The effects of the presence of a dog in the classroom

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Abstract
This study examined the effects of the presence of a dog in the classroom on field independence, social competence, empathy with animals and social-emotional atmosphere. The participants were 46 first-graders (43 of them immigrants) of two school classes (control and experimental). In the experimental group, a dog was present in the classroom for three months. Multivariate analyses revealed significant enhancement of field independence and empathy with animals in the experimental group in comparison to the control group (no dog). Thus, the presence of the dog fostered the development of autonomous functioning and a better segregation of self/non-self, which is the foundation of sensitivity towards the needs and moods of other people. Moreover, according to the views of the teachers, the children in the experimental group exhibited higher social integration, and there were fewer aggressive children, compared with the children in the control group. In sum, the results indicate that a dog can be an important factor in the social and cognitive development of children. © 2002 International Society for Anthrozoology

Keywords: animal-assisted therapy/activity, children, education, empathy, field dependence, social intelligence

The positive effect which animals have on people has been shown on many occasions: they have been successfully employed in the areas of well-being, preventive care and therapy (Levinson 1962, 1972; Rowan and Beck 1994). In addition to improving the physical and mental performance of people, animals have also been useful in fostering social skills (Levine and Bohn 1986). They are also very important for the psyche: they are partners and playmates, and satisfy important emotional

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needs (Sable 1995). Furthermore, animals have been employed to help people of various ages, although children and older people seem to profit the most from interacting with them (Erickson 1985; Nebbe 1991; Rowan and Beck 1994).

In the case of children and young people, the focus of previous research has been on the effects of animals on social behavior. Positive effects have been shown, for example, for aggression (Davis 1986), self-esteem (Covert et al. 1985), and patience and control of temper (Levine and Bohn 1986). Animals have also been successfully used in psychotherapy for children (Brüch 1988).

In the present study, our focus was on the effects of the presence of a dog in the school classroom. The idea of a possible positive effect of dogs in the classrooms of first-graders was developed in co-operation with the Institute for Interdisciplinary Research on the Human–Pet Relationship (IEMT) and the Institute of Zoology in Vienna. The reported research is part of a larger project, which also included behavioral observations gathered by researchers at the Institute of Zoology. Here we only report the results concerning the psychological aspects of the human–animal relationship. Preliminary results of our research were also reported at the 9th International Conference on Human–Animal Interaction in Rio de Janeiro (Kotrschal et al. 2001).

Dogs were chosen because we considered that their popularity and interactive nature made them more likely than other animals to have an impact on children (Rost and Hartmann 1994; Paul and Serpell 1996). The positive effect of the use of animals in a school setting has already been shown in the case of children with autism (Law and Scott 1995). Daily pet routines fostered responsibility in these children and lead to increased confidence and care when handling domestic animals. Similar positive results have been found for other behavioral deficits (Nebbe 1991). In our study, we expected positive effects on the social-emotional atmosphere, and the social intelligence and the field independence of the children in the classroom (this cognitive style comprises autonomous functioning and is explained in more detail below).

With respect to the social-emotional atmosphere, some studies have already shown that the presence of animals has a positive effect. Gonski, Peacok and Ruckert (1986) found that juvenile delinquents react to animals with less animosity and more openness when a dog is present during an interview than when no dog is present. Emotionally disturbed children appear better able to establish contact with animals than with humans (Davis 1986), and animals can also assist in establishing contact with
difficult children in a classroom setting (Nebbe 1991). These findings led us to the assumption that a dog in the classroom could also help create a better social-emotional atmosphere, especially for children with language difficulties (those with different national backgrounds).

With respect to social intelligence, previous studies have demonstrated that children with pets exhibit greater social competence (e.g. Guttmann, Predovic and Zemanek 1985; Melson, Sparks and Peet 1989) and empathy (Bryant, 1986; Melson and Fogel 1989; Ascione and Weber 1996; Paul 2000) than children who do not have pets, although merely possessing a pet is much less a requirement for social competence than the bond with the animal (Poresky 1990, 1996). Empathy with animals, e.g. the ability to perceive their independent needs, seems to have a transfer effect on empathy with people (Ascione 1992), and is therefore a basis for the development of social intelligence (Kidd and Kidd 1987). We expected that these positive effects of pets could also generalize to animals in a school classroom environment.

