Subdivisions of the arcopallium are differentially involved in the control of fear behaviour in the japanese quail

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upon rat turning behaviour and hippocampal levels of noradrenaline and corticosterone, in order to minimize stress, limitation of movement and other confounding factors in microdialysis studies. Three groups of rat setups were examined: fast to slow turning, slow to fast turning and a liquid swivel. Rat turning behaviour was recorded digitally over a period of forty-five hours. Brain samples were taken twice for two hours in twenty-four hours and analysed for corticosterone and noradrenalin with radio immuno assay and liquid chromatography coupled to electrochemical detection respectively. The results show a significant difference in total turning time between the first day/night and the second day/night in both turning setups, meaning that it takes et least twelve hours before the rats are adapted to the turning apparatus. These results are confirmed by a decrease of hippocampal corticosterone and noradrenalin levels during the second day compared to the first day in both turning setups. The slow to fast turning setup showed enhanced slow movement and therefore a higher total turning compared to the fast to slow turning setup. Therefore, these results reveal that the adaptation period to the turning apparatus and the turning speed in microdialysis studies require careful consideration when interpreting data.

ACTIVITY CHANGES IN MICE SUBJECTED TO CHRONIC MILD STRESS: A PIVOTAL POINT FOR STRESS RESPONSE AND MEASURES REFLECTING ANHEDONIA?

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Chronic mild stress (CMS) as an animal model of depression enjoys a certain popularity in psychiatric research - not least due to its face validity and comprehensive readout. However, the results are difficult to replicate in different labs. The goal of the present study was to examine the influence of stress-induced changes in general activity on the behavioural readout. We particularly focussed on the influence of light as a widely used stressor in CMS protocols on subsequent measures. A weekly CMS schedule consisting of common mild stressors was applied for at least 4 weeks to different strains of mice. During this stress period saccharin intake and preference over water was acquired twice a week, each time during the first 2 hours of the dark phase. To exclude interventions with a putatively high impact on consuming behaviour per se, food and water deprivation was omitted. Parameters were assessed using tests like open field, modified holeboard and long-term home cage observation. Independent of the illumination conditions in the behavioural tests, an apparently paradox decrease in anxiety-related behaviour after CMS was observed. This could be explained by a generally increased stress-induced activity, which in turn appeared as reduced risk assessment behaviour. Preceding application of a single footshock normalised the latter in CMS mice. While no enduring decrease in saccharin intake ('anhedonia') due to CMS was observed, over-night illumination as particular stressor of the weekly paradigm turned out to be associated with a significant decrease in saccharin intake during the measurement period the day after. Taken together, these results suggest that in mice the CMS regimen as a whole causes hyperreactivity to a novel environment represented by the test situation and therefore requires careful interpretation of behaviour. Shifts in circadian rhythms due to light cycle changes may mimic an 'anhedonic' effect of CMS.

NON-CONSCIOUS EMOTIONAL CONTAGION IN BLINDSIGHT

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Observing facial expressions prompts imitation as can be typically observed with facial electromyography (EMG). Here we explored whether this automatic reaction occurs even in the absence of visual awareness for the stimulus, and whether this can be elicited also by bodily expressions. Facial and bodily expressions of happiness and fear were presented either in the intact visual field or in the blind field of two well-known hemianope patients (DB and GY) with striate cortex lesions but residual vision (blindsight). The patients were required to judge the emotional expression of the pictures presented in their intact visual field, and "to guess" the expression of the unseen pictures shown in their blind field. During the task we recorded emotion-specific facial muscle activity (zygomaticus major for happy, corrugator supercilii for fear). Despite both patients reported no visual awareness for stimuli projected in the blind field and commented their performance as "at chance", their evaluation of the emotional expressions was significantly above chance-level for faces and bodies alike. Most notably, unseen facial as well as bodily expressions produced a congruent emotional reaction in patients' face, comparable to that observed in response to consciously perceived pictures. Our findings provide evidence that facial expressions in the observer may unfold as an automatic reaction that results from emotional contagion. This expressive response seems insensitive to visual awareness and to the specific perceptual features of the stimuli. Rather, it appears to be modulated by the emotional valence of external events.

