The role of white noise speech illusions in indicating risk for psychotic disorders

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Chapter 9

Valorisation
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Psychotic disorders remain among the most disabling mental disorders. They are often associated with persistent health and social burdens, not only for patients but also for families and caregivers. The costs of psychotic disorders are substantial. In Europe in 2010, the cost was estimated at €94 billion (1), including the direct costs of treatment and the indirect costs (e.g., long-term unemployment). The aetiology of the disease is largely unknown, and there is still a considerable delay to diagnosis. The delay is partly the result of the symptoms of psychotic disorders, which can be elusive and non-specific in the early stages (2). Psychotic experiences below the threshold of clinical severity – in the form of attenuated reality distortions, including perceptual abnormalities and persecutory ideas – can also be found in the general population. Psychotic experiences may become clinically relevant after reaching a threshold of severity. There is interest in gaining a clearer understanding of the phenomenology, neurobiology and course of subthreshold psychotic experiences, as this may help to identify earlier the onset of clinically relevant symptoms.

Recently, an experimental paradigm was developed to elicit experiences resembling psychotic phenomena in the form of white noise speech illusions. As psychosis is thought to represent a continuum of human experience that is also present, in attenuated form, in healthy individuals in the general population, the task can be used not only for patients but also for healthy controls. A simple and inexpensive experimental psychosis task for use in both clinical and non-clinical populations is of great practical interest, as it would allow for easy and large-scale investigation of risk and mechanisms underlying psychotic disorders. Previous work has shown that experimentally induced speech illusions clearly distinguish patients from healthy controls, which is promising.

In the present study, the white noise paradigm was used to examine to what degree speech illusions reflect individual differences in risk of psychotic disorders beyond
case–control differences, for example by comparing healthy controls with individuals at higher-than-average genetic risk, such as the healthy siblings of patients. We additionally investigated to what degree environmental and familial risk factors associated with psychotic disorders may predict white noise-induced speech illusions. Finally, we attempted to identify the cortical mechanisms of speech illusions using EEG.

We found that, although speech illusions in the general population cross-sectionally are characterised by reduced alpha activity during a noise fragment, baseline EEG oscillatory activity did not show any association with the expression of speech illusions at the follow-up of the same sample. The practical significance of this is that the cross-sectional, ‘diagnostic’ association of EEG activity and our experimental psychosis task has no predictive value, which limits the practical significance of the cross-sectional finding.

In addition, the analyses showed that there were no associations between white noise speech illusions and self-reported psychotic experiences in the general population, nor were there associations between speech illusions and known risk factors for psychotic disorders in the general population. From a practical perspective, this is disappointing, because it suggests that experimentally induced speech illusions cannot serve as a marker of subthreshold psychosis. There was some evidence, however, that speech illusions could serve as a marker in the healthy siblings of patients with psychotic disorders, but only if they already showed high levels of trait-like risks. This again limits the practical use of speech illusions as a marker in this group, as the group already has high levels of trait-like markers.

To acquire further practical significance, we recommend investigating cortical activity of speech illusions in the trait-rich subgroup of siblings and patients. This may not only help in determining the (biological) basis of psychosis, but may also provide insight
into the mechanisms differentiating between healthy individuals with speech illusions who do and those who do not develop psychotic disorders.
References