

Nicola J. Rooney,¹ Ph.D.; John W. S. Bradshaw,¹ Ph.D.; and Helen Almey,² Ph.D.

Attributes of Specialist Search Dogs—A Questionnaire Survey of UK Dog Handlers and Trainers

ABSTRACT: The ideal and actual characteristics of specialist search dogs have been examined in questionnaire surveys of 244 dog handlers and trainers from the six main UK dog-using Government agencies. The ten most important characteristics were (ideal level in brackets): acuity of sense of smell (very high), incentive to find an object which is out of sight (very high), health (very high), tendency to hunt by smell alone (very high), stamina (very high), ability to learn from being rewarded (very high), tendency to be distracted when searching (very low); agility (high), consistency of behaviour from day to day (high), motivation to chase an object (high). Significant differences between actual and ideal levels were found for 22 of the 30 characteristics, predominantly in undesirable attributes, suggesting that there is scope for significant improvement in operational effectiveness.

KEYWORDS: forensic science, specialist search dog, selection, questionnaire survey, behavioral attributes

Specialist search dogs (also known as detection dogs) are used by a large number of law-enforcement agencies worldwide to help locate a variety of target substances (1). They are trained to detect a range of substances and items, including explosives, weapons, and drugs, as well as currency, land mines, ivory, flammable materials, and both live and dead bodies. In the UK, the military, civilian police forces, HM Prison Service, HM Customs and Excise, and a range of private companies employ large numbers of search dogs. There is literature on the temperament of working guide dogs (2–4) and guarding breeds (5), but despite the important role they perform, search dogs are rarely referred to in the scientific literature (but see Refs 6–8).

Over the past 30 years, the use of search dogs has grown dramatically, and this has been accompanied by a corresponding increase in the demand for suitable animals to be trained. Thus, the process by which agencies select and procure dogs has become increasingly important. There have been several attempts to establish breeding programs for specialist search dogs. Today a number of overseas agencies successfully breed many of the dogs that they require (e.g., Australian Customs, Ref 9). However, in the UK, procurement procedures rely mainly on the donation of unwanted dogs. The majority of these dogs are rejected pets obtained either directly from members of the public or via rescue centers.

The demands upon trainee search dogs are very high, and only a small minority of the general dog population possesses the characteristics necessary to complete training. Selecting those dogs that are likely to be trainable requires knowledge of which behavioral traits are most important and predictive of future success. Selection procedures are well established within individual agencies, and search dog experts have clear ideas of what constitutes a “good” dog. How-

ever, there is little documented literature describing and collating these opinions.

In this study we have devised and applied a questionnaire that examines the characteristics that search dog trainers and handlers consider the most desirable in a potential search dog. Although this technique has not been used previously in this context, questionnaires have been used successfully to gain information about the behavioral characteristics of different dog breeds (10), behavioral disorders (11), attitudes towards dogs (12), behavior of potential guide dogs (4), and differences between the ideal and actual behavior of pet dogs (13). More generally, it has become commonplace to characterize the behavioral traits of complex animals, including primates (14), cats (15), and farm animals (16), using information from people familiar with them. In our study, we first conducted structured interviews with 37 search dog experts to identify behavioral traits that they deemed important. This process ensured that common search dog terminology was used subsequently. A written questionnaire was then formulated to poll the opinion of a larger number of handlers and trainers ($N = 251$) to ascertain the relative importance and desired levels of each trait.

Since search dogs are used for a variety of purposes, we explored whether the characteristics required for different uses vary. For example, dogs are used to search either for drugs or for explosives: the conditions under which each works vary, and this may in turn affect the type of dog that is required. In addition, there are dogs that locate drugs hidden on people and their luggage (passive work) and other dogs that search areas (proactive work). Passive drugs dogs are employed in airports and prisons and are trained to scan large numbers of people for the presence of narcotics, while proactive drugs dogs generally search buildings and outdoor areas. The demands of these two types of work differ, which again may affect the requirements of the dog.

Finally, we used the questionnaire to examine the performance of the respondents' current search dogs. We compared the respondents' ratings for their ideal dog with their ratings for their own dog. We thus assessed the extent to which each trait deviated from

¹ Anthrozoology Institute, University of Bristol, Department of Clinical Veterinary Science, Langford, Bristol BS40 5DU, UK.

