

Importance of Puppy Training for Future Behavior of the Dog

Ai KUTSUMI^{1)*}, Miho NAGASAWA¹⁾, Mitsuaki OHTA¹⁾ and Nobuyo OHTANI¹⁾

¹⁾*Azabu University Graduate School of Veterinary Science, 1-17-71 Fuchinobe, Chuo-ku, Sagami-hara, Kanagawa 252-5201, Japan*

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ABSTRACT. In this study, we attempted to clarify whether puppy socialization and command training class, which was limited to puppies approximately 4 months of age, prevented behavior problems in dogs. We evaluated the behaviors of 142 dogs with 4 types of training experience by using a behavior test and the Canine Behavior Assessment and Research Questionnaire (C-BARQ). Dogs in the puppy class (PC) group (n=44) attended the class for 1 hr each week for 6 weeks, dogs in the puppy party (PP) group (n=39) attended a 1-hr “puppy party,” dogs in the adult class (AC) group (n=27) undertook basic obedience lessons for adolescent/adult dogs for 1 hr each week for 6 weeks, and dogs in the no class (NC) group (n=32) underwent no formal training. The behavior test evaluated each dog’s response to commands, owner’s recall, separation, a novel stimulus and strangers. The C-BARQ evaluated 15 canine behavioral factors. The behavior test results indicated that the PC and AC groups showed significantly higher response to commands than the PP or NC group. Thus, participation in puppy and adult classes improved the obedience behavior of dogs, regardless of age. Positive response to strangers in the PC group was significantly higher than that in the AC and NC groups and tended to be higher than that in the PP group. Therefore, PC may help prevent canine behavioral problems such as disobedience or fear of strangers.

KEY WORDS: behavior, canine, puppy, socialization, training.

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In the United States and Europe, dog behavioral problems account for 17–20% dogs relinquished to animal shelters, with most of these dogs being sacrificed eventually [3, 11, 14, 16]. In Japan, the estimated number of pet dogs was 11,861,000 in 2010 [9]. Of these, 74,297 adult dogs and 19,510 puppies were relinquished to animal shelters in 2009 [13]. An additional report suggested that 32,944 of those relinquished dogs were either returned to their owners or adopted by new owners, whereas 64,061 dogs were eventually sacrificed in 2009 [13]. Although empirical data have not been collected to assess the reasons why the dogs were relinquished to animal shelters, it is likely that the key reason underlying this action was behavioral problems, which was also observed in the U.S. and Europe.

Adequate socialization is necessary for producing a well-balanced and well-adjusted dog [17]. Fear or aggression towards people or other dogs is strongly influenced by the environment during the socialization period [1, 19]. An interesting survey in Spain suggested that aggressive behavior toward people and moving objects is associated with the levels of training and socialization [10]. Puppy class (PC) was originally developed to provide training for puppies to prevent behavioral problems, and it is different from the obedience class conducted for adult dogs. The PC includes socialization with people and other dogs, desensitization to noises in the class, basic command training and responsible dog ownership. Dogs that participated in puppy

socialization classes had a higher retention rate in homes [5]. However, there have been no studies on the behavioral effects of dogs after the puppy socialization class. Till date, a limited number of researchers have succeeded in scientifically clarifying the effects of PC training. If a short course of puppy training could help minimize unwanted behaviors and if the effect of training was scientifically proven, then PC could play an important role in preventing behavioral problems.

PC includes basic obedience training as well as socialization with other puppies and people. However, in Japan, basic obedience class for adolescent/adult dogs is more popular than PC. We hypothesize that the PC and the adult class (AC) have different effects on canine behavior, particularly in terms of socialization. Thus, a trial puppy training session called “puppy party” (PP) is currently being practiced in Japan. It has been observed that participants were recruited more easily for PP than PC. In this study, we compared behavioral effects on dogs with 4 different types of training class experience: PC, PP, AC and NC (no class). For the evaluation of dog behaviors, a behavioral test was performed at the owner’s house to investigate the dog’s social behavior towards people, response to handling by and commands of the owner or strangers, response to a novel stimulus and response to separation. In addition, the Canine Behavior Assessment and Research Questionnaire (C-BARQ) [20] was used to identify any aggression in the dog’s daily conduct that might not be sufficiently identified by the behavioral test.

