Evaluating Atypical Imagination and Cognition in Autism: Working in the Arts/Science Interspace

Book Section

4

Evaluating atypical imagination and cognition in autism: working in the arts science interspace

Ilona Roth

Hans Asperger, writing in 1944, and later translated by Uta Frith observed that 'Autistic children are able to produce original ideas. Indeed they can only be original, and mechanical learning is hard for them…..the special abilities and disabilities of autistic people are interwoven.'[1] Yet in 1991 Frith wrote: 'The appearance of rapt attention and deep absorption in their own preoccupations may be partly responsible for the belief that autistic children have a rich inner imagination. However, there is little evidence to suggest that autistic children have the same sort of fantasy life as normally developing children'.[2] Asperger's reputation as an autism pioneer has foundered, justifiably, following the shocking revelations of his role in Nazi euthanasia programmes[3] Quoting him here is in no way to endorse the man, but rather to highlight some of the strikingly different interpretations of the autistic imagination that form the backdrop to this chapter.

In examining research into those constraints on imagination typically considered characteristic of autism, I draw upon my experience as a psychologist specialising in the autism field, as well as my educational film work as an Open University (OU) academic. My long-standing personal interest in the arts and humanities began to infuse my work on autism in the early 2000s, when I conducted studies of poetry written by writers on the autism spectrum.[4] I consolidated my arts base with an honours degree in humanities and Romance languages, completed in 2017. In a recent paper, I offer a poetic response to visual artworks by autistic artists.[5] My ongoing quest for the rapprochement of science and arts forms a backdrop to this chapter, as does my engagement with the evolving culture of autism research over a number of decades.

In what follows I employ a first person perspective rather than traditional scientific narrative, to revisit video footage in which, over more than 25 years, I have sought to portray key findings about autism. Drawing upon five vignettes or 'scenes', I explore epistemological, interpretive and ethical issues highlighted by working in a space where

scientific method is juxtaposed with the richer more individualistic interpretations that the video medium promotes. In the first three scenes, scientific tests of imaginative capacities are put under the spotlight, and reconsidered in terms of questions and insights suggested by the footage. In the fourth scene, I interview a young autistic man, who offers 'inside' insights into his own skills and difficulties with social and individual imagination. In the fifth, I consider the life story and work of an artistically gifted autistic child.

Autism, Case Studies and Psychological Science

The first descriptions of autism, by child psychiatrist Leo Kanner[6] and paediatrician Hans Asperger, took the form of case studies, that is, detailed observations of characteristics and behaviour, together with developmental history, of individual children in their clinical care. Asperger, notably, described some of his young child patients as having clever if eccentric ideas and interests- what by today's standards would surely count as imagination, albeit of an unusual kind. Yet both clinicians also described the narrow, restricted focus and adherence to repetitive behaviours and routines, which have been accepted as a hallmark of autism ever since. In DSM-5, the latest version of one of two internationally used diagnostic systems,[7] this symptom cluster forms one of two main diagnostic criteria, along with problems in social interaction and communication.

Case studies provide a wonderfully rich mine of information, but they are of their nature selective, reflecting what the author considers most significant, especially in establishing a new diagnostic profile, or matching observations to an existing one. Alongside the 1960s paradigm shift to cognitive psychology, which promoted experimental studies of the human mind, it was inevitable and important that the behaviour of autistic children would be more systematically explored.

Science also helped to challenge ill-founded theories and spurious claims of an autism 'cure'. For instance, Bruno Bettelheim's corrosive and stigmatising theory that autism was caused by emotionally cool and detached mothering was countered, in part, by convincing scientific evidence for genetic influences in autism.[8] Psychological and neuroscientific work has continued to play a key role in presenting a reliable and authoritative picture of autism.

Autism and imagination

Theories about how autistic people think evolved in the 1980s, with the experimental work of Simon Baron-Cohen and Uta Frith among others. Yet insights into imagination in autism remained fragmentary. Restricted and repetitive behaviours and interests (RRBIs), long recognized as diagnostic, implied that autistic individuals, with their strong dependence on

structure, sameness and routine, would struggle to generate novel and original ideas, and thus lack creativity. Kanner and Asperger had noted that their case study children showed little pretend play. For instance, instead of using a brick as a toy car, or a stick as a gun, they preferred to line up their toys, or sort them by colour or shape. Baron-Cohen reported concordant experimental findings, although diminished pretend play may be motivational rather than a fundamental 'deficit'.[9]

Paradoxically, a small minority of children on the autism spectrum show exceptional talents in fields typically associated with creativity, including visual art and music.[10] The fact that these gifts are frequently attributed to exceptional memory and attention to detail, conveniently side-steps any challenge they otherwise pose for the diagnostic criterion of imagination-related difficulties. I argue for a more complex and nuanced account of creativity which better accommodates this work.

