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Habitation Throughout the Solar System (1)

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THE PERFECT BORING SITUATION – IN VIEW OF DESIGNING ONBOARD
COUNTERMEASURES TO MONOTONY & ISOLATION DURING TRANSFER STAGES OF
EXTENDED EXPLORATION MISSIONS

Abstract

In contemporary orbital missions, workloads are so high and varied that crew may rarely experience stretches of monotony. However, in historical orbital long duration missions, experiences of monotony were, indeed, reported anecdotally by crew. Remedies appeared to be at hand, including a constant visual connection to Earth providing a rich source of stimulation and past-time activity, regular direct audio contact to the ground, visiting crew, and even designated ‘surprise’ packages containing novelty items, correspondence and fresh produce delivered with cargo. However, all these countermeasures – which were relatively successful in addressing what is essentially an operational issue – are not feasible in the remote context of an extended mission scenario. Particularly in- and outbound cruising stages are characterised by longer, comparably uneventful stretches of low workload, coupled with confinement and unchanging vehicle surroundings. While the challenge of monotony has been pointed out as critical in taxonomies of exploration-related further research needs, it has received comparably less explicit attention today from a habitation design perspective than other human behaviour and performance issues. This paper aims to address this gap through an introductory overview on the theory and application of design-based mitigation strategies. Following an introduction of key concepts surrounding the phenomenon of monotony as such, a summary of the existing body of literature from the orbital experience is given and models of mitigation strategies outlined. Based on a situational characterisation of a typical transfer stage scenario, monotony is conceptualised as a threefold model of sensory, social and spatio-temporal isolation that may exacerbate other psychological stressors of the setting and negatively affect human behaviour and performance. In view of translating currently available orbital evidence into design recommendations for an autonomous setting, a review conducted of published primary anecdotal evidence of crew on orbital and simulator missions in relation to their experience of monotony is summarised, highlighting three themes of design-based countermeasures.