MATERIALS AND METHODS

Subjects: In this study, 142 dogs and their owners were recruited by personal contacts and circulars distributed by

*CORRESPONDENCE TO: KUTSUMI, A., Azabu University Graduate School of Veterinary Science, 1-17-71 Fuchinobe, Chuo-ku, Sagami-hara, Kanagawa 252-5201, Japan.

e-mail: tsujimura@siriusdog.jp

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the SIRIUS® Dog Training School and the adjacent pet store in Japan. The participants lived in Hyogo, Osaka, or Kyoto Prefecture in Japan. In the study, informed consent was obtained from each participant. The participants included 76 male and 66 female dogs, with 7 crossbred dogs and 135 purebred dogs, which represented 31 different breeds. According to American Kennel Club categories, the dogs were classified into 13 sporting dogs, 24 hounds, 18 terriers, 57 toy dogs, 19 non-sporting dogs and 11 herding dogs (Table 1). The term “breed group” was used when comparing the results among these 6 breed groups in this study. All dogs were classified into one of the 4 classes on the basis of previous training experience: (1) PC group, (2) PP group, (3) AC group and (4) NC group (Table 2). The dogs in the PC group attended the SIRIUS® Dog Training School Japan for 1 hr each week for 6 weeks (n=44). The dogs in the PP group attended a 1-hr puppy party (n=39). The dogs in the AC group participated in basic obedience lessons for adolescent and adult dogs (n=27) and had never participated in a PP, PC, or any other training lessons before joining this class. The dogs in the NC group did not receive any training lessons (n=32).

The puppy class: In this study, PC refers to the classes held by the author in SIRIUS® Dog Training School Japan. Each PC included 4–8 puppies and their owners. The puppies were between 10 and 18 weeks of age when they started the first class and had received 2 DHLPP (Distemper, Hepatitis, Leptospirosis, Parvo and Parainfluenza) vaccinations. The PC training opportunities included bite inhibition, house-training, habituation, classical conditioning to the other dogs and handling by other participants. The adopted training methods were basic obedience commands (Sit, Down, Come, Stay, and Off) and off-leash control skills without force. We used the training methods and PC program that were developed by Dunbar [4]. A homework sheet was given to the dog owners of each class to encourage their study at home.

The puppy party: In this study, PP means the parties held by the author in SIRIUS® Dog Training School Japan. The PP included 4–8 puppies and their owners, and these are held for a single 1-hr session, which is the same as the first week of the PC. The puppies were between 10 and 18 weeks of age and had received 2 DHLPP vaccinations. The PP provided the opportunities for bite inhibition, housetraining, habituation, classical conditioning to the other dogs and handling by other participants as well as basic obedience command training (Sit and Down).

The adult class: The dogs in the AC had participated in one of the 3 dog training schools: SIRIUS® Dog Training School Japan, Dog’n’people, or Tocotoko. All the training schools adopted the training methods based on positive reinforcement without using physical force or physical punishment. All 3 schools were provided the training of basic obedience commands (Sit, Down, Come, Stay and Off) and handling by the owner and other participants. The participants attended the class for 1 hr each week for 6 consecutive weeks. The dogs were 5 months to 2 years of age when they started the first class. Adult classes were group sessions, and there were 2–5 dogs in each class. All dogs in the ACs were not aggres-

Table 1. Demographic information of dogs

Breed groups	Breed	n
Sporting	Golden Retriever	6
	Labrador Retriever	6
	Irish Setter	1
Hound	Miniature Dachshund	19
	Beagle	2
	Miniature Dachshund mix	1
	Beagle mix	1
	Whippet	1
Terrier	Miniature Schnauzer	8
	Jack Russell Terrier	6
	Miniature Bull Terrier	1
	West Highland White Terrier	1
	Airedale Terrier	1
	Wire Fox Terrier	1
Toy	Toy Poodle	23
	Chihuahua	7
	Papillon	5
	Miniature Pinscher	4
	Shih Tzu	4
	Pomeranian	3
	Pug	2
	Maltese	2
	Italian Greyhound	1
	Cavalier King Charles Spaniel	1
	Pekingese	1
	Japanese Chin	1
	Bichon Frise mix	1
Chihuahua - Toy Poodle mix	1	
Chihuahua - Miniature Pinscher mix	1	
Non-sporting	Shiba Inu	13
	Shiba Inu mix	3
	Boston Terrier	2
	Japanese Spitz	1
Herding	Pembroke Welsh Corgi	9
	Belgian Tervuren	1
	Border Collie	1
	total	142

sive or reactive to people or dogs.

Experimental procedures: Behavioral test. In this study, we needed to evaluate the dog’s socialization with the owner and other people, response to handling, response to commands, and response to a novel stimulus. Since there is no suitable behavioral test to assess all the above responses, we developed a behavior test from previous behavior tests [15, 18, 21] and performed factor analysis of the results of the behavior test.

