Methods: Forty-nine individuals with SocAhn and 33 well-matched controls underwent a fMRI session, during which they were instructed to envision positive or neutral future events in next year in response to the cue words. Each trial was divided into construction phase and elaboration phase. After scanning, participants received an interview to confirm they were able to project themselves into future and rated their experience in future events.

Results: Three contrasts were identified to examine the main effect of emotion [Positive - Neutral] and phase [Construction - Elaboration], and their interaction [[Positive Construction – Neutral Construction] – (Positive Elaboration – Neutral Elaboration)]. One sample t test was conducted on these contrasts in each group and the results demonstrated that, in the control group, a set of regions including the bilateral caudate, bilateral amygdala, the left medial prefrontal (mPFC), and the left inferior parietal lobe were more engaged in envisioning positive future episodes relative to neutral episodes. However, preferential engagement of these regions was not observed in the SocAhn group. Both the SocAhn and control groups exhibited similar brain activation for the phase contrast. In addition, no significant clusters were shown for the interaction contrast in both groups, which may reflect no significant emotion difference in construction and elaboration of future events in these participants. Two sample t test results indicated that compared to controls, individuals with SocAhn exhibited hypo-activation in the right caudate and the right precursoes cortex when envisioning positive future events (relative to neutral events). Subsequent ROI analysis indicated that social interaction in positive future events was correlated with the engagement of bilateral amygdala (left, r = 0.46, p = 0.001; right, r = 0.43, p = 0.003) in the SocAhn group. In the control group, social interaction was correlated with activation of the left mPFC (r = 0.43, p = 0.02).

Discussion: The present findings suggest there is reduced engagement of the caudate and the precursoes cortex in individuals with SocAhn when they envision positive future events. In addition, social interaction involved in positive future episodes is related to activation in different regions in individuals with SocAhn and controls.

S74. HYPERACTIVATION OF LEFT MEDIAL FRONTAL AND CINGULATE GYRUS MEDIATES SOUND-INDUCED FLASH ILLUSION IN NON-AFFECTIVE PSYCHOSIS

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Background: Humans are constantly confronted with streams of information from multiple sensory modalities for rapid processing in order to execute appropriate behaviours. Schizophrenia is characterized by a disintegration of common multimodal experiences and has been conceptualized as a disorder of connectivity and integration within the brain. In the current study, we used the sound-induced flash illusion paradigm to examine auditory-visual integration on a basic perceptual level. The classic illusion occurs when one flash accompanied by two beeps is erroneously perceived as two flashes (fission illusion). Conversely, two flashes are often perceived as one when they are accompanied by a single beep (fusion illusion). We previously observed attenuated fusion and illusion illusions in patients relative to healthy controls (Vanes et al., 2017), but the neural mechanisms underlying this effect remain unclear.

Methods: Thirty-six patients diagnosed with non-affective psychosis according to ICD-10 and 20 matched healthy controls participated in this fMRI study. Visual stimuli were presented on a screen viewed via a head-mounted mirror during scanning. Each flash (F) was a white disk presented against a black background. Beeps (B) were presented via headphones at a volume permitting dissociation of the tone from background noise. 0, 1 or 2 flashes were presented alongside 0, 1 or 2 beeps. On congruent trials (F1B1 and F2B2), flashes and beeps had identical onsets. On incongruent trials (F1B2 and F2B1), the single stimulus in one modality was presented symmetrically in between the first and second onset of the stimuli in the other modality. Participants were instructed to attend to the flashes and disregard beeps, and to indicate via button press how many flashes (0, 1, or 2) they had seen on each trial. F1B2 trials were potential fusion illusion trials and F2B1 trials were potential fusion illusion trials. Neural responses to all experimental conditions (F1B0, F2B0, F0B1, F1B2, F2B1, F0B2, F1B2, F2B2) were modelled for each subject. At the second (group) level, we tested for differences in activation associated with incongruent (F1B2 and F2B1) trials between patients and controls using two-sample t-tests at a significance threshold of P<0.001.

