many will be shared. The expectation that creates acts like a trail of breadcrumbs - a very linear trail, one that marks out a few pathways that ideas will generally take, paths that soon become well-worn and hard to deviate from.

I have asked this question dozens of times. Audiences have ranged from school children to intelligence analysts; software coders to academic administrators; start-up founders to museum visitors. And I have learned many things. That school children are the most original thinkers and start-up founders the least was not particularly surprising. Nor is the seemingly immutable rule that one of the first three answers will involve some kind of weapon. I learned that people's answers reflect deep perceptions about how society runs (some look for ways of ensuring post-apocalyptic society still has artistic culture to give life value; others look for ways of ensuring it has a functioning economy to keep it running; others look for ways of providing rules to give it cohesion); and their place within it (some ideas focus on how to survive post-apocalyptic loneliness; others on how to create a new cohesive society; still others on how to defend oneself in a Mad Max type future). I learned that very few ideas ever stray outside these categories. (I can only actually recall one, which was a wonderful essay about how a violin could provide an architectural blueprint, whose underlying premise was that the part of life most likely to be missing in a post-apocalyptic world was curiosity).

All of which is to say, our minds travel well-worn paths.

But deviating from established pathways, taking the non-linear route, matters. And it matters in an existential way, because unless we pursue different paths we are unlikely to avoid exactly this kind of apocalypse at some point or in some degree.

So I want to look at some of the ways academia relies on linearity, and in doing so actively places barriers in the way of creativity and neurodivergence. We will see in every one of these areas an interesting confluence of factors. The most obvious of those factors is that the linear assumptions we have baked-in to our practices for

dealing with people are things we would laugh at if they were actually presented to us as real ideas about real people - and yet we cling doggedly to their use.

Three things stand out:

the linear CV

the linear output

and the linear person

We might think we understand that everyone is different, that life happens and that people's lives take different trajectories. But access to, and empowerment within, academia are based on systems that structurally fail to acknowledge this.

When it comes to the linear CV or the linear career trajectory, we might understand that different lives have different shapes. We might know that the lives of our friends who are parents or carers have different contours from those who are not. We might get that if you have a life peppered with poor health or have spent decades undiagnosed as autistic, your CV might reflect that pattern. But when we speak as an academy we still do little but shrug.

And we continue to tweak rather than fundamentally overhaul our admissions system. We continue to require a PhDs before we allow someone to apply for research funding. And all our early career schemes and next generation scholar programmes fail to take even the most basic steps to widen participation in research to those who are not already within a very linear and arbitrary. The academy remains the opposite of Rome. Only one road leads here.

I experienced this with almost textbook clarity during my own Faculty's Athena Swan application. Everyone I speak to about the problem knows there is a problem. And when confronted with it they acknowledge it's a problem. But the response is often, "there's nothing we can do" because, and here is the first of those factors I talked about, "we can't take the risk of letting someone in who doesn't meet some standard criteria." Pragmatism and safety. These are the most common justifications of the status quo, and in practice they will override any diversity statement.

But of course they are neither safe nor pragmatic.

The linear output is typified by the journal article. Or the monograph. Or the syllogistic argument. Or, indeed, the classically formatted research proposal.

When it comes to the REF, and by implication therefore the consideration of academic CVs, different ways of expressing the outcome of research, video, audio, art, performance, conversation, are typically kept aside for impact case studies just as within institutions we hive them off as knowledge transfer or Public Engagement. It is as though we see these methods of communicating as tools through which we can translate research into the vernacular rather than as possible primary

presentations of the research itself. as though linearity were a marker of seriousness rather than simply a mode privileged by the prevalent neurotype.

To put it bluntly - we think of these methods of communication as ways to make research accessible for the public, and fail to recognise that acknowledging their value makes research accessible for the researcher. In this way the privileging of the journal article is no different from something I have experienced all too frequently - the lecture theatre with wheelchair access to audience seating but not the stage.

And the linear person is the person defined by a single trait. Let me explain what I mean with a very simple example from personal experience. Two days after I won the second of my three Creative Thinking World Championships, I spent 10 hours trying, and failing, to order a washing machine because, despite giving intimate details of my medical history 11 times to 11 individuals, no company would provide an accessible means by which I could communicate with them to arrange delivery.

Many of us who are neurodivergent can tell similar stories about what you might call our “spiky profiles.” Well-meaning people see either the things we can do (how many times do we have to hear “I don’t see the disability, I see the ability”?) and fail to provide the support we need in order to do them; or they see only what we cannot do, and fail to even consider what we could do - and so much progression in any field is based upon a failure to consider that we can be both disabled and brilliant. That someone could be an outstanding researcher - but unable to jump the hoops a neurotypical world puts up in order to determine whether they are allowed to demonstrate this.