The experimenter (woman) and another woman who played the role of a stranger in the test visited the home of each dog once. Each test session lasted 30 min. All test sessions were videotaped for subsequent analysis. In all behavior tests, the experimenter had a familiarization period of at least 5 min. The woman who played a stranger in the test had never met any of the tested dogs in the past.

Table 2. Breed groups, genders and ages of dogs in experimental groups

Group	Sporting	Hound	Terrier	Toy	Non-sport	Herding	Male (neutered)	Female (spayed)	Age in months (mean \pm S.D.)	Range (months)
PC	5	6	5	21	5	2	23 (17)	21 (14)	18.83 \pm 1.11	6–36
PP	3	6	6	19	0	5	20 (6)	19 (5)	18.33 \pm 1.41	6–33
AC	3	7	4	7	4	2	15 (11)	12 (8)	23.78 \pm 1.74	9–36
NC	2	5	3	10	10	2	18 (4)	14 (6)	17.56 \pm 1.41	6–33

The room with which the dog was most familiar was selected as the test room. A small chair was placed in the corner of the room, and the experimenter outlined the test protocol to the owners. A video camera (GZ-MG330-S; JVC KENWOOD Corp., Kanagawa, Japan) was mounted on a tripod to maximize the floor space being filmed while eliminating the risk of accidental damage by the dog. The dog's behaviors during each test were transcribed from the video data. The behavioral tests and variables are described in Table 3. These variables were used in the factor analysis. Further, comparisons between the groups were based on the factor scores.

Questionnaire. Before the behavioral test, we mailed a questionnaire to the test-dog owners. The questionnaire used in this study was based on the C-BARQ developed by Hsu and Serpell [8]. They developed the original C-BARQ for measuring behavioral traits in pet dogs by using data from the United States. Nagasawa *et al.* examined the validity of the C-BARQ in Japan [12]. Subsequently, they suggested that C-BARQ could be used in Japan to assess 15 behavioral factors. In this study, we used the mean of the total scores of each behavior factor, according to the method of Hsu and Serpell [8].

In the questionnaire, we also asked about the level of socialization and command training that the dogs experienced in daily life and rated the score on a 5-point scale: "Frequency of contact with people outside the family," "Frequency of contact with dogs outside the family," "Frequency of basic command training (Sit, Down, Come and Stay)," and "Frequency of learning new tricks."

We evaluated the differences in the 15 factors of the C-BARQ in Japan and 4 experience levels in daily life among the 4 training groups.

Statistical analysis. Demographic data of the dogs were analyzed using the chi-square test. Data from the behavioral test were initially subjected to factor analysis. Kaiser's eigenvalue rule was used to determine the number of interpretable factors that could be extracted, and varimax rotation was used to identify empirical groupings of the measured variables of the behavior test. Results were expressed as mean \pm SEM. To analyze the factors of the behavior test and questionnaire, each parameter was analyzed by multivariate analysis of variance (MANOVA) by using training group, breed group, and sex as factors. In addition, a post-hoc Bonferroni test was used to analyze differences among the training groups. Statistical significance was accepted at $P < 0.05$. All analyses were performed with statistical software (SPSS, v.13; IBM Japan Ltd., Tokyo, Japan).

RESULTS

There was no significant difference in breed groups, age, and sex among the training groups. There were significant differences in the ratio of neutered/spayed to total dogs among the groups [$\chi^2(3)=23.7$, $P < 0.01$], but there was no significant difference in residual analysis.

Factor analysis of the behavior test: Twenty-five variables measured by the behavior test were categorized into 2 groups: the 19 continuous variables group and the 6 ordinal variables group. Further, each group was analyzed by factor analysis. The continuous variables were grouped into 5 factors that accounted for 80.3% of the common variance (Table 4). Measured variables with an absolute value of factor loading of < 0.4 were excluded. The first factor consisted of 6 variables that were related to commands both by the owner and the stranger, which was labeled "Response to commands." The second factor consisted of 4 variables that were related to separation and was thus labeled "Response to separation I." The third factor consisted of 3 variables that were related to interaction with a strange person and was labeled "Positive response to stranger." The fourth factor consisted of 2 variables that were related to owner's recall and was subsequently labeled "Response to owner's recall." The fifth factor consisted of 2 variables that were related to separation and was labeled "Response to separation II."

The ordinal variables were grouped into 2 factors that accounted for 69.25% of the common variance (Table 5). The first factor consisted of 4 variables that were related to fearful behavior for novel stimulus and investigation behavior for novel stimulus, which was labeled "Fearful response to novel stimulus." The second factor consisted of 2 variables that were related to aggressive behavior for novel stimulus and was thus labeled "Aggressive response to novel stimulus."