SUBDIVISIONS OF THE ARCOPALLIUM ARE DIFFERENTIALLY INVOLVED IN THE CONTROL OF FEAR BEHAVIOUR IN THE JAPANESE QUAIL

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Growing interest in the phylogeny of emotions within vertebrates has motivated research on the neurobiology of fear reactions in birds. In the avian brain, the arcopallium has been suspected to play a major role in the control of fear reactions. This structure is considered as a partial homologue of the mammalian amygdale, on the basis of developmental and anatomical data. Moreover, lesions or stimulations of the arcopallium induce respectively a decrease or an increase in fear reactions. However, the arcopallium is a large and heterogeneous structure and the specific roles of its subdivisions are unknown. The present study aimed at investigating the respective implications of different subdivisions of the arcopallium in the control of fear behaviour. Adult Japanese quail were given bilateral electrolytic lesions of the arcopallium or sham-operation, and were subsequently placed in several tests of fear: open-field, hole-in the-wall box, tonic immobility and novel object tests. Quail with lesions of the anterior part of the arcopallium exhibited reduced fear behaviour when compared to sham-operated quail. By contrast, quail with lesions in the caudal part of the arcopallium tended to show more pronounced fear behaviour than sham-operated quail. The behaviour of quail with combined lesions of the anterior and caudal parts of the arcopallium was not significantly different from that of shamoperated quail. Those results are the first to show a differential involvement of subdivisions of the arcopallium in the control of fear behaviour in birds. The results will be discussed in the light of current knowledge regarding the neuroanatomical characteristics of the arcopallium.

EFFECTS OF HOUSING ENVIRONMENT ON ACTIVITY AND ANXIETY LEVEL IN MALE AND FEMALE MICE

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The present study was designed to determine the effect of individual or social housing on various tests of anxiety in mice of both sexes. After an 18-day isolation period or group-housing, general activity of each mouse in the actimeter and in the open-field test was recorded for 5 min. Afterwards, the animals were individually placed onto the central square of the elevated plus-maze and video recorded for 5 min. The number of counts in the actimeter and number of crossings from one square to another in the openfield were registered as measures of activity, and also the number of closed arm entries in the elevated plus-maze. The percentage of time on the central square of the openfield, together with the percentage of time spent on the open arms and the percentage of open arm entries were scored as measures of anxiety level. Individual housing increased the activity on both open-field and actimeter, this increase being really due to the effect of isolation on the females, because when sexes were analysed separately, individually housed females showed higher activity than those socially housed, however, housing conditions had no effect on males. Furthermore, isolated females displayed higher activity in the actimeter than isolated males. Individual housing also increased the general activity of mice on the elevated plus-maze, but equally in both sexes. The females displayed more anxiety than males, spending less time on the central square of the open-field. This effect was not due to sex differences in general locomotion, because it was precisely the females which presented more activity in this behavioural test. Nevertheless, neither the individual housing condition nor the sex produced significant differences in anxiety on the plus-maze. These results indicate that social housing can reduce the hyperactive response to novelty in females, whereas in males, the housing environment did not have a significant effect on activity or performance in the anxiety test.

WHAT CAN NAPLES HIGH EXCITABILITY AND SPONTANEOUSLY HYPERTENSIVE RATS TELL US ABOUT DIFFERENT VARIANTS OF ATTENTION-DEFICIT HYPERACTIVITY DISORDER?

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Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental problem affecting 1–3 % of school children, mainly boys (4 : 1 ratio). It is characterized by inattention, hyperactivity and impulsivity. An altered mesocorticolimbic dopamine (DA) system is thought to be associated to different variants of ADHD. The Naples High Excitability (NHE) and the Spontaneously Hypertensive (SHR) rats model the variant with altered executive functions and response inhibition respectively. The NHE show hyperactive mesocortical DA branch by hypertrophic DA neurons, high expression of tyrosine hidroxylase (TH), high DA D2 receptor density and overexpression of DA-related phosphoprotein (DARP32) in the mesencephalon. Conversely they show in the prefrontal cortex (PFC) more axonal varicosities, high DA transporter (DAT) density and lower DA D1 and D2 receptors. Moreover the mesotriatal branch is not altered as shown by TH, DAT, DA D1 and D2 receptors and DARP32. Treatment with methylphenidate (MPH; 3 mg/Kg i.p. for 14 days) reverses the basal profile. In contrast, the SHR show altered mesolimbic and mesocortical branches associated with no main changes in the mesencephalon but with a high responsiveness for TH expression and no responsiveness for DA D2 autoreceptors to MPH treatment. Conversely in the PFC a higher basal DA tone (Carboni et al. 2003, 2004) is associated with high DAT