Many of us undiagnosed as children went through school desperately needing help that was never forthcoming because “you’re clever, you’ll be fine.” Even as a 40-something adult, the first psychiatrist I went to see for an ADHD diagnosis because my poor executive function had left me unable even to cope with the most basic day to day tasks simply told me when I asked for help, “you’re so bright you’ll think of something”

The result of this linearity is, of course, a quiet untold series of personal tragedies.

But it is also a disaster for a research environment that needs, and claims to want, researchers who can bring brilliant new perspectives to problems.

Belief in this linear default leads to a catastrophic lacuna at the heart of the academy’s infrastructure: the use of proxies for the actual thing you want, without realising they are proxies. This is the classic fallacy of mistaking the map for the territory. And while the private sector, possibly because it feels the pace of disruptive pressure more quickly than we do, has started to recognise this and shift to, for example, skills-based interviewing, in academia we persist in loving our maps, perhaps because many of us are archivists at heart.

And when in moments of clarity we notice that our recruiting toolbox is full of maps, we fall back on another principle that gives away our origins - the distinction between sins of commission and omission. To fail to act to improve sits far more easily with us than a failure of action intended to improve. Which brings us back again to the neurodivergent unease with holding illogical positions.

And so, sensing a problem, yet clinging to the safety of inaction, the academy returns once more to its skill at laying down linear paths, and invites the creative and the neurodivergent to lean in.

Creativity, like neurodivergence, is diminished through the lean-in fabric on which our institutions are built. I often refer to being creative as being a Cassandra.

It is the role of creativity to provide answers to society's most pressing problems which then do not get implemented because those with the platform to nurture those ideas cannot see the value in them.

Academia has increasingly embraced innovation and creativity just as it has made increasingly positive noises about the important of neurodiversity. But the pathways into and through this landscape remain narrow, an architecture designed for the lives of linear people with linear CVs. Those whose CVs are peppered with holes that reflect their lives find themselves buffeted between the verges. Those who lean in, who contort themselves through that linear path often arrive, like salmon after a season of swimming upstream, burned out to the point of breaking - only to find if they ask for support that they are left to the bears and the eagles with a weary response of, "you leaned in to get here, stop getting ideas above your station and do it again now you're here."

Whether through exhaustion and attrition or through demotivation or simply through an inability to participate, these linear pathways all ultimately lead to disengagement. If you enable people to develop great ideas, create forums for them to be heard, incubators for them to be developed - but then never put them into action - enthusiasm will soon be lost. Ultimately, Cassandra will get tired of Troy.

Let's return for a moment, to the theme of safety, and try to understand its pull. Of course, doing this is, in a way, a neurodivergent response to a neurotypical problem. The academy falls back into its own normal because of, at its most fundamental level, the emotional pull of the familiar. But it is able to feel comfortable in this by finding a rationale with which to retrofit it, so questioning that logic for its coherence is not only valid, but something we have, albeit it implicitly, been invited to do.

Of course, academia does not express it in these terms to itself, but a very useful analogy to help explain what is happening, is how groups undertake brainstorming.

Brainstorming is what many people think of first when they think of creative thinking techniques.

We think it is self-evident that the process for a brainstorming session is to begin with divergent thinking, letting the ideas flow, and then converging on those ideas to put into action.

But is it really self-evident? Should it be?

We rely on this pattern of divergence and convergence, I believe, because we believe that all problems are iterative. We go into a brainstorming session around a problem because our aim is to make our solution “a bit better.” We believe that we will arrive at options that could provide a solution to 50, 70, 90% of a problem. And we believe that it is our job, when converging in on a plan of action, to undertake an optimization process whereby we calculate trade-offs based on a nuanced set of criteria to arrive at the best we can manage in the circumstances.

But what if a problem required not an iterative step but a paradigm shift? In that case, if 90% solved is no better than 0% solved, what would be the very best way of deciding which of the ideas arising from your brainstorming in order to maximise the chance of success?

This is a question I often ask during workshops. It is of course a provocation. The correct answer is one no one ever gives. And it is a very simple answer. Any criterion a group will use to select an idea to pursue will be shot through with the same parameters and assumptions, perspectives and biases that created the problem it wants to solve. Having introduced creativity through divergence, convergence would throw it out as it asks ideas to lean in.

So what should the brainstormer do?

As someone with a background in Theology, the answer is clear to me.

