SHORT COMMUNICATION

The ethological approach as a new way of investigating behavioural health in the Arctic

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ABSTRACT

Objectives. From an interdisciplinary perspective, the goal of our research in human ethology is to investigate the adaptive dynamics of small groups in isolation and confinement with a particular emphasis on unexplored environments, from circumpolar missions on earth to interplanetary missions in space.

Study design. The ethological observations were designed to monitor the polar teams on the Subantarctic islands, the Antarctic continent and the Arctic Ocean. The working hypothesis viewed the periodic changes in the groups’ organization as optimal behavioural strategies in extreme living and working conditions.

Methods. The general methodological feature is a quantitative description of observable events based on the motor activity of individuals, interactions and communications among individuals and spatial mapping in collective areas.

Results. We observed group organization, group disorganization and group reorganization over extended time periods in the polar stations. Cultural grouping and gender-based individualities were observed as well. Focusing on the Tara Expedition in the Arctic, we observed variations in spatial indicators, including inter-individual positions, and in temporal indicators, like collective times, as behavioural strategies for preventing the monotony of social life.

Conclusion. The ethological approach, using non-invasive techniques of observation, description and quantification of spontaneous human behaviour, offers an innovative and complementary tool for sociocultural approaches, enhancing the knowledge of contemporary circumpolar micro-societies. With the changing of environmental context, the Arctic natives would undertake changes in their group organization for maintaining their behavioural health. Such social adaptation could be investigated with this new approach in the field.

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INTRODUCTION

In ethology, human behaviour is considered to be the expression of personal and social issues resulting from the relationships between individuals and the environment. When the living and working conditions are extreme, the human being has to develop adaptive strategies to maintain behavioural health. A broad array of disciplines, such as medicine, physiology, psychiatry, psychology, sociology and anthropology, deals with behavioural and mental health. The ethological approach brings a global dimension to the investigation. It is mainly concerned with human behavioural adaptation in space missions and polar missions. The goal of ethology is to investigate adaptive dynamics of small groups in isolation and confinement, comparable to the laws governing self-organizing systems, as micro-societies. Ethological observations were performed on the polar teams in three French stations (1): at Kerguelen in the Subantarctic islands (49.21°S 70.13°E), in Adélie Land in the Southern Ocean side (66.40°S 140.01°E) and at the Dôme C in the Antarctic continent (75.06°S 123.21°E). These observations have provided motor, spatial, social and temporal indicators of the groups’ organization. Ethological observations performed in the Arctic reinforce the hypothesis that enacting periodic changes in the group’s organization is an optimal behavioural strategy in the social adaptive processes. The applied objectives are to use behavioural indicators for preventing interpersonal conflicts, physical diseases and mental disorders.

MATERIAL AND METHODS

The ethological approach is an exhaustive method based on quantitative descriptions of the spontaneous behaviour of the subjects in daily life activities and tasks at work. Its aim is to explore the field of observable events, like actions, interactions, communications and positions. Three main steps qualify the general method (Fig. 1). First, data are collected by completing ethograms or by recording videos on site. For this study, research focused on the Tara Expedition in the Arctic, on a polar schooner’s crew (n=10) that drifted in the ice from a north-eastern latitude (79.53°N 143.17°E) to a north-western latitude (74.08°N 10.04°W). Then, a descriptive repertoire was established on the subjects’ behavioural manifestations as they changed over time and according to environmental contexts (e.g., spatial positions linked to inter-individual distances; collective times linked to group habits; verbal and non-verbal communications linked to interacting populations). Finally, these items were measured in quantitative terms (frequency and duration of occurrences) with all the possibilities of associations among items at the individual level and among subjects at the collective level.

RESULTS

The most salient outcome in the Subantarctic and Antarctic stations was that the group members seemed to behave as an auto-organized system with periods of organization, disorganization.
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and reorganization (1). Cultural grouping and gender-based individualities were also observed (2). During the Arctic drift, the irregularity of collective times and the variations of inter-individual positions (Fig. 1) were behavioural indicators preventing the monotony of social life. They illustrated the group’s disorganization as a nominal period of adaptation.

Figure 1. The methodological tools of the ethological approach applied to the Tara Expedition in the Arctic. The polar mission started on 3 September 2006 and was a 507-day drift, over 3,231 miles, on a direct cross of 1,616 miles, at the nearest north position 88.32°N, and with two main crews working in shifts. The videos or pictures were collected once a week during a collective task (evening meals) of the second crew. It was a multicultural and mixed-gender group (n=10) that was isolated and confined over a summer campaign (24 weeks), followed by a wintering period (14 weeks) until they were released from the ice on 21 January 2008. The examples within the results present the collective time (a) based on task durations and the spatial positions (b) based on place preferences. The images are copyright to the Tara Expeditions.
DISCUSSION

These studies were first designed for application to human exploration in space. As far as human colonization is concerned, the study starts on Earth by reaching the most isolated living and working environments. The Tara Expedition has pointed out climate changes further north in the arctic ice to Longyearbyen. These changes in the environmental context could induce new behavioural habits. As a result, the lifestyles of both traditional Inuit populations and modern, urban circumpolar populations could change. Ethological investigations are one answer to the challenges of, and opportunities for, tracking health and social indicators (3) of these isolated groups. Just as it has largely been performed on polar teams in Antarctica, and as it has preliminarily been shown in the Arctic, ethological research could be applied by collecting ethological data and monitoring them over time. This would enable the identification of new social adaptations which could help to prevent adverse behavioural health effects in isolated groups. For instance, the spatial and time disorganization of the group observed in our studies would break down the monotony of daily life activities in the polar regions. Interpersonal conflicts could be prevented by arranging alternative times for cultural and working tasks, and by regularly changing the collective spaces. To conclude, the ethological approach, using non-invasive techniques of observation, description and quantification of human behaviour, offers an innovative tool for enhancing knowledge on circumpolar micro-societies, complementary to current sociocultural approaches. In ethology, investigations are restricted to the observable field. The main benefit is the collection of exhaustive data at different levels of observation: egocentric (i.e., at the personal level), allocentric (i.e., at the inter-individual level) and geocentric (i.e., at the level of the habitats).

Conflict of interest and ethics statement
There is no conflict of interest. The participants in the studies gave their informed consent.

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