² Defence Science and Technology Laboratory, Fort Halstead, Sevenoaks, Kent, TN8 7BP, UK.

Received 15 Feb. 2003; and in revised form 17 Aug. 2003 and 1 Nov. 2003; accepted 1 Nov. 2003; published 4 Feb. 2004.

the ideal rating and identified those traits that may benefit from additional attention during selection.

Methods

Establishment of Descriptive Vocabulary

Informal oral interviews were carried out with 37 subjects. These included representatives of the UK Army (Royal Veterinary Corps and Royal Military Police), Royal Air Force (RAF), Ministry of Defence Police, HM Prison Service, HM Customs and Excise, and civilian police forces. All were highly experienced search dog handlers and trainers. Interviewees reported over 100 characteristics that they believed to be important in a potential search dog. These were condensed, by removal of synonyms and splitting of composite characters, into 30 ostensibly discrete characteristics (agreed by consensus between three judges familiar with search dog training), which were then used in the questionnaire survey.

Distribution of the Questionnaire Survey

Questionnaires were distributed to each of the main agencies using detection dogs within the UK. Senior management sent ques-

tionnaires to search dog-handling and training personnel within the Ministry of Defence Police, HM Prison Service, HM Customs and Excise, the Joint Services Defence Animal Centre, the UK Army, and the RAF. Since there are a very large number of UK civilian police forces utilizing dogs, a representative sample was chosen from Surrey, Thames Valley, Lancashire, South Wales, Dyfed Powys, and Durham constabularies.

Questionnaire Design

The questionnaire consisted of five pages. Respondents answered an initial eleven questions, some of which had multiple components that provided demographic information on the agency they worked for, the length of time they had handled dogs, and the types of dogs they were trained to handle. They next gave details of each of the dogs that they currently worked. These included the dog's purpose, age, breed, sex, and the main jobs it currently performed. The respondent was then asked to rate their overall satisfaction with their dog's working ability.

The next three pages each contained a list of the 30 behavioral traits (Table 1, Column 1), as identified from the preliminary interviews. Respondents were asked to perform three ratings:

TABLE 1—Mean ideal levels of each of the 30 search dog characteristics presented in order from highest to lowest for the overall sample ($N = 244$). Mean levels for each of the four separate handler types are also presented. Those traits that were required at significantly different levels by the four handler types are indicated with asterisks.