SLIDE

They should cast lots. Choose an option at random. In doing so they will greatly increase their chance of choosing a 0% solution over a 70% effective one. But for either/or problems that is irrelevant. And it is that step - seeing 70% as the equivalent of 0 and seeing 100% not as “a bit better than 90%” but as qualitatively different from anything else - that brainstormers find it so hard to take.

But of course, for us all is well. The academy's neurodivergence and creativity problems are not, after all, structural. Are they? They do not require a paradigm shift. Do they?

Do they?

If we want to build these enabling, empowering structures, one answer lies, perhaps unsurprisingly, in the nonlinear - building an academy from unfamiliar shapes, paving the entrance and the campus with nonlinear pathways. But to do this, we first need to open ourselves to the possibilities for true change. we need to find a way to hear Cassandra. This is what I mean when I talk of empowering institutions to empower individuals to empower institutions.

Change requires the creative and the institutional both to play a role. Creativity must not lean in. Instead, creative ideas must be white rabbits - anomalies so intriguing they draw anyone who comes across them into their own world. To lean in, to express an idea in terms that can be understood or, as we might put it in politics, to speak only within the Overton Window, means to strip an idea of the one thing that made it valuable. But institutions must then undertake to hear what Cassandra the white rabbit has to say and never demand that she lean in.

Is institutional change an all or nothing problem? I am not sure that anyone in the academy is ready to hear that it is. But I believe there is a burden upon them to demonstrate, before considering what that would mean, why it is not.

What if there is one fundamental thing we could do differently that would empower different ways of doing research, different ways of being a researcher?

For our last tangent I want to take you out onto the streets to experience something whose very nature is about taking the nonlinear route, solving problems by finding helpful tangents.

The modern urban practice of parkour originated in Lisses, a commune on the outskirts of Paris. Its practitioners, or traceurs, run and jump through spaces where people are unaccustomed, or often intended by design not, to do so. Whether roof or railing; wall, barrier, bridge or step, a philosophy of “always move forward” combines with athletic practice that uses the world as its gym to allow free and fluid movement through spaces designed, through ignorance or purpose, to obstruct or reduce motion to staccato.

Parkour does one thing very differently. And it's one thing that's absolutely fundamental. Movement through space.

And then we iterate back and discover what that one thing is: move. Different ways of occupying space/the co-occupation of space - there is more than one way to occupy the space you find yourself in - even where spaces have been engineered with paths so clear and well-used that we cannot imagine any other way of travelling

through them, it is possible to move differently, more fluently, more efficiently, more beautifully, more enjoyably. And in doing so it is possible to learn more about ourselves, our environment, and our connection with it, than we ever could by keeping to the paths put in place for us.

What might it mean to move differently? To occupy the academic space and move through it differently? In many ways of course the value of difference is about the value of movement - of moving away from assumptions, moving towards new paradigms, moving between disciplines.

Let's end by moving for a moment through this possible world.

What would it be like for CVs and careers no longer to be linear? For the linear expression of ideas no longer to hold a privileged place?

Might lives look somewhat like Lull's memory wheels? With each step a stepping off point to a myriad other associated steps? With no architectures restricting the flow from one place to another, one idea to another, one qualification to another, gating the communities of one funding course until the lock can be opened with the right piece of paper, closing doors in slow motion from the moment an article is published like a scene from an Indiana Jones movie in which Indy must constantly publish to avoid the rolling stone of an unsatisfactory CV.

Might we layer ideas like laqueur as well as stringing them into syllogisms? Might talks and pictures and performances emerge from their public engagement enclave? Might open access stand for ideas that all can use not articles that someone could, in theory, find?

What might it mean to move differently through impact?

Well, I often start my talks with this one point, because it's probably the most important thing anyone who makes funding or hiring choices can hear. The greatest impact you will ever have on the world is in the projects you do not fund, the people you do not hire. The stories you decide should not be told. When you sit down with a pile of applications, remind yourself of this before you dive in.

It is our job to be one of the most innovative sectors in the world. The problems we address demand the highest levels of innovation, openness, and flexibility in the ideas and the solutions we propose, communicate, and help to implement. And yet the structures in which this openness is supposed to happen are often closed and inflexible. Don't get me wrong - constraint can be a friend of creativity - but narrowing the definition of who a researcher is, how we fund the work they do, the support we offer them, the pathways we make possible, these are not that kind of restraint. They diminish our possibilities - to change the world, yes; but even beyond the agenda of

impact, they diminish the possibility we have to enrich people's lives; to illuminate our species; to broaden our dreams; the more we close ourselves through insisting upon our straight lines, the more we take those dreams we all have as children of one day building something new, discovering something new, being a part of something new, those sparks catching fire in future generations and giving us all hope and extinguish them. And that would be a very profound, an immensely significant, and an utterly shameful impact.