Results: Auditory and visual brain regions were excluded to nullify the obvious activation of these areas in response to flashes and beeps. An exclusion mask was constructed based on anatomically defined occipital and temporal cortices. The brain regions exhibiting increased activation for fission and fusion trials in patients with non-affective psychosis compared to healthy controls included left medial frontal gyrus (-14, 28, 34), t(54)= 4.22; right sub-gyral (24, 22, 36), t(54)= 3.69 and left cingulate gyrus (-16, 6, 38), t(54)= 3.43 with effect sizes (Cohen’s d) of 1.15, 1.004 and 0.933 respectively. On ROI analysis including the masked areas, patients showed hyperactivation in bilateral superior temporal gyrus (-52, -26, 2 and 46, -14, -6), t(54)= 2.89 with effect sizes of 0.544 and 0.514 respectively.

Discussion: Behavioural results from our previous study suggested that illusory visual perception was more strongly influenced by auditory input in healthy controls compared to patients for both illusions. Therefore, this impairment of multisensory integration could be reflected in hyperactivation in patients as a compensatory mechanism, in order to detect conflict in a situation of illusory perception. Patients may have to allocate more resources towards focusing attention to relevant stimuli compared to healthy controls. Further, audio-visual perceptual disturbances in psychosis may lead to corollary discharge phenomenon.

S75. POWER LAW SCALING IN SCHIZOPHRENIA: A RESTING-STATE FMRI INVESTIGATION

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Background: To understand the complex mechanisms of schizophrenia, an interdisciplinary approach such as complexity science has integrated the essences of physics, mathematics and computational neuroscience, becoming essential to decrypt heterogeneous brain information. Nonlinear dynamical approaches to quantify the complexity of brain signal extract fundamental features from spatial-temporal neuroimaging data at multiple levels. Power law scaling as a well-validated principle in physics is used to describe the complex nature of a system across time scales. Following “the loss of brain complexity hypothesis” (Yang & Tsai, 2013), we anticipate that neuronal dynamics in healthy states exhibits multiscale variability, a characteristic of power law behavior, and pathological state is associated with the breakdown of neuronal dynamics. In this research, we adopt the nonlinear property of a complexity, investigating the change of power-law characteristics in a large-scale schizophrenic and healthy resting-state fMRI data.

Methods: Brain image data of age and sex-matched 200 schizophrenia and 200 healthy subjects (age mean=43.56; male = 49.5% for each group),
right-handed Han Chinese, were retrieved from Taiwan Aging and Mental Illness (TAMI) cohort. Whole brain resting-state fMRI and anatomical MRI image data are acquired to indicate the dynamic activities across brain regions. For the patient’s group, the average onset is 28 years old, and the average duration of onset is 15 years. Image preprocessing was operated with DPARSF (V4.3) and SPM12. To extract power law scaling, edited Pwchel function was performed under MATLAB2017a. With the data in frequency domain presented in logarithm plot, linear regression is applied to capture the pattern of scaling. Lastly, general linear model is used to compare these slopes between 2 groups with age and sex controlled for each voxel.

Results: Whole brain grey matters of 55749 voxels were searched with the extent threshold k= 35 voxels (p = 0.02). The expected false discovery rate is ≤0.05. Statistical images were assessed for cluster-wise significance using a cluster-defining threshold of uncorrected p ≤ 0.001. The results show that schizophrenia patients has significantly more positive power law spectrum slope than healthy adults at 4 clusters: left precuneus (k=17555, T=7.72) and left middle occipital gyrus (T=6.97), left medial dorsal nucleus (k =183, T=5.99), right inferior frontal gyrus (k =160, T=4.26), and right middle temporal gyrus (k =48,T=3.93). These 4 clusters have p (FDR-corr) <0.001 at voxel level. On the other hand, 2 key regions were identified where healthy group show significant higher power law slope: right putamen (k =60, T=3.11) and left putamen (k =44, T=.311).

Discussion: The located regions with complexity abnormality found in this research indicates over or insufficient brain activities in the schizophrenia brain, corresponding with clinical observations such as auditory hallucinations, attentional control and stop-signal inhibition. While adopting complexity analysis in patient’s data, the heterogeneity of hallucinations, attentional control and stop-signal inhibition. While adopting complexity analysis in patient’s data, the heterogeneity of hallucinations, attentional control and stop-signal inhibition.