Underlying the absence of a coherent picture of imaginative capacity in autism, lies a wider lack of theoretical consensus about imagination and its relationship to creativity, which has been addressed elsewhere.[11] For present purposes I will adopt a broad definition of imagination, as encompassing both social imagination, the capacity to imagine what other people are thinking and feeling, considered fundamental for reciprocal social interactions, and individual creativity, the capacity to generate novel, original ideas and outputs.

The autistic imagination in film: revisiting an archive

As an OU academic, I have had opportunities to devise and present audio-visual resources for undergraduate distance teaching courses. In my earlier ventures, some doubling as BBC general service broadcasts, my aim was to demonstrate the methodology and theoretical implications of experimental and other scientific work on autism and imagination. This aim characterized the first three of the five scenes discussed here.

My purpose now is not to question the important contribution of the scientific methodology and findings illustrated here. Yet in revisiting the footage with a more visual focus, I have observed nuances and considered issues that the experimental tasks were not designed to capture. I see cues from the children which might usefully have been pursued, and even missed opportunities to scaffold their responses to the tasks, but for the experimental design, and protocol which constrains an experimenter to adopt a consistent, neutral stance towards all participants. I have found myself questioning this studied neutrality, and its epistemological and ethical consequences. In the two final scenes, interviews recorded in 2017, I adopt a different lens.

Scene One: The Sybil Elgar School, London 1989

I am with an OU/BBC production unit, filming for an undergraduate psychology course.[12] The Sybil Elgar School has a special place in autism history. It was the first school for autistic children established in the 1960s by the National Autistic Society, at that time a pioneering group of parents seeking better services and support for their children with the then little known autism diagnosis. These parents have fulsome praise for all that Sybil Elgar, the charismatic head – teacher, achieved with their children.[13]

Our filming starts in the school playground. The broadcast commentary highlights that the children tend to play alone, and explains that they have 'a condition known as autism'. I recall that the producer insisted on a male commentary 'to suit the subject matter'. The rather portentous tones of my colleague, once an actor, bother me to this day.

We film inside the school too, children in their classrooms, artwork on the walls and a poignant interview with two parents describing their feelings on learning that their child was autistic. Then we set up to record what is, in its way, a historic sequence of educational film. I had invited psychologist Simon Baron-Cohen, then not long out of graduate school, to reprise experiments he had published in 1985, which became landmark studies of autism, and launched his own distinguished career.[14]

In a school classroom, we recreate and record experimental scenarios illustrating the step by step sequence through which Simon tested his big idea. Our participants are two autistic children- Sara and Andrew, both aged about 11 and pupils at the school, and a younger 'neurotypical control' child, Gabriel, aged about 4.

Mirror recognition and self

Simon first sits next to Sara, holds a mirror in front of them both, and asks Sara to identify each person in the mirror. He repeats the test with Andrew. Both children respond, naming themselves and Simon correctly. Simon then comments that contrary to a theory prevalent at the time, this result shows that autistic children do have some sense of self: 'At least at the lowest level of being able to appreciate that they are physical objects separate to other people.'12 Almost 30 years ago, this comment seemed broadly acceptable - a logical inference from the results. However, on revisiting the footage, I have found the observation dehumanising. While I doubt that Baron-Cohen himself would use such language nowadays, here is an example of experimental stance setting the researcher apart from participants in a cool relationship of expert interpreting 'subject matter'. This is not a question of unkindness: Simon cares deeply about autistic children, and has devoted his life to studying autism. But his communications with the children in this experiment follow a script, and his demeanour,

though courteous, is detached; almost, one might say, a mirror for the behaviour he is studying.

Yet with a different investigative stance, Simon could have asked Sara and Andrew to say more about the self they had recognized in the mirror, perhaps evoking interesting insights into the autistic sense of self, and each child's inner life. Whenever I look at this footage, I am struck by Sara's proud, smiling demeanour. The appearance of depth and something enigmatic in her expression suggest an inner life far from Simon's objectifying account. Andrew, by contrast, is a reserved and sad-looking looking child, but here too there is surely a story. Perhaps these children could have talked about themselves, and expressed their thoughts about the tests. According to the quote from Frith opening this chapter, little would come of such an exercise. Yet a number of autistic people, for instance Temple Grandin and Daniel Tammett, have written autobiographies documenting rich if unusual inner lives.[15]

Perceptual perspective-taking

The mock-up laboratory is now re-arranged. A toy telephone is placed on the table in front of the child, a toy frog on a table to one side, and a toy elephant to the other side. Simon sits opposite the child directing his gaze to each toy in turn and asks Sara and then Andrew what he, Simon, is looking at. The children respond correctly each time, from which Simon concludes that, in a 'purely perceptual sense', these children can take the perspective of another person. Visually, they can see the world from another person's point of view. There is no comment on the rather sophisticated visual processing required to work out where someone else is looking, to look there too and identify what they are looking at. Rather this result is framed as a comparatively unremarkable achievement compared with the challenge of the next test.