Correlation between the behavior test and questionnaire: The relationship between the behavior test and C-BARQ was examined by correlation analysis, and significant correlations were observed between the following mutual corresponding traits (Table 6): Positive response to strange person and Stranger-directed fear ($r_s = -0.37$, $P < 0.01$) and Response to command and Trainability 2 ($r_s = 0.32$, $P < 0.01$). Trainability 2 was related to 2 question items, namely, slow learning and reactivity to command (reverse scoring).

With regard to the relationship between the behavior test and the 4 experience levels in daily life, some significant correlations were observed (Table 7): Response to command and Frequency of contact with people outside family

Table 3. Behavioral variables measured in the behavior test

Evaluated factors	Descriptions	Evaluation unit
1. Handling test by OW ^{a)}	OW sat either in front of or beside the dog and demonstrated the four actions listed below.	
1-1 Touch both ears and look inside them	Pass: Accepted being handled without aggressive behaviors or escape behaviors	Passed frequency from 4 handling tests (0–4)
1-2 Touch four legs	Fail: Showed aggressiveness such as growling, snapping, biting, or moved out of reach and made it impossible to continue this test.	
1-3 Touch muzzle	* If the dog did not come to OW, these tests were finished with all the results considered “fail”. Never forcefully grab or get close to the dog.	
1-4 Hug (hold up)		
2. Food guarding test	OW was instructed to feed kibble and the dog’s favorite treats from his/her bowl as usual. Immediately after the food was served, the experimenter performed the below listed actions on the dog. If the food was completely consumed prior to the end of the experiment, more food was added.	
2-1 Move a dummy hand squarely toward the dog	Evaluate the dog’s behaviors after 1–6 trials by the scores (0) to (4) against the dog behaviors	Maximum scores through 6 tests (0–4)
2-2 Touch the dog’s back with the dummy hand	0: Did not show any aggressive or food guarding behaviors.	
2-3 Move the bowl using the dummy hand	1: Guarded the food with its body, stopped eating or changed eating speed.	
2-4 Pet the dog’s back with the experimenter’s hand	2: Stiffened the body, growled, picked the dish when eating.	
2-5 Move the bowl with the experimenter’s hand	3: Snarled and growled, snapped, touched the dummy hand or human hand with its teeth.	
2-6 Remove the bowl with the experimenter’s hand	4: Showed seriously aggressive behaviors. Bit the dummy hand hard. Bit and flung it around many times. If the dog became aggressive toward the dummy hand, the test was terminated	
3. Command test by OW	OW gave the following commands. The commands were repeated for a maximum of 30 sec if the dog did not respond immediately. Neither food nor toy was used as the dog’s motivation, and touching the dog was prohibited. Two trials were permitted for each test. The total number of commands, either through verbal or hand signals, were counted.	
3-1 “Sit” when dog is in a standing position	[Command achievement] Passed if the response was seen within 30 sec on each trial, otherwise failed. Two trials are permitted for each command test.	Frequency of passed from 6 trials (0–6)
3-2 “Down” when dog is in a sitting position	[Command reliability] Measured the rate of responding to commands.	1/command qty. (AV)
3-3 “Sit” when dog is in a down position		
3-4 Come	OW sat on the chair or stood in front of the dog. The experimenter tapped on the floor to make a sound to induce the dog to move more than 2 m away from OW. When the dog was away from OW, OW was instructed to recall the dog. OW was allowed to call the dog for a maximum of 15 sec, and two trials were permitted. [Recall achievement] Passed if the dog came to OW within 15 sec, otherwise failed. [Recall reliability] Measured the rate of responding to recall command.	Frequency of passed from 2 trials (0–2) 1/command qty. (AV)
3-5 Sit-Stay	Time of Sit-Stay (Max. 30 sec)	sec
3-6 Down-Stay	Time of Down-Stay (Max. 30 sec) [Time of “stay”] The sum of time of Sit-stay and Down-stay.	sec
4. Handling test by ST ^{b)}	} We used the same routine for the stranger that was used for OW.	
5. Command test by ST		

($r_s=0.41$, $P<0.01$), Frequency of contact with dogs outside family ($r_s=0.32$, $P<0.01$), Frequency of basic command training ($r_s=0.39$, $P<0.01$), and Positive response to stranger and Frequency of contact with people outside family ($r_s=0.30$, $P<0.01$).

Comparisons of the scores derived from the behavior test and questionnaire between training groups: The behavior test. MANOVA revealed that there were no significant interactions among training groups, breed groups and sexes. There were significant effects of training group [Response to

commands: $F(3)=3.59$, $P<0.05$; Response to strange person: $F(3)=3.20$, $P<0.05$].