Characteristic	Overall Sample	Mean \pm SD			
		Explosives $N = 58$	Proactive Drugs $N = 114$	Passive Drugs $N = 31$	Proactive and Passive Drugs $N = 27$
Very High					
Acuity of sense of smell	4.8 \pm 0.44	4.7 \pm 0.46	4.8 \pm 0.46	4.9 \pm 0.43	4.9 \pm 0.32
Health	4.8 \pm 0.47	4.7 \pm 0.46	4.8 \pm 0.45	4.8 \pm 0.62	4.8 \pm 0.37
Incentive to find an object which is out of sight	4.8 \pm 0.69***	4.5 \pm 0.92	4.9 \pm 0.39	4.4 \pm 1.12	4.9 \pm 0.32
Ability to learn from being rewarded	4.6 \pm 0.53	4.5 \pm 0.57	4.6 \pm 0.54	4.7 \pm 0.46	4.7 \pm 0.45
Stamina	4.6 \pm 0.56	4.5 \pm 0.57	4.6 \pm 0.57	4.6 \pm 0.49	4.6 \pm 0.64
Tendency to hunt by smell alone	4.6 \pm 0.63***	4.4 \pm 0.69	4.7 \pm 0.61	4.8 \pm 0.53	4.9 \pm 0.32
High					
Consistency of behaviour from day to day	4.4 \pm 0.69	4.3 \pm 0.76	4.4 \pm 0.69	4.5 \pm 0.62	4.5 \pm 0.64
Travel ability	4.3 \pm 0.69	4.3 \pm 0.74	4.2 \pm 0.65	4.4 \pm 0.72	4.3 \pm 0.78
Agility	4.3 \pm 0.79***	4.3 \pm 0.64	4.5 \pm 0.64	3.4 \pm 1.08	4.5 \pm 0.58
Motivation to chase an object	4.3 \pm 0.96	4.3 \pm 1.08	4.3 \pm 1.01	4.2 \pm 0.87	4.4 \pm 0.75
Playfulness	4.2 \pm 0.70	4.2 \pm 0.67	4.2 \pm 0.71	4.3 \pm 0.73	4.4 \pm 0.69
Obedience to human command	4.2 \pm 0.79***	4.6 \pm 0.52	4.1 \pm 0.80	4.2 \pm 0.92	4.1 \pm 0.89
Intelligence—ability to act on own initiative	4.2 \pm 0.84	4.2 \pm 0.71	4.2 \pm 0.89	4.2 \pm 0.87	4.2 \pm 0.89
Boldness	4.1 \pm 0.79	4.1 \pm 0.73	4.2 \pm 0.78	3.9 \pm 0.91	4.1 \pm 0.85
Independence—ability to work without constant guidance	4.1 \pm 0.85	4.0 \pm 0.85	4.2 \pm 0.80	3.9 \pm 1.17	4.3 \pm 0.71
Motivation to retain possession of an object	4.1 \pm 0.97	3.9 \pm 0.92	4.1 \pm 1.00	4.0 \pm 1.10	4.4 \pm 0.84
Interest in toys or objects	4.1 \pm 1.01	4.1 \pm 0.91	4.0 \pm 1.13	4.3 \pm 1.01	4.5 \pm 0.70
Friendliness to people	3.8 \pm 0.96**	3.8 \pm 0.86	3.7 \pm 0.92	4.2 \pm 1.22	4.0 \pm 0.96
Ease of adaptation to kennel environment	3.8 \pm 0.84	3.7 \pm 0.87	3.8 \pm 0.81	4.0 \pm 0.98	3.9 \pm 0.77
Willingness to bring an object back to a person	3.7 \pm 0.95	3.7 \pm 1.01	3.7 \pm 0.91	3.7 \pm 1.08	3.6 \pm 0.97
Intermediate					
Ease of adaptation to new handler	3.4 \pm 0.95*	3.4 \pm 1.04	3.4 \pm 0.87	3.1 \pm 1.04	3.9 \pm 0.91
Excitability	3.2 \pm 0.86*	3.3 \pm 0.88	3.4 \pm 0.83	2.8 \pm 0.91	3.1 \pm 0.80
Size	2.9 \pm 0.64	2.9 \pm 0.74	2.9 \pm 0.64	3.1 \pm 0.68	3.0 \pm 0.39
Low					
Body sensitivity—reactivity to touch and contact with objects	2.5 \pm 1.11	2.6 \pm 1.09	2.4 \pm 1.07	2.2 \pm 1.21	2.9 \pm 1.18
Reaction to sudden loud noises	2.2 \pm 1.28	2.3 \pm 1.23	2.2 \pm 1.29	2.1 \pm 1.39	1.8 \pm 1.08
Motivation to obtain food	1.6 \pm 0.85	1.8 \pm 0.90	1.6 \pm 0.79	1.7 \pm 0.88	1.6 \pm 0.80
Very Low					
Fear of specific things	1.5 \pm 0.83	1.6 \pm 0.86	1.5 \pm 0.85	1.2 \pm 0.57	1.5 \pm 0.85
Level of aggression towards other dogs	1.4 \pm 0.74	1.5 \pm 0.80	1.4 \pm 0.73	1.5 \pm 0.77	1.6 \pm 0.80
Tendency to be distracted when searching	1.3 \pm 0.80	1.4 \pm 0.89	1.3 \pm 0.78	1.3 \pm 0.69	1.4 \pm 0.37
Level of aggression towards humans	1.2 \pm 0.69	1.2 \pm 0.62	1.3 \pm 0.74	1.1 \pm 0.72	1.1 \pm 0.62

** Differs significantly between four types of handler at: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Question 1—Desirable Levels of Traits

They were asked to indicate the level of each of the characteristics that they thought was ideally suited for the sort of search work that they performed. The options available were: as low as possible (1), low (2), intermediate (3), high (4), and as high as possible (5).

