Editorial

Psychotic symptoms in the general population – an evolutionary perspective

Ian Kelleher, Jack A. Jenner and Mary Cannon

Summary
Our ideas about the intrinsically pathological nature of hallucinations and delusions are being challenged by findings from epidemiology, neuroimaging and clinical research. Population-based studies using both self-report and interview surveys show that the prevalence of psychotic symptoms is far greater than had been previously considered, prompting us to re-evaluate these psychotic symptoms and their meaning in an evolutionary context. This non-clinical phenotype may hold the key to understanding the persistence of psychosis in the population. From a neuroscientific point of view, detailed investigation of the non-clinical psychosis phenotype should provide novel leads for research into the aetiology, nosology and treatment of psychosis.

Declaration of interest
J.A.J. is director of Jenner Consultants, Haren, The Netherlands, which provides advice and training on psychological treatment of psychosis.

Evolutionary theories of psychosis
Psychosis is highly heritable and exerts strong negative fitness effects. Despite this apparent disadvantage, schizophrenia maintains a relatively stable prevalence worldwide. Several theories drawing on the Darwinian paradigm of selective advantage have been formulated to explain the persistence of psychosis in the human population. Crow’s ‘speciation’ hypothesis argues that psychosis is the ‘price that Homo sapiens pays’ for development of language. Burns proposed that schizophrenia is a ‘costly by-product’ in the evolution of complex social cognition and Nesse developed this idea further in terms of ‘cliff-edge’ fitness, whereby certain traits may increase fitness up to a critical threshold, but beyond this point, fitness falls precipitously. For instance, strong tendencies to use metarepresentation and theory of mind can increase the ability to predict other people’s behaviours and discern their intentions, but, as Nesse explains, ‘it is only one step further, over the cliff’s edge of psychotic cognition . . . to finding secret meanings and evidence for conspiracies in other people’s most casual gesture’. Recently, Dodgson & Gordon have proposed that certain types of hallucinations could be viewed as evolutionary by-products of a cognitive system designed to detect threat since, from a survival perspective, it is much worse to fail to recognise a threat such as the sound of an approaching predator than to mistakenly believe that a predator is approaching when it is not. Evolution may therefore favour a selective skew towards propagation of genes that promote false positives over false negatives, thus resulting in ‘hypervigilance hallucinations’ in the population. In social or pack animals, such as humans, hypervigilance is not necessary for every member, but the presence of this trait in at least some members stands to benefit the entire group. Such a trade-off allows the persistence of advantageous traits even in the presence of increased risk of disorder.

Implications for genetic studies
The possibility that vulnerability to psychosis may be a by-product of ‘normal’ human brain evolution, may offer an explanation for
the difficulty in locating a genetic ‘point of rarity’ between individuals with schizophrenia and controls.\textsuperscript{15,16} We would also suggest that the limited success in findings in schizophrenia to date may be a result of shared genetic variation between the clinical (disease) phenotype and the non-clinical (symptom) phenotype. Genetic research thus far has used the simple dichotomy of people with psychotic disorder compared with the general population. However, the relatively high prevalence of the non-clinical psychosis phenotype in the general population may have masked genes of importance. Rather than searching for genetic variation only between individuals with psychotic disorders and the rest of the population (which contains, as we have discussed, significant numbers of individuals with the non-clinical phenotype), it may prove more fruitful to investigate genetic variation among individuals with the non-clinical phenotype in the general population (plus or minus individuals with the disease phenotype) compared with the individuals without such symptoms. Furthermore, an understanding of these genes and their functions may hold the key to explaining the persistence of psychosis in the population. It is possible that there are evolutionary advantages associated with genes that contribute to the non-clinical phenotype but which, in a fitness trade-off, also increase the risk for psychotic disorder. If, for example, as suggested by cliff-edge fitness theory,\textsuperscript{10} psychosis results from the development of certain useful traits beyond an optimal peak, we might find that people with the non-clinical psychosis phenotype demonstrate advantageous traits compared with the rest of the population in, for example, certain language, cognitive or metacognitive skills. Detailed investigation of the non-clinical psychosis phenotype might, therefore, allow us to uncover a Darwinian explanation for the persistence of psychosis genes in the general population that has not been possible by looking only at psychotic disorder.

