REVIEW

Unexpected development of artistic talents

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The development of exceptional and unexpected artistic skills at any age must be a matter of curiosity. This can occur among young children with severe learning difficulties, especially if they are autistic. Some examples of these so called idiot-savants are given, and the way in which their brains may function. It is also true that elderly people who suffer from frontotemporal dementia can find that they are able to express themselves in remarkable art forms. This can occur in other types of dementia, but then more often it is the changes that result in the paintings of established artists, for example in the paintings of de Kooning. Possible links between these two phenomenon are discussed, and it is suggested that in both instances it may be that if the brain is relieved of a number of functions it can concentrate on the remaining ones. Ways in which this may operate in both groups are reviewed.

The acquisition of artistic skills can develop under certain circumstances in both young children and among elderly people. This may seem to occur for no apparent reason, but the causes may well be related.¹ Little is known about the incidence of these phenomenon, but it has been estimated that in the USA 0.06% of the population of residential homes who have severe learning difficulties possessed a special or outstanding skill.²

UNEXPECTED ARTISTIC TALENTS IN CHILDREN

It is well known that children with severe learning difficulties can sometimes show exceptional knowledge in one particular area, the so called idiot-savant, which usually occurs among male children.³ The skill identified in an individual child will be determined presumably by genetic influences. For example, studying a group of autistic patients, Pring *et al*⁴ found that they were able to construct a pattern from segmental components as well as those of higher intelligence, and that children with an aptitude for drawing, whether they were autistic or not, had a facility for seeing wholes in terms of their parts rather than as unified "gestalts". Perhaps this is not surprising if it is accepted that the human organism is motivated to achieve its capabilities through constant practice and the use of skilled memory and eidetic imagery; and that this is responsible for the development of special talents.⁵ Although the latter ability to hold an image in "the mind's eye" has been thought to be related to brain damage, there are

doubts about this.⁶ The visual and graphic abilities of the disabled children seem to be independent of their verbal intelligence level, although this determines matching and recognition skills;⁷ and the results of other tests done by O'Connor and Hermelin⁸ confirm a superior image memory and a ready access to a "picture lexicon"; and the existence of a superior graphically directed motor programme must also be assumed. It certainly seems to be true that so called idiot-savants who are visual artists more often express themselves through drawing and sculpture than in painting, and that the idiot-savants' graphic skills rest on their superior output ability rather than on a particular competent perceptual analysis.⁹ While accuracy of drawing may be related to intelligence, the artistic quality of the product is not,¹⁰ and affected people can abstract to some degree. Their talent appears at an early age, and after that practice may have a limited part to play. They do introduce rules, and suit their actions to these, so that these are not just automatic but develop according to perceived plans.¹¹

These rules must be based on the child's ability to learn and remember, and these last two references do discuss the part that visual memory and imagery play in the development of these exceptional artistic skills.

It is difficult to compare the children who have been reported in the literature, except that their development was delayed and their behaviour was of an autistic nature. However, one of the best examples of exceptional artistic talent in such a young child is the story of the early life of Nadia, and her abilities have been exceptionally well investigated.¹² She was an autistic child, who between the ages of 3 years 6 months and 6 years 6 months, showed amazing artistic ability although having a severe learning disability and little use of language. She showed this outstanding skill in her drawing of horses, other animals, and latterly humans. Nadia started at a school for autistic children at the age of 7 years 6 months where her language function began to improve. At 9 years old she could utter simple sentences, but now seldom drew spontaneously. Her drawings of people were recognisable, which is still unusual but no longer an extraordinary talent at this age.

Comparing the complexity of Nadia's drawings with the simpler ones of normal children of the same age the difference may be attributable to the fact that autistic artists make no assumptions about what is to be seen in their environment. They have not formed mental representations of what is significant, and consequently perceive all details as equally important. Also they do not impose visual or linguistic schema, so essential

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for quickly forming concepts when the information provided is incomplete.¹³

UNEXPECTED ARTISTIC TALENTS IN ELDERLY PEOPLE

Miller *et al*¹⁴ have described the clinical, neuropsychological, and artistic skills of patients with frontotemporal dementia. They can show a burst of visual creativity as, although they are dysphasic, the posterior parietotemporal regions are spared, and they are more likely to be successful than patients with Alzheimer disease in which the parietal lobes are affected. Also impairment of frontal lobe functions may remove certain inhibitory mechanisms from the posterior visual cortex with heightened visual sensitivity,¹⁵ but language and social skills are devastated. Investigations, using single photon emission computed tomography and positron emission tomography, have shown that it is when the right frontotemporal regions are involved that behaviour and social disorders occur that may be absent when the lesion is on the left side,^{16, 17} and this will undoubtedly influence the quality of the artist's work.¹⁸ Miller *et al*¹⁹ have confirmed that in the event of left sided frontotemporal dementia language function is likely to be severely impaired, but that artistic and musical skills can be much improved. The converse to this may be the observation that Nadia's drawing ability lessened as her language function improved.