Question 2—Importance of Different Traits

On the following page, they were asked to consider the relative importance of each attribute when selecting a search dog and to rate this on a scale of 1 to 5. Respondents were urged to use the whole scale and to rate the overall importance irrespective of whether the trait was desirable or not, so even traits that were required to be present at very low levels could be rated as very important to consider during selection and vice versa.

Question 3—Current Dogs

Lastly, the respondents were asked to rate their own search dog for each of the 30 attributes. If they handled more than one dog, they were requested to answer only about the dog that they had worked for the longest. Respondents whose dogs were still in training or who answered about their patrol (not search) dog were not included in the analysis of this question.

To conclude, the respondents were given the opportunity to provide any additional information that they felt appropriate. They were given space to give their name and contact details; otherwise, anonymity was retained.

Analysis

Desirable Levels of Traits

The mean rating for each trait was calculated. We examined whether respondents' opinions of the ideal level of each characteristic differed depending upon the sort of search work with which they were familiar using Kruskal-Wallis tests. We compared the responses of four groups of respondents:

1. Those who handled/trained only proactive explosives search dogs.
2. Those who handled/trained only proactive (area searching) drugs dogs.
3. Those who handled/trained only passive (people searching) drugs dogs.
4. Those who worked with both passive and proactive drugs dogs.

The respondents who worked with other combinations of search types were too few to be included in this part of the analysis.

Importance of Different Traits

When respondents rated the importance of each trait, some attributes were desirable in search dogs and others undesirable in such animals, so it was important to check that their overall *importance* and not the desired level was being reported. The questionnaire had been designed so that if respondents had not confused importance and level, their answers to Questions 1 and 2 would not be correlated. Therefore, respondents' ratings for the importance of each characteristic were compared to their scores for the ideal levels of the same characteristic using Pearson's Correlation tests. A bimodal distribution of correlation coefficients was found; the larger mode, which had been apparent in pilot studies, centered around $r = 0.25$,

and there was also a smaller group around $r = 0.75$. The latter, defined as all respondents with correlations of more than 0.7, were eliminated from analysis of this question on the assumption that they may not have adequately discriminated between importance and ideal level (e.g., many of these rated aggression to humans as very unimportant, even though an aggressive dog would be unworkable, as well as rating the desirable level for this trait as low as possible). The mean importance rating for each of the characteristics was calculated. Again, we compared between the responses of those handlers/trainers working with different types of search dog using Kruskal-Wallis tests.

Current Dogs

Each respondent rated their own dog for each of the behavioral traits. They had previously stated the level of each characteristic that they thought was ideal for search work (Question 1), so we were able to calculate a "deficiency score." This was the difference between the level the respondent stated was ideal and the rating they gave to their current dog for a given characteristic. One sample t-tests were carried out on the deficiency scores to ascertain which characteristics deviated significantly from the ideal levels.

Results

The Sample

In total, 251 completed questionnaires were returned. Seven were rejected because the rating scales had been completed incorrectly. The remaining sample of 244 comprised: 120 HM Prison Service; 51 civilian police; 30 HM Customs and Excise; 20 RAF; 21 Army; 2 Ministry of Defence Police. Return rates could not be calculated, as some agencies had copied and distributed the questionnaires themselves.

Of the respondents, 12.3% were female; 93.9% described themselves as search-dog handlers, 16.4% were trainers, 14.3% managed a dog section, and 5.3% were responsible for procuring search dogs. The average length of time the respondents had been handling detection dogs was 5.9 (± 5.1) years, and this did not vary significantly between the agencies (Kruskal-Wallis; $\chi^2 = 6.1$, $df = 5$, $p = 0.30$). Since all but one of the managers had previously been dog handlers and their average length of experience was 8.9 (± 5.2) years, their data were retained. The majority of the sample (76.2%) handled one search dog (although 48.4% of those also had a patrol/general purpose dog), while 16.8% handled two search dogs; 0.8% handled three, and 6.1% did not currently handle a search dog.