The Sally-Anne false belief task

There is now a final scene change. Simon sits at the table facing Andrew, and plays out a scenario with two small dolls, Sally and Anne, and some other props, describing each step as he goes. First he introduces and names the dolls and equips each doll with a small coloured 'box' (actually an inverted toy brick), placing a marble inside Sally's box. He now walks Sally 'out of the room', saying that she is going out to play. He then walks Anne over to Sally's box, and enacts her removing Sally's marble, and walking back to her own box to hide the marble. He brings Sally back 'into the room'. He now asks Andrew three seemingly simple questions, which form the core of the test:

Belief question: Where will Sally look for her marble? (Correct response: in Sally's box)
Memory question: Where was the marble at the beginning? (Correct response: in Sally's box)
Reality question: Where is the marble really? (Correct response: in Anne's box)
Insert Figure 4.1 about here with caption:
The Sally Anne false belief task. Some details differ from the filmed version, but essentials remain the same. (Image: The Open University)

Andrew follows the procedure closely with the rather impassive expression he has had throughout these recordings. He answers without hesitation, correctly pointing to Sally's box in answer to the memory question, and to Anne's box in answer to the reality question. But his confident response to the belief question is that Sally will look in Anne's box where the marble is now, not in her own box. Now it is Sara's turn, and as before she approaches the task smiling, head held high and, notably, returning Simon's gaze. But as for Andrew, her unhesitating response to the belief question is incorrect: Anne's box, not Sally's.
The last participant is Gabriel, the four-year-old 'control child'. As Simon explains, if much younger controls respond correctly, this rules out that the autistic children's difficulty with the task reflects general intellectual delay. Gabriel answers all three questions correctly and grins conspiratorially at Simon when responding to the belief question, as if he knows that this is a game in which Anne has cheekily deceived Sally and hidden her marble.

Why do the two older autistic children fail on the crucial belief question, while the younger neurotypical child passes? Simon attributes this to their inability to put themselves in another person's shoes, mentally speaking. Unable to take the mental perspective of another, they fail to understand that another person's belief about a situation may be different from their own - and in this case wrong. It is principally from the incorrect answers of children like Andrew and Sara in the Sally-Anne task, and performance in similar false-belief tasks, that the highly influential idea of a 'theory of mind deficit' in autism took off, stimulating a veritable industry of further psychological studies and embellishments to the theory over subsequent decades. In addition, the finding influenced the linguistic pragmatics approach known as Relevance Theory[16] and the newly evolving cognitive approaches to literature.

Claims about theory of mind problems in autism have nonetheless needed increasing qualification and revision[17] The validity and scope of false belief tasks as tests of theory of mind has been questioned.[18] Not all children with autism fail false belief tasks, and yet those who pass still have difficulty with social communication and interaction.[19] There has also been an increasing move to recognize enhanced cognitive skills, for instance exceptional

memory and attention to detail, in theoretical accounts. Accordingly, Baron-Cohen has reformulated his own theory as the 'Empathising-Systemising Model.'[20] This claims that autistic cognition combines skill in systemising, defined as an affinity for systematic, rule-bound domains such as mathematics and engineering, with a deficit in empathising, broadly a reworked theory of mind construct. In one formulation or another, the notion of a theory of mind problem has prevailed with professionals in the autism field, albeit with many qualifications.

There is no question that the children's incorrect answer to the belief question in the Sally-Anne task suggests an important gap in their social imagination, which may help to explain the difficulties of both autistic children and autistic adults in social communication, as well as a marked literality in their understanding and use of language. But once again, close analysis of the video footage raises some additional questions. Firstly, the scenario is a piece of make-believe - a sort of puppet show, with Simon as the puppeteer, and Sally and Anne as the two puppets. Yet despite autistic children's documented difficulties with pretend play, Andrew and Sara seem quite ready and able to engage with the pretence. Otherwise the question 'Where will Sally look for her marble?' would make no sense at all. Of course, it might be argued that it is precisely because the children's understanding of pretence, necessary only to process the belief question, is compromised, that they cannot answer this question correctly. But in replications of the experiment, with real people rather than dolls carrying out the actions, autistic children still answer the belief question incorrectly. In the present version of the task, the children's ability to attribute human agency to the dolls is side-lined in the interests of the theory of mind headline story.

