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The influence of olfactory stimulation on the behaviour of cats housed in a rescue shelter

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ABSTRACT

A wide variety of feline species have been shown to gain welfare benefits from the introduction of olfactory stimuli to the captive environment. The effect of this stimulation on the domestic cat, however, has been largely overlooked. This study thus explored the influence of olfactory stimulation on cats housed in a rescue shelter to determine whether it holds any value as a method of enrichment for this species. One hundred and fifty cats were randomly assigned to one of five conditions of olfactory stimulation (control [an odourless cloth]; biologically relevant odour [a cloth impregnated with the scent of rabbit]; biologically non-relevant odours, [a cloth impregnated with lavender, a renowned relaxant, or the scent of catnip, a well known stimulant]). Cats were exposed to the relevant olfactory stimuli for 3 h a day for five consecutive days. Each cat's behaviour was recorded every 5 min on days one, three and five of olfactory exposure, using instantaneous scan sampling. Overall, cats showed relatively little interest in the cloths, spending just over 6% of the total observation time interacting with these stimuli. However, animals exposed to the catnip-impregnated cloths exhibited significantly more interest in the stimulus than animals exposed to the other cloths, spending an average of 11.14% of the observation time interacting with the objects. Across all experimental conditions, interest in the cloths was significantly lower in the second and third hours of stimulus presentation compared to the first, suggesting habituation. Certain components of the cats' behavioural repertoire were influenced by olfactory stimulation. Catnip and prey scent encouraged a significantly higher frequency of behaviours indicative of reduced activity (e.g. more time sleeping, less time standing and actively exploring the environment) in comparison to the control condition. Catnip also encouraged play-like behaviour characterised as the 'catnip response'. Overall, the results suggest that certain odours, notably catnip, may hold potential as environmental enrichment for captive domestic cats.

1. Introduction

Common definitions of environmental enrichment comprise the description of the addition of one or more 'factors' to a relatively impoverished environment to examine the impact of these variables on the physical and psychological welfare of the animal(s) involved (see Chamove, 1989; Newberry, 1995; Shepherdson, 1998; Young, 2003). These 'factors' commonly refer to any physical, social, design, or management features that may improve the behavioural microhabitat of captive animals (Shepherdson, 1998; Young, 2003; Smith and Corrow, 2005). One such 'factor' is the introduction of novel and/or species-specific scents into the captive

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environment as a popular means of attempting to enrichment the environment by reducing sensory deprivation in a number of species (for review see Wells, 2009). Much of this work has been successfully carried out on zoo-housed wild cats (for review see Clark and King, 2008), with both positive psychological and physiological benefits reported (Powell, 1995; Schuett and Frase, 2001; Pearson, 2002). For example, exposure to the odours of rosemary, chives, lemongrass and allspice has been shown to encourage more active and social behaviours, including allo-play and allo-grooming, in zoo-housed Asiatic lions, *Leo panthera* (Pearson, 2002). Rosemary has also been shown to increase back rolling and head rubbing in these animals, behaviours similar to those produced by catnip (Pearson, 2002). More recently, Wells and Egli (2004) discovered that captive black-footed cats (*Felis nigripes*) showed an increase in species-specific behaviours and a decrease in stereotypic pacing when exposed to cloth-impregnated odourants of nutmeg, catnip and the body odour of a potential prey animal (quail).

Recently, similar investigations have been carried out on domestic species. For example, Graham et al. (2005) found that dogs housed in a rescue shelter exposed to the scents of diffused chamomile and lavender exhibited increased resting and decreased vocalisation, behavioural changes indicative of increased relaxation and improved well-being. Ambient odours of peppermint and rosemary, by contrast, encouraged behaviours more suggestive of agitation (i.e. barking).

Although the success of olfactory stimulation as a means of environmental enrichment has been scientifically documented for both captive wild cats and sheltered domestic dogs, its value for the domestic cat, whilst advocated (Rochlitz, 2000), remains unknown. This is somewhat surprising since cats are extremely olfactory-orientated animals, making use of odour cues in intra- and inter-specific communication (Robinson, 1990; O'Farrell and Neville, 1994; Nielson, 2008), hunting (O'Farrell and Neville, 1994), feeding (Overall, 1997) and the maintenance of social-cohesion (Macdonald et al., 1987). In addition, detection of scent, in particular, that of the cat's household communal odour (comprised of the individuals residing in the house) often conveys messages of identity, familiarity and security. Such sensitivity to olfactory stimulations has been illustrated in a study investigating domestic felids' behavioural responses to 5 different scents, including, for example, bleach and fish (Nielson, 2008). Whilst discrimination between, and preference for, scents was demonstrated, the cats were only exposed to each odourant for 30 s and therefore their enrichment potential could not be evaluated.

Despite little being documented on their potential enriching properties to the captive cat, olfactory stimulations for cats are readily available on the commercial market (e.g. cat toys containing scents of catnip and valerian). The following study therefore aimed to determine whether olfactory stimulation, in the form of cloths impregnated with a variety of odours, holds any potential as a method of environmental enrichment for captive-housed cats, specifically those housed in rescue shelters.

2. Method

2.1. Study site

Cats Protection Adoption Centre in Co. Antrim, Northern Ireland, was employed as the study site. The cats at this site were housed in two rows of line-block style enclosures which were positioned with the indoor part of the enclosures of one row facing the other. Each cat's enclosure was divided into two sections, referred to hereafter as 'sleeping quarters' and 'exercise area'. The sleeping quarters (90 cm long × 75 cm wide × 108 cm high) contained a plastic bed, blanket and heating apparatus. From the sleeping quarters, the cats could view conspecifics (housed in opposite enclosures) and humans (both staff and visitors) as they walked past the front of the animals' pens. Cats were able to move freely through a flap from their sleeping quarters to the exercise area (187 cm long × 75 cm wide × 216 cm high), which contained a litter tray and water dish. From this location, the cats could view animals in the adjacent exercise areas, but not those in opposite enclosures. Visitors were only permitted to view the cats from a central corridor on the sleeping quarters side of the enclosures, rendering it difficult for them to see animals in the exercise areas.

Compatible cats were kept in pairs or groups, whilst those that were considered unsociable by Cats Protection staff were single-housed in a bid to reduce outbursts of aggression and safeguard welfare. Enclosures were cleaned thoroughly every morning and as needed throughout the course of the day. The animals were fed twice daily, once in the morning and once in the late afternoon. Visitors were able to view the animals between 11:00 h and 15:00 h every day of the week.

2.2. Subjects

One hundred and fifty cats (69 males, 81 females) of mixed breed were randomly chosen as subjects. Most of the cats ($n = 139$, 92.7%) were housed in pairs or groups; the remainder were held singly. All of the cats were physically healthy, and between approximately 4 months to 8 years of age (exact ages were difficult to determine since most of the animals were either relinquished by their previous owners or found as strays). Most of the animals ($n = 131$, 87.3%) had been housed in the shelter for over one month. The sample employed was representative of cats admitted to Cats Protection in terms of breed, age, and sex.

2.3. Olfactory stimulation

Five conditions of olfactory stimulation (one control, four experimental) were developed for the study. These comprised:

(1) *Control environment*: The cats were exposed to no olfactory stimulation other than that arising naturally from their environment, e.g. the odour of the enclosures and their contents, visitors, staff, conspecifics.
(2) *Odourless cloth*: The cats were provided with a cotton cloth (see later), devoid of odour, in addition to