The dogs ranged in age from 1.1 to 11.5 years with an average of 4.5 (± 2.2) years. Of the search dogs, 86.4% were male, and 22.4% of males and 78.4% of females were neutered. There were 62 explosives- and 210 drugs-search dogs. Of the latter, 150 were proactive (trained to search areas), whereas 60 were passive, trained to search people. Three of the drugs dogs were also trained to find firearms, and one searched for tobacco as well as drugs. There were also two dual-purpose explosives/patrol dogs and one cadaver dog. The detection dogs included 13 different breeds, but English Springer Spaniels and Labrador Retrievers jointly accounted for 74% of the sample.

Desirable Levels of Each Trait

Those traits thought to be required at very high levels included "acuity of sense of smell" and "health," while those needed at the lowest levels were "level of aggression to humans" and "tendency to be distracted when searching" (Table 1).

TABLE 2—Mean ratings for the importance of each of 30 characteristics when selecting a search dog presented in order from highest to lowest for the overall sample ($N = 180$). Ranked mean importance rankings for each of the four handler types are also presented. Those traits whose importance was rated significantly differently by the four groups of handlers are indicated with asterisks.

Characteristic	Mean (\pm SD) Importance Rating	Ranked Mean			
		Explosives $N = 42$	Proactive Drugs $N = 81$	Passive Drugs $N = 25$	Passive and Proactive Drugs $N = 21$
Acuity of sense of smell	4.69 \pm 0.58**	1	2	1	1
Incentive to find an object which is out of sight	4.66 \pm 0.68	3	1	8	2
Health	4.56 \pm 0.69	2	3	3	4
Tendency to hunt by smell alone	4.48 \pm 0.73	6	4	2	3
Stamina	4.30 \pm 0.82	5	5	10	15
Ability to learn from being rewarded	4.28 \pm 0.71*	10	6	4	6
Tendency to be distracted when searching	4.27 \pm 1.04	7	7	7	5
Agility	4.12 \pm 0.74	9	8	17	9
Consistency of behaviour from day to day	4.06 \pm 0.77***	8	15	6	9
Motivation to chase an object	4.03 \pm 0.99	11	9	14	14
Obedience to human command	4.02 \pm 0.92**	4	14	12	19
Interest in toys or objects	4.00 \pm 0.94	13	12	11	10
Playfulness	3.95 \pm 0.79	14	13	13	7
Motivation to retain possession of an object	3.94 \pm 0.97	15	10	21	8
Boldness	3.92 \pm 0.90	12	17	15	20
Level of aggression towards humans	3.90 \pm 1.23**	19	18	7	12
Independence—ability to work without constant guidance	3.90 \pm 0.92	17	11	23	13
Intelligence—ability to act on own initiative	3.86 \pm 0.93	16	16	18	16
Travel ability	3.72 \pm 0.92	18	19	19	18
Friendliness to people	3.71 \pm 1.05***	22	20	5	17
Fear of specific things	3.58 \pm 1.14	20	20	21	26
Ease of adaption to kennel environment	3.48 \pm 0.94	21	25	16	23
Level of aggression towards other dogs	3.44 \pm 1.28	25	23	22	24
Reaction to sudden loud noises	3.43 \pm 1.17	24	24	26	21
Willingness to bring an object back to a person	3.43 \pm 1.10	23	22	24	27
Body sensitivity – reactivity to touch and contact with objects	3.26 \pm 1.00*	26	27	25	25
Excitability	3.17 \pm 0.85	27	26	27	28
Ease of adaption to new handler	3.08 \pm 1.02**	28	28	28	22
Motivation to obtain food	2.48 \pm 1.38	29	30	30	29
Size	2.47 \pm 0.97	30	29	29	30

** Differs significantly between four types of handler at: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Importance of Different Traits

In total, 61 respondents gave answers that were highly correlated to their answers to Question 1 ($Rho > 0.7$), suggesting that they had confused importance and level, and therefore these respondents were eliminated (see Methods). Subsequent analysis for this question was carried out on a reduced sample of 180 respondents. The most important characteristics were thought to be “acuity of sense of smell,” “incentive to find an object which is out of sight,” and “health,” while those of least importance were “motivation to obtain food” and “size” (Table 2).

Differences Between Handler Types

For eleven of the characteristics, significantly different levels were suggested by the four handler types for either desirable level (Table 1), importance (Table 2), or both.