In the case of the training groups, the post-hoc Bonferroni test revealed that the Response to commands was significantly higher in the PC group than in the PP and NC groups [Fig. 1(A): PC vs. PP, $P<0.01$; PC vs. NC, $P<0.01$], and the dogs in the AC group showed a significantly higher score for Response to commands than dogs in the PP and NC groups [Fig. 1(A): AC vs. PP, $P=0.03$; AC vs. NC, $P<0.01$]. The Positive response to stranger was significantly higher in the

(Table 3. Continued)

Evaluated factors	Descriptions	Evaluation unit
6. Reaction to novel stimulus	OW sat on the chair and the experimenter placed an electric stuffed toy at a point 1.5 m away from OW. The experimenter used a remote control to operate the toy as per the below listed schedule.	
6-1 Stopped for 0 to 15 sec (unmoving stimulus)	[Level of aggressive behavior for unmoving stimulus: 0–4] 0: Nonaggressive. 1: Stiffened. 2: Growled/barked, snarled. 3: Snapped at or touched the stimulus. 4: Bit or tried to bite the stimulus.	score 0–4
	[Level of fearful behavior for unmoving stimulus: 0–4] 0: No fearfulness. 1: Try to approach the stimulus, but keep away from the stimulus. 2: Look away, ears down, tail down, does not move, tremble, whine, snarl etc. 3: Ears down, tail down and get away from the stimulus. 4: Escape, shrink, try best to escape or hid from the frightening targets.	score 0–4
	[Level of investigating behavior for unmoving stimulus: 0–4] 0: No investigating behavior. 1: Interested in the stimulus, but keep away from the stimulus. 2: Get close slowly and sniff. 3: Get close normal speed and sniff, touch, or push. 4: Get close immediately and sniff, push, push, or hold in.	score 0–4
6-2 Walked for 15 to 30 sec (moving stimulus)	The same variables measured with unmoving stimulus: level of aggressive, fearful and investigating behavior.	score 0–4
7. Separation test	OW left the room and stayed outside for 1 min followed by the experimenter leaving the room and staying outside for 1 min.	
7-1 OW leaves the room	Time that the dog stays close to the door (in 1 min) Frequency of whining Frequency of touching the door	sec times times
7-2 Everyone leaves the room	Time that the dog stays close to the door (in 1 min) Frequency of whining Frequency of touching (scratching, jumping at) the door	sec times times

a) OW: owner, b) ST: stranger.

Table 4. Results of factor analysis of behavior test (continuous variables)

Item	% of Variance ^{a)}	Cronbach α -values	Loading
Factor 1—Response to commands	28.49	0.54	
Command achievement by OW			0.85
Command reliability by OW (mean)			0.85
Command achievement by ST (mean)			0.81
Command achievement by ST			0.80
Time of “stay” by OW			0.65
Time of “stay” by ST			0.59
Factor 2—Response to separation I	21.73	0.95	
Frequency to touch the door No. 2			0.96
Frequency to bark or whine No.1			0.96
Frequency to touch the door No.1			0.94
Frequency to bark or whine No. 2			0.79
Factor 3—Positive response to stranger	11.63	0.67	
Recall achievement by ST			0.94
Recall reliability by ST			0.84
Score of handling test by ST			0.61
Factor 4—Response to owner’s recall	10.3	0.7	
Recall reliability by OW			0.93
Recall achievement by OW			0.78
Factor 5—Response to separation II	8.10	0.8	
Time that the dog stays close to the door No.1			0.88
Time that the dog stays close to the door No.2			0.78

a) Rotation sums of squared loadings. Extraction method: Maximum likelihood. Rotation method: Varimax with Kaiser normalization.

Table 5. Results of factor analysis of behavior test (ordinal variables)

Item	% of Variance	Cronbach α -values	Loading
Factor 1—Fearful response to novel stimulus	39.89	0.84	
Investigating behavior for moving stimulus			-0.92
Fearful behavior for moving stimulus			0.85
Investigation behavior for unmoving stimulus			-0.69
Fearful behavior for unmoving stimulus			0.57
Factor 2—Aggressive response to novel stimulus	29.36	0.86	
Aggressive behavior for unmoving stimulus			0.99
Aggressive behavior for moving stimulus			0.80

Extraction method: Maximum likelihood. Rotation method: Varimax with Kaiser normalization.