Implications for diagnosis and treatment

The current diagnostic nosological systems are undergoing revision. Evolutionary theories lend support for the idea of a continuum approach to the diagnosis of psychosis\textsuperscript{13} and provide some clues as to why the traditional Kraepelinian or categorical approaches to psychosis are beginning to prove problematic.\textsuperscript{16} Breaking down the categorical barriers may also help reduce the stigma associated with psychosis, which remains one of the greatest obstacles standing in the way of recovery and rehabilitation. Taking an evolutionary perspective may also lead to changes in how we think about treatment – for instance the idea of schizophrenia as a disorder of social brain development points to the importance of family therapy and social skills training. Some therapies such as hallucination-focused integrative therapy already incorporate such elements alongside more traditional cognitive–behavioural therapy approaches.\textsuperscript{17} The idea of hallucinations as a `hypervigilance’ reaction also suggests the value of engaging directly with the content of the symptoms in psychosis and acknowledging the fact that some individuals may wish to preserve positive or ‘useful’ voices that they feel support or help them.\textsuperscript{17}

Broadening the evolutionary perspective

An evolutionary approach may also prove fruitful in other areas of psychiatry. Higher than expected prevalences have been reported for depression and anxiety. Prospective studies are showing that up to half (and perhaps even a majority) of the population can expect one or more episodes of depression over their lifetime.\textsuperscript{18,19} Taking an evolutionary perspective, one could speculate that the tendency for unhappiness and dissatisfaction is intrinsic to the human species (man as the `unhappy ape’) and this is one of the features that has been a contributory factor in the success of our species, driving \textit{Homo sapiens} onwards, even to the surface of the moon, in search of new terrain and challenges. Applying evolutionary theories to depression may also lead to new approaches to treatment and novel aetiological theories.\textsuperscript{10}

Conclusion

Charles Darwin’s anniversary year has ended but that does not mean we should put the theory of evolution back on the shelf and dust it off only when the next anniversary comes round. As Theodosius Dobzhansky famously stated, ‘Nothing in biology makes sense except in the light of evolution’.\textsuperscript{20} From a neuroscientific point of view, detailed investigation of the non-clinical psychosis phenotype should provide novel leads for research into the aetiology, nosology and treatment of psychosis and other mental disorders.

Funding

M.C. is supported by a Health Research Board (Ireland) Clinician Scientist Award and a NARSAD Independent Investigator Award and is a member of the European Network of National Schizophrenia Networks Studying Gene-Environment Interactions (EU-GEI) funded by EU-FP7.

Acknowledgements

We thank Alison Yung for suggesting the quotation from Human Traces by Sebastian Faulks.

References

Bipolar (2008)
Alice Hatter (b. 1979)

Alice Hatter decided to leave her medical studies after developing a bipolar illness. This decision was not made because she felt that her illness prevented her from continuing or coping with her studies, but because her outlook on life changed afterwards. Being able to express herself and her experiences through the medium of art has been a great help to her while trying to combat her illness. She had always enjoyed the arts when growing up and hopes to develop this area of her life further. Alice’s interest lies in the link between creativity and mental illness, in particular affective disorders, and she hopes in the future to have the opportunity to look more closely at this area of mental health.

This picture represents Alice’s idea and experience of a bipolar illness. One side is blue and the other is pink, representing depression and mania, respectively. The colours get deeper as you go to the centre where the core appears black – but it is actually black on the depression side and very dark purple on the mania side. The centre is open to interpretation – the red can either represent ‘rage’ or ‘anger’ which is at the centre of the illness but gets buried under the other emotions, or it could be the rawness of the person when the ‘end point’ of mania or depression is reached; it can be like falling into the depths and being exposed and naked. Around the top and bottom edges of the picture the colours merge into one another to give a turquoise colour eventually which Alice feels represents the ‘normal’ mood state, but the fact that all the colours merge like a spectrum is still preserved as, like the illness, it is a continuum rather than specific discrete entities.

Edited by Allan Beveridge.
Psychotic symptoms in the general population – an evolutionary perspective
Ian Kelleher, Jack A. Jenner and Mary Cannon
Access the most recent version at DOI: 10.1192/bjp.bp.109.076018

References
This article cites 16 articles, 6 of which you can access for free at:
http://bjp.rcpsych.org/content/197/3/167#BIBL

Reprints/permissions
To obtain reprints or permission to reproduce material from this paper, please write to permissions@rcpsych.ac.uk

You can respond to this article at
/letters/submit/bjprcpsych;197/3/167

Downloaded from
http://bjp.rcpsych.org/ on October 21, 2017
Published by The Royal College of Psychiatrists