1. Handlers of passive drugs dogs rated “friendliness to people” as more important (Kruskal-Wallis: $Chi^2 = 24.1$, $df = 3$, $p < 0.001$) and needed at higher levels (KW: $Chi^2 = 11.9$, $df = 3$, $p = 0.008$) than did other handlers.
2. Of the four groups, explosives dog handlers required the highest levels of “obedience to human command” (KW: $Chi^2 = 19.8$, $df = 3$, $p < 0.001$) and also attached the most importance to this trait (KW: $Chi^2 = 13.3$, $df = 3$, $p = 0.004$).

3. “Ease of adaption to a new handler,” although relatively unimportant overall, was considered more important (KW: $Chi^2 = 9.5$, $df = 3$, $p = 0.02$) and required at higher levels (KW: $Chi^2 = 12.6$, $df = 3$, $p = 0.006$) by handlers of proactive and passive drugs dogs.
4. People handling passive drugs dogs preferred an intermediate level of “agility,” contrasting with the high levels specified by the three other groups of handlers (KW: $Chi^2 = 33.3$, $df = 3$, $p < 0.001$).
5. Ideal levels of “tendency to hunt by smell alone” were highest among proactive and passive drugs dog handlers and lowest among explosives dog handlers (KW: $Chi^2 = 25.2$, $df = 3$, $p < 0.001$).
6. The ideal level of the characteristic “incentive to find an object which is out of sight” also varied between groups. Handlers of proactive, or proactive and passive, drugs dogs required the highest levels of this trait (KW: $Chi^2 = 15.4$, $df = 3$, $p = 0.001$).
7. Levels of “excitability” also varied slightly between groups: higher levels were required for proactive drugs detection, while passive drugs detection required the lower levels (KW: $Chi^2 = 8.7$, $df = 3$, $p = 0.03$).
8. “Consistency of behaviour from day to day” was less important to proactive drugs dog handlers (KW: $Chi^2 = 15.6$, $df = 3$, $p = 0.001$) than to the other groups.

TABLE 3—Characteristics for which current dog scores deviate significantly from ideal levels listed in order of characteristic showing biggest deviation to one showing least.

Characteristic	Deviation from Ideal	Mean Deviation	<i>t</i>	<i>p</i>
Motivation to obtain food	Too high	1.47 ± 1.31	16.29	<0.001
Tendency to be distracted when searching	Too high	0.92 ± 1.21	11.09	<0.001
Fear of specific things	Too high	0.65 ± 1.16	8.11	<0.001
Level of aggression towards other dogs	Too high	0.71 ± 1.33	7.76	<0.001
Health	Too low	-0.47 ± 0.90	-7.66	<0.001
Excitability	Too high	0.53 ± 1.05	7.36	<0.001
Ability to learn from being rewarded	Too low	-0.35 ± 0.73	-7.04	<0.001
Stamina	Too low	-0.39 ± 0.85	-6.56	<0.001
Acuity of sense of smell	Too low	-0.29 ± 0.71	-5.93	<0.001
Obedience to human command	Too low	-0.39 ± 1.03	-5.49	<0.001
Ease of adaptation to new handler	Too low	-0.41 ± 1.22	-4.92	<0.001
Friendliness to people	Too high	0.34 ± 1.01	4.83	<0.001
Consistency of behaviour from day to day	Too low	-0.30 ± 0.94	-4.56	<0.001
Reaction to sudden loud noises	Too high	0.39 ± 1.31	4.33	<0.001
Boldness	Too low	-0.26 ± 0.96	-3.97	<0.001
Motivation to chase an object	Too high	0.23 ± 0.91	3.64	<0.001
Body sensitivity—reactivity to touch and contact with objects	Too high	0.23 ± 1.17	2.84	0.005
Willingness to bring an object back to a person	Too high	0.25 ± 1.29	2.78	0.006
Incentive to find an object which is out of sight	Too low	-0.13 ± 0.82	-2.36	0.019
Tendency to hunt by smell alone	Too low	-0.15 ± 0.88	-2.44	0.015
Independence—ability to work without constant guidance	Too low	-0.15 ± 1.02	-2.10	0.037
Interest in toys or objects	Too high	0.12 ± 0.89	2.01	0.046
Travel ability		No significant deviation		
Agility		No significant deviation		
Playfulness		No significant deviation		
Intelligence—ability to act on own initiative		No significant deviation		
Motivation to retain possession of an object		No significant deviation		
Ease of adaption to kennel environment		No significant deviation		
Size		No significant deviation		
Level of aggression towards humans		No significant deviation		