The main focus of our study is the variable field dependence/field independence. According to the theory of field dependence/independence of Herman Witkin, field-dependent individuals rely on an internal frame of reference, while field-independent individuals rely on an external frame of reference (Witkin used the general term “field” for the external frame of reference). Initially, subjects who used visual cues to determine their spatial location were designated as “field dependent,” whereas subjects using postural (i.e. vestibular, tactile and kinesthetic) cues were designated as “field independent.” In a later phase of interpretation, field dependence/independence also became a measure of the ability to perceive individual elements within an organized perceptual field. According to this interpretation, field dependence/independence is the degree to which an individual can distinguish “a figure from its background, a part from the whole, or oneself from the environment and other people” (More 1987, p. 21). Subsequent research linked the individual differences described thus far to differences in a still wider array of areas, including neuro-physiological separation (e.g. greater hemispheric lateralization), an articulated body concept (i.e. a differentiated perception of one’s own body) and a sense of separate identity (i.e. greater differentiation between self and other people). All these differences were subsumed under the term psychological differentiation (Witkin et al. 1962).

The hints at a greater neuro-physiological separation include the results that field-independent individuals gesticulate using their right hand only, whereas field-dependents use both hands for gesticulation (Sousa-Posa and Rohrberg 1976; this result implies a greater hemispheric lateralization of
field independents). Field-independent individuals also score better achievements in intelligence tests (McKenna 1984) and spatial-visualization tests (McGee 1979) than field-dependent individuals. As a consequence, the academic achievement of field independents is also better (for a review, see Tinajero and Páramo 1998). The more articulated body concept follows from results in which children had to draw a man or woman (Witkin et al. 1962). The drawings of field-dependent children lacked important details as compared to those of field-independent children (e.g. the number of the fingers was not complete, sex differences were not recognisable).

In the interpersonal area, the greater differentiation between self and other people becomes apparent. Field-independent subjects show greater autonomy when dealing with conflict situations (such as disagreement about the topic of discussion; Witkin and Goodenough 1981) and they are able to analyze problems independently (Kogan and Saami 1989). Generally, in their performance, field independents show a greater dependence from other people. For example, in a study by Chen-Shan (1984), the performance of field-dependents depended to a greater extent on encouragement or discouragement by the experimenter. Manning (1991) also found that field-dependent subjects are liable to change their patterns of performance when influenced by field-independent subjects. More recent research suggests that field independents also possess greater social competence and emotional maturity (Kogan and Block 1991; Tinajero and Páramo 1998).

Several studies have demonstrated that the critical variables for developing field independence are child-rearing practices which facilitate and encourage autonomous functioning. As a result, these children are better able to segregate self/non-self and show greater sensitivity to the moods and needs of others (in a word, they show more empathy). These findings are derived from intra- and inter-cultural studies (for an overview see Kogan and Block 1991). As it has already been stressed that the development of autonomy (a factor which differentiates field-dependent from field-independent children) can be promoted in children with pets (Levinson 1978; Levine and Bohn 1986), it was suggested that the presence of an animal in a classroom could foster the field independence of the pupils. Myers (1996) even argued that in developing the self, interacting with animals can be more primary than interacting with humans.

In addition, we also assumed that, in general, the presence of a dog would enhance empathy with, and attitudes towards, animals. Data from Kidd, Kidd and Zasloff (1995) have already demonstrated that the proximity, touch and visibility of animals are the most important factors influencing
attitudes towards animals (although their study focused on attitudes toward zoo animals). Results from Paul (2000) showed that empathy with animals was related to current pet ownership and to ownership during childhood. Her study also showed that empathy with animals was linked with empathy with humans, which stresses the importance of the previous finding.

**Hypotheses**

The following hypotheses were generated:

1. The presence of a dog promotes the field independence of schoolchildren, through the children learning to pay attention to the needs of others (living beings) and their assuming responsibility for their well-being.

2. The social intelligence of the experimental group will increase compared with the control group.

3. In the experimental group, empathy with animals will have increased by the end of the study, but this will not have happened in the control group.

4. The social-emotional atmosphere will be better in the experimental group than in the control group. This is based on teacher assessments of a) sociability, b) social integration, and c) aggression in the children.

**Methods**

**Participants**

The participants were 46 schoolchildren of two Viennese first-grade classes at a European School. One class represented the experimental group, another class the control group. Most of the children in this school are immigrants and have little knowledge of the German language. In the experimental group, the children came from the following nations: Turkey (10 children), former Yugoslavia (6), Austria (2), Africa (1; the exact state is unknown), Egypt (1), Iran (1), Polen (1), Romania (1), Slovakia (1). In the control group, the distribution was as follows: Turkey (9), former Yugoslavia (9), Albania (1), Austria (1), China (1), Vietnam (1). The common reason why the children’s parents emigrated was economical: the hope of improving their standard of living (this was not assessed empirically, but was based on informal information from the teachers).