S76. ABERRANT SELF-REFERENTIAL PROCESSING IN INDIVIDUALS AT ULTRA-HIGH RISK FOR PSYCHOSIS: AN FMRI STUDY

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Background: Self-referential processing and perspective taking are core facets of self which may be underlying the psychotic symptoms and impaired social cognition in schizophrenia. To investigate this issue, we explored the neural correlates of self-referential processing regardless of the perspective taken, and the other’s perspective taking in any reference target.

Methods: Twenty-two ultra-high risk (UHR) for psychosis individuals and 28 healthy controls were asked to judge the extent of the relevance of personality trait adjectives for themselves or close relatives and were also requested to put themselves in close other’s position and approximate this person’s judgements on the relevance of trait adjectives for self or other during functional magnetic resonance imaging.

Results: In the self-referential processing (self-as-target versus other-as-target), UHR individuals showed significantly reduced neural activity in the ventromedial prefrontal cortex (VMPFC) with medial orbitofrontal cortex. In the taking of the third-person perspective (other’s perspective versus one’s own perspective), UHR individuals showed increased activity in the visual association areas of middle occipital gyrus.

Discussion: These findings suggest that putative ‘prodromal’, UHR individuals already show the self-referential impairment for endorsing self-relevance to surrounding social information, which may be underpinned by reduced VMPFC activity while UHR individuals still can be capable of recruiting additional visual associative cortex for taking the close other’s position.

S77. ANHEDONIA IN NON-PsYCHOTIC INDIVIDUALS IS ASSOCIATED WITH DIMINISHED FEAR GENERALIZATION

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Background: Generalization from previous experiences allows us to evaluate the affective value of novel events. In a previous study, we found that negative symptoms disrupt this ability in schizophrenia. A core negative symptom is an inability to anticipate pleasure (anticipatory anhedonia). Here, in a functional MRI experiment, we examined whether the generalization of conditioned fear responses is affected by the ability to anticipate pleasure in non-psychotic individuals.

Methods: 72 non-psychotic young adults with a range of subthreshold symptoms of psychopathology underwent a functional MRI scan while participating in a Pavlovian fear conditioning and generalization paradigm. Skin conductance responses were measured throughout the experiment. During the conditioning phase, one face was used as a conditioned stimulus and paired with an electrical shock (the CS+), whereas a different face was used as a neutral stimulus that was never paired with a shock (the CS-). For the generalization phase, eight stimuli that gradually morphed from the CS+ to the CS- were selected based on each individual’s ability to discriminate the two faces. Immediately after the experiment, subjects were asked to rate how likely each stimulus was followed by the shock (explicit shock likelihood ratings). The Temporal Experience of Pleasure Scale was used to measure the ability to experience and anticipate pleasure. We hypothesized that subjects with a diminished ability to anticipate pleasure would show lower levels of fear generalization.

Results: Across the full cohort, we observed typical (CS+ and CS+-like morphs > CS-) generalization gradients in the explicit ratings, skin conductance responses, and the BOLD responses of the anterior insula and dorsal anterior cingulate cortex. The reversed pattern of responses (CS- > CS+ and CS+ like morphs) was observed in the posterior cingulate cortex and angular gyrus. The caudate nucleus showed highest responses to the most ambiguous morphs. Individuals with a diminished ability to anticipate pleasure showed lower generalization (as reflected by their explicit ratings) and the ability to anticipate pleasure correlated negatively with responses of the caudate nucleus to ambiguous morphs.

Discussion: Non-psychotic individuals with a reduced ability to experience anticipatory pleasure show impairments in the generalization of conditioned fear. This finding parallels a similar, prior finding in schizophrenia patients with prominent negative symptoms. These results suggest that impairment in fear generalization may be linked to the pathophysiology of negative symptoms, even prior to the onset of psychotic illness. The study was supported by the grant 4R01MH095904.