The visuospatial deficits in Alzheimer disease can cause less precision and attention to spatial relationships in tasks carried out by those suffering from this condition, although sometimes initially motivation, memory and organisation are affected²⁰; and this will obviously change the work of established artists. Miller and Hou²¹ have studied the areas of the brain contributing to the acquisition of artistic skills. Functions localised in the occipital and temporal cortices preserve visual scenes absorbed over a lifetime, and represent the creative soil for many artists, being reproduced in the form of paintings, drawings, and sculptures, while those in the parietal lobes provide visual precision essential for the craft of the artist. Lesions in any of these areas, especially in the parietal lobes, will have severe effects; but other regions of the brain will also play their part, for example many areas of the frontal lobes carry out functions contributing to visual creativity. These will include the planning and organisation of the artist's work, the discipline needed to learn it, and the drive and emotion to complete it. The non-dominant hemisphere, usually the right, controls most of the activities needed for the visual arts, but the left dominant hemisphere, with its essential role in language function, will be used in the form of symbolic and linguistic concepts; as so much of art does have a message to convey.

It was a different scenario in the case of the patient reported by Mell *et al*²² as she was an accomplished artist who developed a progressive aphasia syndrome associated with frontotemporal dementia. As her disease progressed, language and executive skills declined, but her paintings became freer and more original. This history again suggests that, in the context of this type of dementia, language is not required for, and may even inhibit, certain types of visual creativity. It was as if, released from the constraints of her formal training, her paintings began to reflect a more emotional and impressionistic style with less detail. The effects of a degenerative disease, especially involving the right cerebral hemisphere, has been confirmed by Kleiner-Fisman.²³ This led to disinhibition, perseveration, and left hemispatial neglect, which were readily discernable in the artist's work. The same can be said about the paintings of de Kooning. He suffered from the symptoms of dementia from which he largely recovered. The causes of this are uncertain, especially the role of depression. His art had changed from the concrete

to the abstract, and by the time his memory began to fail he was already recognised as a major exponent of abstract expressionism. Then he stopped painting for a period, and when he started again his work had again changed. It became exuberant, carefree, and full of life, and paintings were finished in weeks instead of months.²⁴

DISCUSSION

In both the fields of paediatrics and geriatrics the examples of those people who have shown notable and unexpected skills in drawing and painting have shown evidence of a failures of development, or of acquired damage, of the brain; and this is a possible explanation for the phenomenon, and for the links between the two groups.⁵ The explanation may be, that in both instances, if the brain is relieved of a number of functions it can concentrate on the remaining ones, and in the case of Nadia¹² the converse is shown when the development of language was linked to the loss of drawing skills. Gombrich²⁵ suggests that children draw what they know not what they see. It may be that Nadia with her very delayed language development and severe learning disorders draw what she saw uncontaminated by language and intellect. Her internal visual imagery would no doubt be further developed by her drawings, but with the advent of language this was supplanted, as language is a way of describing reality.

If the exceptional skills of these artists, especially the children, cannot be convincingly explained by training or by the possession of an outstanding memory, or apparently by detectable genetic influences, what are the cognitive processes involved? O'Connor and Hermelin²⁶ found that calendrical calculators can use the rules and regularities in the calendar, and that those with special musical skills use the rules and structures that govern traditional tonal music, which helped them to remember music composed in accordance with these rules, but atonal music proved much more difficult to perform. Then, in the case of unexpected artistic skills, as has been stated, the child is able to extract the essential qualities of common objects in the visual world and memorise their essential features. So all these children use strategies that are founded on the deduction and application of rules governing the material on which their special ability operates; and they may also generate new examples of such rule based structures.²⁶

It is interesting to speculate on the reasons for the loss and gain of artistic skills. Is it a question of the brain only being able to cope with a certain number of skills at one time? This seems unlikely in view of the brain's adaptability. If a part of the brain suffers damage there may well be compensatory development of intact areas. So in frontotemporal dementia, for example, degeneration in these areas may be accompanied by an increase in the functions of the more posterior regions subserving visuospatial functions, resulting in an enhancement of artistic abilities. Kapur²⁷ uses the term "paradoxical functional facilitation". The result of a lesion in the brain is not just the loss of a function mediated by this region, but the efforts of the rest of the brain to re-establish maximal potential. In normal subjects inhibitory and excitatory mechanisms seem to act in a complex harmony, but the role of inhibitory processes, for instance, may be critical in mediating the restoration of certain functions. In the context of severe learning disorders most intellectual high level controls and functions are excluded, thus increasing the capabilities for some simple and faster processing.²⁸

CONCLUSIONS

The links suggested in this paper are purely causal and unrelated to the finding that late onset dementia is associated with low intelligence test scores in childhood;

and the possibility that there may be genes that contribute to intelligence and protect the brain against degeneration in old age.²⁹

It would certainly be wrong to treat any exceptional talent as if it was a disorder of some kind, but management can be supportive with a warm appreciation of the talent, and with due assessment and treatment of the needs of any patient, young and old, who suffers from an impaired intellect.^{30 31} In the case of children the identification of a special skill can influence the kind of special education that will be of most benefit, and can be exploited when decisions are being made for training in adult life.³² It seems probable that techniques such as magnetic resonance imaging,³³ single photon emission computed tomography, and positron emission tomography,³⁴ will throw more light on the causes of the conditions and can already differentiate between different types of dementia in adults. It would be of particular interest to study the two groups, children and adults, with these techniques to see if comparisons can be made. Also it may be asked what is the definition of artistic ability. Is it possible to do this, or is it in the eye of the beholder? After discussing this at length a reluctant conclusion was reached that “what is art” cannot be defined, nor should it be, as it is too restrictive.

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