The experimenter's script for the task includes not only describing the actions of the make-believe characters, but also feedback to the children. In keeping with the experimental protocol, to avoid biasing the results or 'giving the game away', Simon simply says 'good' or 'well done' to each participant after each stage of the task. So Andrew and Sara receive the same positive feedback on their incorrect response as on their correct response. The merit of this approach is that the children are not upset by being told that they have failed. Autistic children can be especially sensitive to failure. Yet a kind word pointing out the correct response might have opened up a fruitful opportunity to ask the children why they thought that Sally would look 'where the marble is now' rather than where she had left it. Moreover, the script requirement for the children to receive inaccurate feedback poses an ethical dilemma, since it deprives the children of an opportunity to learn from their mistakes.

Curiously, when giving feedback on the belief question Simon's tone seems just fractionally more positive and encouraging when addressing Gabriel. Undoubtedly a departure from the experimental script and most probably completely unconscious - human nature and experimental rigour vying for the territory.

Scene Two: Fawcett Primary School, Trumpington, Cambridge 2001

For this second teaching video, entitled *Just Imagine*,[21] imagination has had free rein. The skulls of different hominid species are filmed in the Cambridge Museum of Archaeology and Anthropology, then juxtaposed with palaeolithic tools and cave art to illustrate human imagination evolving across the millennia. Children are filmed playing make-believe in a school playground. A gifted young pianist, Javier Negrín, is filmed at the Royal Academy of Music collaborating with neuroscientists trialling neurofeedback to enhance emotional and expressive engagement in performance. The artist Issam Kourbaj describes how images of his Syrian childhood have inspired his sculptures made with found objects, and the neuroscientist and theatre director Daniel Nettle improvises with young performance arts students, also considering possible links between artistic temperament and mental disorder.

Now we are recreating experimental tasks testing the hypothesis that autistic cognition lacks such striking expressions of creativity. Fawcett Primary School is not a specialist autism school, but has a policy inclusive of children with special needs. The experimenter is Jamie Craig, whose PhD, supervised by Baron-Cohen, focused on evaluating creative imagination in autism. His published studies are among the few in the literature on this theme.[22] Our participants include an autistic pupil aged about eight, and younger neurotypical pupils as controls. Jamie explains that, unlike theory of mind and pretend play, which involve social imagination, the tasks we are filming test 'individual creativity' - what a child can imagine when not required to attribute intentions or take another person's point of view. As will emerge, however, this social vs. individual distinction is blurred. A child's reading of the social context and implications of the task may influence the creativity that is expressed.

The key task here is an adaptation of the Alternate Uses Creativity test,[23] in which participants are asked to generate as many as possible uses for an object such as a brick. Their creativity or 'divergent intelligence' is scored in terms of the number and originality of uses they suggest. For instance, using the brick as a door-stop might score less than incorporating it into a robot sculpture. In the adapted version, the child is shown a piece of white foam, triangular narrowing into a long thin strip. Jamie first asks the autistic child 'What could this shape be? What does it look like?' The boy looks bored and uninterested, but he tugs at the

foam and says ‘glass’, evidently seeing the triangle and its thin extension as the bowl and stem of a wineglass. ‘Good response’ says Jamie, and prompts the child for another suggestion. When he holds the foam upright with the triangle at the bottom, the boy says ‘foot’ and enacts the foot walking across the table. After that he runs out of ideas. Next Jamie presents the task to a neurotypical participant, a girl of about six. Her eyes light up and she smiles with pleasure. She turns the foam this way and that, modelling and describing her suggestions: extended, the foam is a snake, placed encircling her head, it is a hat, folded over it becomes a measuring rule, then a circle, a leaf and stem, a shoe and leg. Like Simon, Jamie keeps to the experimenter script, politely praising and recording each child’s responses. But, especially with the autistic child, he sounds uncomfortable, as if he would like to give more encouragement or cues. And of course his feedback phrase ‘well done’ is ambiguous.
The autistic child’s responses are undoubtedly limited in number and originality compared to the neurotypical child’s, a consistent finding in Craig’s studies. But in some ways this difference is less interesting than the children’s strikingly contrasting approaches to the task, apparent only thanks to the recording. The little girl engages enthusiastically: each idea is enacted with flair and flows seamlessly into the next. Notwithstanding Jamie’s view that the task evokes individual creativity, social imagination infuses her responses. She has read the intention of the experimenter’s instructions as an invitation to perform, and acts her part with the experimenter as her audience. Her creativity lies not just in the number and quality of her ideas, but in the richness - not scored - of the enactment. By contrast there is little social engagement and limited enactment in the autistic child’s responses.