Both classes had one — though not the same — teacher for all lessons, who was assisted by a second accompanying teacher (who was also different for both classes). The assignment of classes to conditions was not random, as the dogs which were used belonged to one of the teachers. This teacher, known to one member of the IEMT, was asked to participate.
However, the full purpose of the study and the measures to be used were not revealed to her. She only knew that the aim of the study was to investigate the influence of the presence of a dog in the classroom on the social behavior, and several psychological variables, of the children. The second participating teacher (without dogs) was similarly informed. The experimental group (n=24) consisted of 11 girls (45.8%) and 13 boys (54.2%). All children were between 6 and 7 years of age (the mean age was 6.7 years, with a standard deviation of 0.65). In the control group (n=22) there were 12 girls (54.5%) and 10 boys (45.5%). The mean age was 6.5 years, with a standard deviation of 0.69.

**Instruments**

At the start of the study, all children were presented with the Coloured Progressive Matrices (CPM) test, a largely culture-independent analysis of intelligence (one-time administration). The reliability (Cronbach’s alpha as a coefficient of internal consistency) of the scale was 0.84. Gender and age were also recorded. The following measurement instruments were selected for the study:

1. A children’s version of the “Gestaltwahrnehmungstest” (Gestalt Perception Test - GWT) by Hergovich and Hörndler (1994) was used to measure the degree of field independence. This is a one-dimensional test based on the linear logistical Rasch model (Fischer and Molenaar 1995), and measures the ability to act independently of a given context. The test resembles the Embedded Figures Test (EFT; Witkin et al. 1971), which assesses an individual’s ability to identify simple forms within a more complex visual field. Field-independent people are able to easily break the complex figure apart and to find the embedded forms quickly, whereas field-dependent people have more difficulty and take more time. EFT and GWT correlate to a measure of 0.51 (Pearson correlation; Hergovich 1999). The items of the
GWT consist of 30 figures in which one has to find an embedded figure (a little house) and mark it using a computer mouse (Figure 1). Because of the low age of the children in the current sample, it was decided to reduce the number of items (30) by half (every second item was presented to the children). The reliability of the test (Cronbach's alpha) in our sample was 0.75 at the beginning of the study, and 0.87 at the end of the study, three months later.

2. A procedure for measuring social intelligence, the sub-test “Fotoalbum” of the Wiener Entwicklungstest — “Vienna Development Test” (WET, Kastner-Koller and Deimann, 1998). This test consists of seven photos of people with different facial expressions (e.g. happiness, sadness, surprise); the children had to judge which emotions were being expressed. The reliability of the scale (Cronbach's alpha) in our sample was 0.55 at both the beginning and end of the study. Although these coefficients are rather marginal, they are comparable to other scales with young children (Melson 1988).

3. Self-assessment of empathy with animals (as measured by Killian 1994). Items include:
   “Do you want to own a pet?”
   “Do you believe that animals can experience fear?”
   “Do you believe that animals can communicate with each other?” or
   “Do you believe that a fly feels pain if you tear out its leg?”

   The reliability (Cronbach's alpha) of the scale in our sample was 0.70 at the beginning of the study, and 0.55 at the end of the study, three months later. These coefficients are comparable to other measures (e.g. pet attachment scales) for young children (Melson 1988).

4. Teachers’ assessments of their pupils with respect to sociability, social integration and aggressive behavior. The teachers (the accompanying teachers were not asked) were asked the following questions:
   a) How well do you get along with the child in class? The teacher was asked to respond using a four-point Likert scale, ranging from “good” (1) to “bad” (4). This question was designed to measure the sociability of the children.

   b) How well is the child integrated into the class? The teachers were asked to respond using a four-point Likert scale, as above. This question was designed to measure the social integration of the children.

   c) Are there children who exhibit aggressive behavior? The teachers were asked to provide the names of these children. This question
was designed to determine the number of aggressive children in
the classroom.

Procedure

Questionnaires were administered at the start of the second semester (Time
1), and 3 months later, toward the end of the school year (Time 2). Between
these times, one of three dogs was alternately present during lessons in the
experimental group. Alternating the dogs had the purpose of giving them
periodic breaks. However, it was not decided in advance which days each
dog would come to the school. Instead the teacher, knowing the dogs very
well, decided each day which dog she would bring to the school. Thus, a
dog was in the classroom every day until classes finished. Normally the
classes lasted from 8:00 a.m. to 12:00 p.m., but on one day of each week
the classes lasted until 1:00 p.m.