Table 6. Correlations between the response scores from the behavior test and the factor scores from the C-BARQ in Japan

Response in the behavior test	Factors from the C-BARQ in Japan															
	SDA	SRB	SDF	NSF	PRA	ODA/F	AAB	DDA	CHASE	ORE	TRAIN1	DDF	VRE	TRAIN2	IAB	
Commands	-0.17	0.01	-0.29	-0.07	-0.02	-0.10	-0.06	-0.06	0.19	-0.07	0.20	-0.26	-0.07	<u>0.32</u>	0.01	
Separation I	-0.04	0.24	0.00	-0.03	-0.07	-0.09	-0.01	-0.02	-0.11	0.12	0.07	0.07	0.13	0.07	-0.05	
Stranger	-0.18	-0.01	<u>-0.37</u>	-0.08	0.02	-0.03	-0.05	-0.03	0.15	-0.02	0.17	-0.19	-0.09	0.11	-0.04	
Owner's recall	0.04	0.06	-0.02	-0.06	-0.05	0.00	0.07	0.05	0.13	-0.11	0.04	-0.09	0.01	0.10	0.05	
Separation II	-0.10	0.14	0.01	-0.06	-0.07	-0.02	-0.05	-0.14	0.02	0.03	-0.07	-0.07	0.05	0.10	-0.04	
FRN	0.26	0.10	0.25	0.19	0.08	0.08	0.15	0.20	-0.27	0.05	0.00	0.26	0.07	0.01	-0.06	
ARN	0.27	0.12	0.23	0.16	0.11	0.10	0.15	0.21	-0.26	0.07	-0.01	0.27	0.07	0.01	-0.04	
Cronbach α -values	0.90	0.81	0.86	0.73	0.75	0.66	0.74	0.94	0.75	0.81	0.67	0.85	0.72	0.63	0.73	

Coefficients in bold indicate statistically significant correlations at $P < 0.05$ after correction for the number of comparisons, coefficients greater than 0.30 are underlined. SDA: stranger-directed aggression, SRB: separation-related behavior, SDF: stranger-directed fear, NSF: non-social fear, PRA: possession-related aggression, ODA/F: owner-directed aggression/fear, AAB: attachment and attention-seeking behavior, DDA: dog-directed aggression, CHASE: chasing, ORE: outing-related excitability, TRAIN1: trainability 1, DDF: dog-directed fear, VRE: visitor-related excitability, TRAIN2: trainability 2, IAB: intervention of third-party-related attention-seeking behavior, FRN: fearful response to novel stimulus, ARN: aggressive response to novel stimulus.