My question, again, is whether a differently framed task might have offered learning opportunities, albeit compromising the experimental aim of showing autistic children’s limitations. For instance, many autistic people have areas of special interest, sometimes unusual in topic, and pursued with high levels of commitment and motivation.[24] If autistic children do not spontaneously see the alternate uses task as fun, perhaps imagination tests harnessing their special interests would evoke more enthusiastic engagement.[25] Koegel and Porter both report such benefits in interventions, for instance an autistic boy was encouraged to pretend through scenarios involving his interest in trains.[26] Notably, although not a fully-fledged performance, the boy in our video did enact a brief pretence, walking the imaginary foot across an imaginary floor. Thus another way to nurture such embryonic creativity might be through engagement with drama and fantasy, an effect demonstrated in the Imagining Autism project.[27]

Since Craig's intention was scientific hypothesis testing, these suggestions for practical interventions might seem misdirected. Yet the footage has also highlighted the theoretical question of whether Craig's findings suggest a fundamental creativity block or just low creative motivation.

Scene Three: Queensmill School, London 2009

Queensmill is a state-funded primary and secondary 'special school' for autistic children, with an exceptional track record. Working with an Italian freelance film-maker, I have permission to video regular activities throughout the school, as well as to recreate experimental tasks. Video clips will be used in my new OU course 'Understanding the Autism Spectrum' combining online and hard copy teaching resources.[28] Much as at Sybil Elgar, we film children at play, in classes and at lunchtime. New though, are the trampolines and gym equipped for sensory-motor stimulation. For years parents and schools had no doubt that heightened or lowered sensitivity to sensory stimuli affected how their children responded to the world. Yet only in 2013 was this symptom cluster included in the diagnostic criteria.

We are provided with a small room to film pupils participating in brief illustrations of cognitive tests for use in teaching. Clips for the new course will include another false belief task to complement the 1990 footage of Sally-Anne, together with some verbal and non-verbal tests from the WISC-IV (Weschler Intelligence Scale for Children).[29] As we have no experimenter, a Queensmill teachers agrees to play this role. She is instructed on the test procedures, and mostly sticks to the script, remaining neutral and avoiding giving the children hints. Yet with her encouragement and affection for the children, who are interacting with someone familiar, the atmosphere is palpably warmer.

The false belief task involves a Pringles canister with a lid. The teacher shows the canister to our first participant, a boy of around eight, and asks him what is inside. He answers 'crisps'. Then he is shown that the canister contains only an orange 'Pentel' pen, which drops out when the teacher opens and upturns the canister. The child picks it up and identifies it as a pen. Then the teacher encloses it in the canister again, and asks the child 'If Mary saw this, what would she think is inside?' (Mary is a teacher whom the child knows). The child's response 'a Pentel' complies with the prediction: he does not understand that unless Mary has witnessed the scenario she will have a false belief about the contents of the canister. At this point it seems that the teacher has misheard his response 'Pentel' as 'pencil' and she continues to refer to pencils, not Pentels in her follow-up questions to him

Procedurally our experimental demonstration is flawed by this pencil/Pentel confusion, but we cannot re-film it because the child now knows the denouement. Yet I am somehow comfortable with the unflustered way the boy keeps to his own 'Pentel' script. And when offered crisps as reward for his participation, in a disarmingly sweet gesture, he pushes them back to the teacher saying 'you have them'. Despite theory of mind difficulty according to the test, he is socially both graceful and generous.

From the other tests filmed at Queensmill, I will describe one further example of how rigorous procedure may constrain interpretation. This is the block design task, a non-verbal sub-test from the WISC-IV [30] The teacher sits opposite the boy participant. She makes geometrical designs using square blocks with surfaces either all red, all white or diagonally split red and white, and invites the child to copy the designs with more blocks.

On one 'trial' the teacher has formed the upward facing designs of four blocks into a red square with a superimposed white diamond. The child goes to great lengths to positions his blocks correctly, turning them over so that he has the right designs facing upwards. Working carefully and deftly, with a frown of concentration, he produces a perfect copy of the teacher's block design, except that the colours are transposed – red diamond on white square. The teacher asks him if the two designs are the same and he says 'yes' without hesitation. According to WISC scoring this would be an error, and yet it is an appropriate and even, one might say, creative variation of the test design, only apparent thanks to the video. Moreover, it suggests that the child is attending to the overall pattern, not its details, in contrast to the common claim that autistic children fixate on details.

Without praising this 'incorrect' response, the teacher moved to the next trial. A question to the child, not part of the protocol, might have shed interesting light on his thinking.

Images of autism through interview and art 2018

This year I am replacing our 'Understanding the Autism Spectrum' course, studied over nine years by more than 7000 students, with a new short online course.[31] Developments in the autism landscape, already ongoing in 2009, mean that conveying autism adequately is ever more challenging. The course will describe developments in autism science and therapeutic intervention, services for autistic people and so on. But I also need to convey to students the growing demand for pluralism and inclusivity in methods for understanding autism.[32] As

shown in scenes one to three, the visual medium highlights nuances of behaviour and questions of interpretation which experimental tasks are not designed to address. One route to a richer analysis is more video-based observational research, and this has indeed become more common. For instance, Maestro and colleagues' studies of parents' early home videos of their infants highlighted subtle but important differences in the focus of attention between infants subsequently diagnosed with autism and neurotypical control infants.[33] As for my teaching videos, these home recordings yielded unforeseen insights.