The dogs in the study were a male retriever (5 years old), a female
husky (3 years old) and a female cross-breed (8 months old). The husky
and the retriever were trained therapy dogs. All three dogs belonged to the
teacher in the experimental group and were free to roam around the class-
room and be petted. They were fed at regular intervals but they were not
exercised at any time. At the start of the project, the children were shown
how to care for a dog (how to pet a dog, feed it, give it a toy, where to place
the water bowl, etc.).

Analysis

All statistical analyses were conducted using SPSS (Norusis 1993). First,
the reliability (internal consistency) of the scales was examined (we cal-
culated Cronbach’s alpha). Second, hypotheses 1–3 were examined using
multivariate analysis of variance (MANOVA) for repeated measurements, a
procedure of the general linear model. A requirement for this procedure is
multivariate normality. This was tested using the Box M Test, which exam-
ines the equality of group covariance matrices. Finally, hypotheses 4 a) and
b) were examined using non-parametric Wilcoxon-Tests for ordinal data,
and hypothesis 4 c) was analyzed using Fisher’s exact test for nominal data.

Results

To start, we checked (using the CPM test) if the two groups of children were
comparable with respect to their levels of intelligence, because intelligence
generally influences many psychological findings. However, we found no sig-
nificant differences in the intelligence of the children ($t_{(40)}=0.23, p=0.816$).
GWT consist of 30 figures in which one has to find an embedded figure (a little house) and mark it using a computer mouse (Figure 1). Because of the low age of the children in the current sample, it was decided to reduce the number of items (30) by half (every second item was presented to the children). The reliability of the test (Cronbach’s alpha) in our sample was 0.75 at the beginning of the study, and 0.87 at the end of the study, three months later.

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c) Are there children who exhibit aggressive behavior? The teachers were asked to provide the names of these children. This question
Table 1. Mean “empathy with animals” scores at the beginning (Time 1) and end of the study (Time 2:3 months later) for children in the control and experimental groups.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>9.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Control group</td>
<td>10.5</td>
<td>11.1</td>
</tr>
</tbody>
</table>

F=6.94; df=1.43; p=0.006 (one-tailed)
Higher values indicate higher empathy with animals

Table 2. Mean “field independence” scores at the beginning (Time 1) and end of the study (Time 2:3 months later) for children in the control and experimental groups.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>7.4</td>
<td>8.5</td>
</tr>
<tr>
<td>Control group</td>
<td>7.4</td>
<td>7.2</td>
</tr>
</tbody>
</table>

F=3.8; df=1.43; p=0.029 (one-tailed)
Higher values indicate higher field independence

In order to examine hypotheses 1–3, we performed a multivariate analysis of variance using the independent variables time (Time 1, Time 2) and group (dog in the classroom/no dog) and the dependent variables (between-subject factors) “Empathy with animals,” “Field independence” and “Social intelligence.” The CPM scores (intelligence) served as a covariate (although no differences in intelligence were found at the beginning of the study, it was possible that the experimental manipulation had different effects, dependent on the individual differences in the intelligence of the children). The Box M Test (Box-M=28.86, F_{0.1,699}=1.17, p=0.266) showed that the prerequisites for using MANOVA were fulfilled. This analysis revealed significant multivariate effects of intelligence, (F_{3,41}=15.58, p<0.001, one-tailed), indicating that more intelligent children, on the whole, had higher values on the dependent variables, and that there was a two-way interaction between time and group (F_{3,41}=3.32, p=0.015, one-tailed). The two-way interaction indicates that the variables time and group had a common surplus effect, which could not be explained by considering them alone. At the level of the individual dependent variables, an intelligence effect emerged for the variables “Field independence” (F_{1,40}=40.95, p<0.001, one-tailed), “Empathy with animals” (F_{1,40}=5.45, p=0.012, one-tailed) and “Social intelligence” (F_{1,40}=7.42, p=0.004, one-tailed), and the interaction between time and group was significant for the variables “Empathy with animals” (F_{1,40}=6.94, p=0.006, one-tailed) and “Field independence” (F_{1,40}=3.80, p=0.029, one-tailed) (for the mean values, see Tables 1 and 2). The effect of social intelligence was not significant. Thus, in comparison with the control group, at Time 2 the children in the experimental group had significantly higher values on the scale which measured empathy. The mean baseline value for the experimental group was 9.5, which increased to 12.5
Table 3. Mean "sociability" scores at the beginning (Time 1) and end of the study (Time 2: 3 months later) for the children in the control and experimental groups.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Z*</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>2.3 (n=24)</td>
<td>1.7 (n=24)</td>
<td>-3.26</td>
<td>0.001</td>
</tr>
<tr>
<td>Control group</td>
<td>2.1 (n=22)</td>
<td>1.6 (n=22)</td>
<td>-2.7</td>
<td>0.007</td>
</tr>
</tbody>
</table>