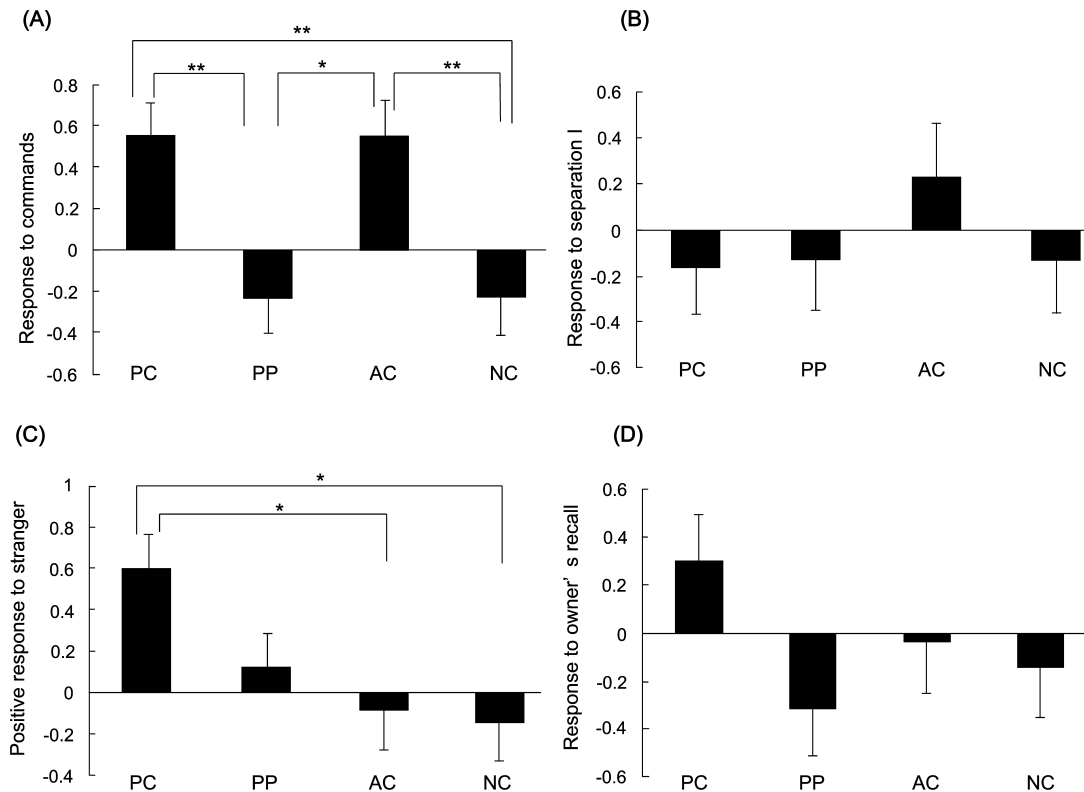


Table 7. Correlations between the response scores from the behavior test and the experience level in daily life

Response in the behavior test	Experience level in daily life			
	People	Dog	Commands	Tricks
Commands	0.41	0.32	0.39	0.10
Separation I	-0.12	-0.07	-0.10	-0.06
Stranger	0.30	0.22	0.16	0.07
Owner's recall	-0.01	0.02	0.01	-0.05
Separation II	0.00	0.00	-0.03	0.00
FRN	-0.21	-0.14	-0.04	-0.12
ARN	-0.20	-0.16	-0.03	-0.12

Coefficients in bold indicate statistically significant correlations at $P < 0.05$ after correction for the number of comparisons, coefficients greater than 0.30 are underlined. FRN: fearful response to novel stimulus, ARN: aggressive response to novel stimulus.

PC group than in the AC and NC groups [Fig. 1(C): PC vs. AC, $P=0.04$; PC vs. NC, $P=0.02$]. The Positive response to stranger in the PC group tended to be higher than that in the PP group [Fig. 1(C): $P=0.07$].

Questionnaire. Regarding the C-BARQ and the 4 experience levels in daily life, MANOVA revealed that there were no interactions among training groups, breed groups, and sexes. Further, there were no significant differences among the training groups.

DISCUSSION

The primary aim of this study was to compare the behavioral effects of puppy socialization and command training class, which was limited to puppies approximately 4 months of age with the effects of other types of training experience: PP, AC, and NC. There were no significant differences in breed groups, age, sex, and the proportion of neutered/spayed dogs among the class groups.

In this study, an original behavior test was developed from previous behavior tests to evaluate the behavior traits required of companion dogs, such as friendship to owners and strangers, acceptance of handling, response to commands, and response to novel stimulus. Seven factors were extracted by factor analysis: "Response to commands," "Response to separation I," "Positive response to stranger," "Response to owner's recall," "Response to separation II," "Fearful response to novel stimulus" and "Aggressive response to novel stimulus."

There were 2 significant correlations between the scores of the behavior test and the C-BARQ in Japan. A negative correlation was observed between Positive response to stranger in the behavior test and Stranger-directed fear in the C-BARQ, suggesting that dogs less friendly to strangers according to the behavior test show a stronger fear of strangers in daily life. A positive correlation was also detected between Response to commands and Trainability. The trainability in C-BARQ indicates the speed of learning new tricks or tasks and responding to correction or punishment.