The episodes in scenes one to three also begged the question of what the participants themselves thought. Since it is commonplace, in 2018, for people with autism to speak for themselves, it is important for autism, as portrayed in the new course, to be informed 'from the inside' by autistic people's perspectives and experiences. Even less verbal children may express themselves powerfully through non-verbal means, their parents adding complementary insights derived from long-term knowledge and close bonds with their offspring.

So in 2018 I am enriching the course with video recorded in the previous eighteen months, together with visual art to convey a sense of individual lives. One such encounter is with a young autistic man, and the other with an exceptionally gifted autistic child and her parents. In brief selections from this material I now return to the themes of self, inner life and imagination.

Scene four: Walton Hall, The Open University, 2017

Alex has driven himself and his mentor from Surrey to our interview recording in Milton Keynes. There is a quiet composure about him, and he engages well with the interview[34], never appearing unwilling to answer my questions. He recounts that he has always excelled at science and maths, and is putting these skills to good use, studying pharmacy at university, while working part-time at a book-makers. He loves calculating betting odds and his flair for mathematics and computing is clearly well used. He tells us about his family, friendships and plans for the future.

There is so much that could be the story of a neurotypical boy growing up. But Alex also talks of being isolated and friendless at school, of his social difficulties and obsessions and of how he overcame quite extreme bullying.

I don't ask Alex whether he has participated in tests of theory of mind, empathy, systemising or creativity. His own self-insights offer a rich and nuanced picture that test scores might do little to enhance. Regarding social imagination, he talks of his difficulties in imagining other people's thoughts and feelings. Yet he recounts episodes of helping his

friends which speak of empathic generosity. He also states that he dislikes fiction because he does not understand the characters' intentions and cannot follow plots. Yet he has a strong sense of autobiography, self and identity, of which his autism is an integral part. Here, then, are expressions of a rich inner life, even if Alex's imagination is fired by scientific formulae and mathematical equations, not by fiction and fantasy.

Scene five: Northamptonshire, August 2016

I am with a producer and cameraman at the house of Iris Grace, aged seven, and her parents, Arabella and P. J. Iris Grace has few words, and for part of our visit she is out of the house with her father. In my interview with Arabella she talks at length about the early realisation that Iris was developing differently.[35] She would not settle at night, was so hyper-sensitive to textures that she was difficult to clothe and her language development was slow and limited. Arabella describes the difficult experience of Iris Grace's diagnosis, aged two, and the approach that she and P. J. evolved to provide security, stimulation and learning for her. Arabella made mugs of watery paint to encourage Iris Grace to express herself and communicate, for instance by choosing colours and asking for more paint. By the age of three, Iris Grace displayed unique and special gifts, the evidence of which is all around us as we talk. She mixes her own paint colours and often drops or flicks the paint onto paper from above, with a technique almost like Jackson Pollock's. She selects small and large brushes or rollers and sponges to achieve different effects:
https://irisgracepainting.com/paintings/

The exceptional quality of Iris Grace's artwork, which is sold all over the world, evokes so-called 'savant talent', defined as an exceptional talent in the context of profound disabilities.[36] Savant autistic art is often described as the product of exceptional memory and meticulous attention to detail reflected in accurate representation of real scenes. This proposal, attributing autistic art to quirks of neuropsychological functioning,[37] conveniently avoids reconciling evidence of creativity with a diagnostic profile that has imagination deficit as a criterion. Although some autistic artwork does involve memory and replication, many examples transcend a single reducible genre. Iris Grace's unusual brushwork bears comparison to abstract expressionism and her paintings have qualities of colour, light and spontaneity reminiscent of impressionism. Yet her work is no pastiche: each painting has its own strongly coherent abstract patterning, a variation on a unified and distinctive style.
Iris Grace might be unable to participate in theory of mind or creativity tests. Yet it is surely plausible to see her work as the expression of a rich inner imagination.

Conclusions

The earlier scenes in my archive of video teaching material induced me to articulate a certain ambivalence about classic scientific approaches to 'understanding' autism. I am a cognitive psychologist by training. I appreciate the role of experimentation and other quantitative work in researching autism, and have employed these methods in my own work. Scientific methodology plays the important role of identifying behaviours and traits which autistic people tend to share in common, and of testing explanations against evidence. Rigorous testing is necessary, above all, in trials of new therapeutic interventions. Yet, as I have shown, experimental tasks constrain what questions are asked, and what evidence is considered relevant to the answers. The phenomena of interest are defined by the task, and the researcher's stance. Further information is lost when reports of these studies are published. Traces of the original observations are typically confined to words, numerical data and the odd figure, and individual participant behaviour is not reflected in the mean scores and statistical analyses which constitute the data. By contrast, video preserves traces which give access to richer fields of enquiry.