* Results of Wilcoxon Signed Ranks test
Higher values indicate lower sociability

Table 4. Mean "social integration" scores at the beginning (Time 1) and end of the study (Time 2: 3 months later) for the children in the control and experimental groups.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Z*</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>1.96 (n=24)</td>
<td>1.6 (n=24)</td>
<td>-2.31</td>
<td>0.021</td>
</tr>
<tr>
<td>Control group</td>
<td>1.7 (n=21)</td>
<td>1.6 (n=21)</td>
<td>-0.30</td>
<td>0.763</td>
</tr>
</tbody>
</table>

* Results of Wilcoxon Signed Ranks test
Higher values indicate lower social integration

after the presence of the dog. In comparison, the starting value for empathy with animals in the control group was somewhat higher ($M=10.5$). Nevertheless, after three months the values had not changed much ($M=11.1$).

The most interesting result from our point of view (as the increased empathy with animals is something that could be expected after the three-month presence of an animal) was the significantly greater field independence of the children of the experimental group at Time 2, compared to the control group. On average, the children of the experimental group, after the three-month presence of a dog, could solve more than one extra item of the GWT (mean of 8.5 items solved) than the children of the control group (mean of 7.2 items solved). In sum, hypotheses 1 and 3 were confirmed, whereas hypothesis 2 could not be supported.

In order to test hypotheses 4a) and b), we performed non-parametric Wilcoxon Signed Ranks tests. We found significant differences for sociability (Question to the teacher: How well do you get along with the child?) between times 1 and 2 for the experimental group and the control group. This means that the teachers of both groups were of the opinion that they got along better with the children at Time 2 than they had at Time 1 (Table 3). Thus, the effect can not be traced back to the presence of a dog in the classroom.

With respect to the social integration of the children, however, there did appear a significant effect for the experimental group only. At Time 2, the two teachers regarded the children as significantly better integrated into the class group than at Time 1(Table 4).
Concerning the aggression of the children, it was discovered that in the experimental group only two out of 24 children could be rated as aggressive at both time points, whereas four children were rated as aggressive only at Time 1. Eighteen children were assessed as being non-aggressive at both times. Therefore the number of aggressive children had been reduced by half. This change tends in the direction of significance (Fisher's exact test, $p=0.054$). In the control group, 19 of 22 children were regarded as non-aggressive at both time points. One child was rated as aggressive at both time points and two children only for Time 2. This difference, however, is not significant (Fisher's exact test, $p=0.136$). Thus, hypothesis 4b) was confirmed but hypothesis 4c) was not (though the near significant data suggest a tendency in the predicted direction).

**Discussion**

In general, the present findings show that the presence of a dog had a positive effect on the children in the classroom. Thus, the hypotheses concerning the enhancement of field independence and empathy with animals could be confirmed. The hypothesis concerning the atmosphere in the classroom (measured by the assessments of the teachers) was partially confirmed. Thus, the children were better integrated in the classroom after having the dog present, and we found a tendency, from the teachers' viewpoints, that there were fewer aggressive children. These findings suggest that the presence of animals in the classroom is not only appropriate for disabled children (Law and Scott 1995) but is also important for the social and cognitive development of young immigrant children, who have various problems connected with understanding a new language and starting school. Whether it is possible to generalize our results to all school beginners is something which should be investigated in future studies.

At this point it is necessary to stress some of the limitations of our research which, hopefully, can be avoided in future studies. To start, it must be said that the experimental period of 3 months is rather short. Certainly long-term studies are needed to confirm our results. Moreover, we were not able to provide a randomized experimental design. Thus, it was not possible to randomly assign teachers and classes independently to the experimental and control groups. Although both teachers knew that the presence of the dog in the classroom was the critical experimental intervention, and that social integration and some other psychological variables would be tested twice, it is possible that the teacher who provided the dogs was more motivated to get "good results" in her class. Therefore the results from the assessments of the teachers should be viewed with caution. On
the other hand, the children themselves clearly did not recognize the aim of the study. They adapted very quickly to the presence of the dog and, thus, it is unlikely that they felt part of an experimental group. And although the main finding — the increased field independence of the children in the experimental group — may be partially explained by the greater enthusiasm of the teacher (although we believe that the presence of the dog was the decisive variable), it is not possible, from the present study, to determine just how important this confounding factor is.

In spite of the limitations of the study, we hope that the reported results will encourage other investigators to undertake further research in this field. Moreover, we hope that responsible institutions for the social integration of young immigrant children take notice of these results.

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