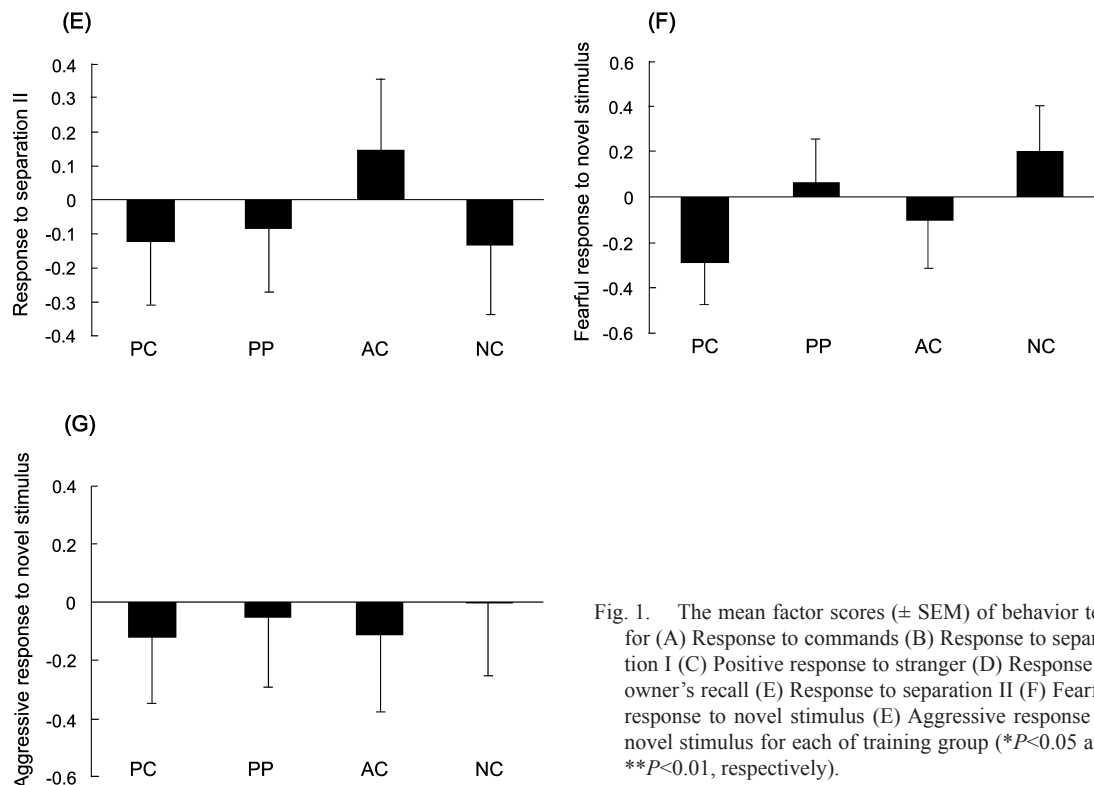


Fig. 1. The mean factor scores (\pm SEM) of behavior test for (A) Response to commands (B) Response to separation I (C) Positive response to stranger (D) Response to owner's recall (E) Response to separation II (F) Fearful response to novel stimulus (E) Aggressive response to novel stimulus for each of training group ($*P < 0.05$ and $**P < 0.01$, respectively).

This positive correlation suggests that the dogs with higher Response to commands were considered as highly trainable in daily life by the owners. In addition, there were some significant correlations between the scores of the behavior test and the 4 experience levels in daily life. Three positive correlations were detected between Response to commands and Frequency of people outside family, Frequency of dogs outside family, and Frequency of basic command training. These positive correlations suggest that the dogs with greater experience of socialization and basic command training in daily life showed stronger Response to commands, according to behavior test. Further, a positive correlation was observed between Positive response to stranger in the behavior test and Frequency of contact with people outside family, suggesting that dogs with higher experience level about socialization with people are more friendly to strangers, according to the behavior test.

To compare the behavior test scores among the training groups, we used MANOVA to analyze the training groups, breed groups, and sexes. There were no interactions among these variables. Response to commands was significantly higher in the PC and AC groups than in the PP or NC group. Past studies have revealed positive effects of puppy socialization and training programs on response to commands [18] and positive effects of obedience training in adult dogs [2]. Hence, command training may be effective, regardless of age. In addition, Positive response to stranger in the PC group was significantly higher than that in the AC and NC groups and tended to be higher than that in the PP group. This indicates that handling or command training by non-family members during PC could promote socialization with people and classical conditioning. In addition, there were no significant differences among the training groups with respect to the experience level of socialization and basic command training in daily life, according to the results of the questionnaire. Therefore, the differences in the response to stranger and commands in the behavior test among training groups were because of the effect of learning in training class, and not experience in daily life.

From the above results, we suggest that the training frequency of PP is insufficient for both command and socialization training. AC is good for command training, but too late for socialization. Previous studies have indicated that a dog's experience during the socialization period has a strong influence on future behavioral development [1, 6, 17, 19]. Scott and Fuller defined the period of socialization as between 3 and 12 weeks from the results of a study on complete isolation in laboratory animals [17]. This study, however, claimed that contact with people after the socialization period was still effective. Fuller found that puppies could be socialized to people during this period with as little as two 20-min sessions of exposure per week [7]. Our study suggests that even after the socialization period, active approach by various people in the puppy class (6 weeks of 1 hr session per week) might be effective in further socialization to people.

In conclusion, this study revealed 3 important findings. First, the behavior test showed that participation in PC contributes to improving the positive response of the dog to

strangers. This indicates that if an ordinary companion puppy participates in a PC for socialization at about 4 months of age, the dog is likely to remain friendly to non-family members at an acceptable level. Second, participation in PC or AC contributes to improving the response to commands. Therefore, PC and AC may help prevent or modify disobedience problems. Third, significant correlations were found between the behavior test and C-BARQ. This suggests that the C-BARQ is effective for early detection of behavioral problems, and dog owners and professional dog-behavior therapists can start behavior modification programs before the problem becomes critical.

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