With some exceptions, for instance spatial ability tests, on which autistic people perform especially well, experimental tasks have predominantly focused on evaluating deficits. Even Baron-Cohen's systemising quotient, which measures enhanced affinity for fields governed by systems and rules, seems, paradoxically, to imply limitation. At several points in scenes one to three, instances of skilful or imaginative responding fell outside what the test was measuring. More interactive engagement with the participants might have evoked insights which the experimental protocol precluded. No wonder that Pellicano has advocated an integrated role for autistic people in both formulating research questions and interpreting evidence.**Error! Bookmark not defined.**

In my teaching approach for 2018, I feature individuals with scientific and artistic talents as one of several routes to a richer appraisal of autistic capabilities. Of course, most individuals on the autism spectrum do not have the exceptional flair portrayed here, so in my teaching I am also careful to offer widely contrasting life stories. Yet demonstrating that rich inner imagination is *possible* in autism opens the dialogue about how it might be nurtured. One promising approach unfolds weekly at the house of Iris Grace herself. At the 'Little Explorer's Club', Iris Grace is joined by other children for activities designed to both harness and stimulate their imagination. Group leaders build learning around children's special interests and skills and through playful exploration of the environment.

The ‘method’ of understanding autism through personal stories is entirely contrary to the careful control and statistical analysis of experiments and other psychological tests. Part of the power of experimental studies lies in minimising individual differences in order to convey a representative picture. Individual stories cannot be representative of all autistic experience, but they are authentic and informative in a different way. Notably they emphasize the wide spectrum of variation which autism encompasses. They also empower individuals to speak, and enable expressions of creativity to be recognized and celebrated.

[1] Hans Asperger translated by Uta Frith (ed.), *Autism and Asperger Syndrome*, (Cambridge: Cambridge University Press, 1991) 70.

[2] Frith, Ibid., 78n.

[3] Herwig Czech, H (2018) 'Hans Asperger, National Socialism and "race hygiene" in Nazi-era Vienna' *Molecular Autism* 9 (2018) 29

[4] See Ilona Roth, 'Autism and the Imaginative Mind', in *Imaginative Minds: Proceedings of the British Academy*, 147 ed. Ilona Roth (Oxford; Oxford University Press, 2007); Roth, 'Imagination and the Awareness of Self in Autistic Spectrum Poets', in *Autism and Representation*, ed. Mark Osteen (New York: Routledge, 2008).

[5] Ilona Roth, 'Autism, Creativity and Aesthetics', *Qualitative Research in Psychology* (2018) DOI: 10.1080/14780887.2018.1442763

[6] Leo Kanner, 'Autistic disturbances of affective contact', *Nervous Child*, 2 (1943), 217–50.

[7] American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (Washington, D.C: American Psychiatric Association, 2013).

[8] Bruno Bettelheim, *The Empty Fortress: Infantile Autism and the Birth of Self* (New York, Free Press, 1967); Susan Folstein and Michael Rutter, 'Infantile autism: a genetic study of 21 twin pairs', *Journal of Child Psychology and Child Psychiatry*, 18 (1978), 297-321.

[9] Simon Baron-Cohen, 'Autism and symbolic play', *British Journal of Developmental Psychology*, 5 (1978), 139–48; Christopher Jarrold, 'A review of research into pretend play in autism', *Autism*, 7 (2003), 379-90.

[10] Francesca Happé and Uta Frith, ' The beautiful otherness of the autistic mind' in *Autism and Talent* *Philos Trans R Soc Lond B Biol Sci. 364* ed. Francesca Happe and Uta Frith (Oxford, Oxford University Press, 2010);

[11] Ilona Roth, 'Imaginative Minds: Concepts, Controversies and Themes', in *Imaginative Minds*: *Proceedings of the British Academy 147* ed. Ilona Roth (Oxford; Oxford University Press, 2007);

[12] The Open University, *Autism*, broadcast programme for DSE202 'Introduction to Psychology' (Open University/BBC Television, 1990).

[13] Simon Baron-Cohen, *The Autism Puzzle* (BBC Television, 2003).

[14] Simon Baron-Cohen, Alan Leslie and Uta Frith, 'Does the autistic child have a "theory of mind"?' *Cognition*, 21 (1985), 37–46.

[15] Temple Grandin and Margaret M. Scariano, *Emergence: Labeled Autistic* (Novato, CA: Arena Press, 1986); Daniel Tammet, *Born on a Blue Day: Inside the Extraordinary Mind of an Autistic Savant* (New York: Free Press, 2006).

[16] Dan Sperber and Deirdre Wilson, *Relevance: Communication and Cognition*, 2nd edition (Oxford: Blackwell, 1995).

[17] Ilona Roth, with Chris Barson, Rosa Hoekstra, Greg Pasco and Terry Whatson, *The Autism Spectrum in the 21st Century: Exploring Psychology, Biology and Practice* (London, Jessica Kingsley, 2010).

[18] Paul Bloom and Tim P. German, 'Two reasons to abandon the false-belief task as a test of theory of mind', *Cognition*, 77 (2000), B25-B31; Sara M. Schaafsma, Donald W. Pfaff, Bob Spunt and Ralph Adolphs, 'Deconstructing and Reconstructing Theory of Mind, *Trends in Cognitive Science*, 19 (2015), 65-72.

[19] Claire Hughes and Sue Leekam, 'What are the Links Between Theory of Mind and Social Relations? Review, Reflections and New Directions for Studies of Typical and Atypical Development', *Social Development*, 13 (2004), 590-619.

[20] Simon Baron-Cohen, 'Autism: the empathising-systemising (E-S) theory', *Annals of the New York Academy of Science*, 1156 (2009), 68–80.

[21] The Open University, *Just Imagine*, broadcast programme for DSE212 'Introduction to Psychology', (Open University/BBC Television, 2001).

[22] Jaime Craig and Simon Baron-Cohen, 'Creativity and imagination in autism and Asperger syndrome', *Journal of Autism and Developmental Disorders*, 29 (1999), 319–26.

[23] J. P. Guilford, *The Nature of Human Intelligence* (New York, McGraw-Hill, 1967).

[24] Ilona Roth, M. T. Roelfsema and Rosa Hoekstra, 'Measuring Commitment to Special Interests in Adults on the Autism Spectrum', paper presented at the 2015 International Meeting for Autism Research, Salt Lake City: https://insar.confex.com/imfar/2015/webprogram/Paper20342.html (last accessed April 3rd 2018); Rachel Grove, Ilona Roth and Rosa Hoekstra, 'The motivation for special interests in individuals with autism and controls: Development and validation of the special interest motivation scale', *Autism Research*, 9, no. 6 (2016), 677–688.

[25] Robert Koegel, Sunny Kim, Lynn Koegel and Ben Shwartzman, (2013) 'Improving Socialization for High School Students with ASD by Using Their Preferred Interests', *Journal of Autism and Developmental Disorders,* 43 (2016), 2121- 2134.

[26] Noriko Porter, 'Promotion of Pretend Play for Children with High-Functioning Autism Through the Use of Circumscribed Interests' *Early Childhood Education Journal*, 40 (2012), 161–7.

[27] Julie Beadle-Brown et al, 'Imagining Autism: Feasibility of a drama-based intervention on the social, communicative and imaginative behaviour of children with autism', *Autism*, 1 (2017).

[28] The Open University, 'Psychological Tests', video clips for SK124 'Understanding the Autism Spectrum' (Open University/Pahni Productions, 2009).

[29] David Wechsler, Wechsler Intelligence Scale for Children ® - Fourth UK Edition (WISC-IV UK, 2014).

[30] Wechsler, IBID

[31] http://www.open.edu/openlearn/science-maths-technology/coming-soon-understanding-autism.

[32] Elizabeth Pellicano and Marc Stears, 'Bridging autism, science and society: moving towards an ethically-informed approach to autism research', *Autism Research*, 4 (2011), 271-82.

[33] Sandra Maestro and Filippo Muratori, 'How Young Children With Autism Treat Objects and People: Some Insights into Autism in Infancy from Research on Home Movies', in *Autism: An Integrated View from Neurocognitive, Clinical, and Intervention Research*, ed. Evelyn McGregor, Maria Núñez, Katie Cebula and Carlos Gómez (Oxford: Blackwell, 2008).

[34] The Open University (2018b) Alex Pritchard Martin in conversation with Ilona Roth for 'Understanding Autism' http://www.open.edu/openlearn/science-maths-technology/coming-soon-understanding-autism.

[35] The Open University (2018a) Arabella Carter-Johnson in conversation with Ilona Roth for 'Understanding Autism' http://www.open.edu/openlearn/science-maths-technology/coming-soon-understanding-autism.

[36] Darold A. Treffert, 'The savant syndrome: an extraordinary condition. A synopsis: past, present and future', *Philosophical Transactions of the Royal Biological Society*, 364 (2009), 1351–57.

[37] Marion Quirici, 'Geniuses without Imagination: Discourses of Autism, Ability and Achievement', *Journal of Literary & Cultural Disability Studies*, 9 (2015), 71-88.