9. The importance of “ability to learn from being rewarded” also varied significantly, with explosives dog handlers rating it lower than other handler types (KW: $\text{Chi}^2 = 8.3$, $df = 3$, $p = 0.04$).
10. “Acuity of sense of smell” varied between different search disciplines. Handlers of drugs dogs rated it as the most important attribute, while explosives dog handlers consistently rated it as slightly less important (KW: $\text{Chi}^2 = 11.0$, $df = 3$, $p = 0.01$).
11. Finally, “level of aggression towards humans” was considered more important by passive drugs dog handlers than by the other groups (KW: $\text{Chi}^2 = 12.7$, $df = 3$, $p = 0.005$).

Characteristics of Current Dogs

Only eight characteristics showed no significant deviation between the handlers’ ratings of their current dog and those of their ideal dog. Twenty-two traits showed significant differences; the biggest deviations were in “motivation to obtain food,” “tendency to be distracted when searching,” and “fear of specific things”; all of these undesirable traits were considered higher than ideal in the current dogs (Table 3).

Discussion

The use of structured interviews and questionnaires has been validated as a method for obtaining information from trainers and handlers about desirable characteristics of search dogs. Initial interviews allowed us to word our subsequent questionnaire in terminology that was familiar to the respondents, thereby increasing the validity of the data obtained.

Via this methodology, we have identified 30 attributes generally considered to be important in the selection of specialist search dogs. When ranked by 180 dog handlers and trainers, the most important characteristics were: acuity of sense of smell, incentive to find an object which is out of sight, health, tendency to hunt by smell alone, and stamina. The importance of these attributes to the training and function of a specialist search dog is self-evident. The dog is trained to search for a training aid that is scented with a target odor. Thus, in order to be trainable, it must show a natural aptitude to search for hidden objects, use olfactory cues rather than vision, and possess an acute sense of smell. Once operational, a dog will be required to work for long periods and to carry out relatively complex searches. Good health and stamina are therefore paramount.

Although many of the traits (63%) were highly desirable and so needed at either high or very high levels, others were not. Several traits were needed at intermediate levels and these included ease of **adaptation** to a new handler, excitability, friendliness to people, and size. In moderation these traits can be beneficial, but in excess they would interfere with the dog’s work. For example, an ideal dog would be adequately friendly and easy to adapt to new people, such that a change of allegiance would be possible should a new handler be required. However, it should not be so friendly that its attraction to people stops it from working, nor should it adapt to new people too quickly as some bond with its current handler is needed to establish a close working relationship.

There were also several attributes (7 out of 30) that were undesirable and so ideally would occur at low or very low levels. These were body sensitivity, reactivity to noise, fears, motivation to obtain food, ease of distraction, and aggression to both humans and dogs.

In an operational environment, these attributes would all detract from a dog's ability to search for a target scent and so they should be avoided in a potential search dog.

The ideal attributes discussed so far are those required in a generic "search dog." We have also found subtle variations in the requirements, depending upon the type of work performed. The relative importance of different characteristics and their ideal levels varied dependent upon whether dogs were used for explosives, proactive drugs, or passive drugs work.

Some of these differences are easily explained by considering the different tasks that the dogs perform. For example "friendliness to people" differed both in importance and required levels, being most important and needed at highest levels when selecting passive drugs dogs. These dogs are used to search humans and their luggage, usually members of the public who are either traveling on an airplane or visiting a prison. Thus, it is essential that the dog is of a calm friendly disposition and is unlikely to exhibit aggression. The dog's behavior towards people is not so important when it is used to search buildings and areas for either drugs (proactive) or for explosives. This also explains why "level of aggression towards humans" and "consistency of behaviour from day to day" were considered as important traits by passive drugs handlers and less important by proactive drugs handlers. "Excitability" was also required at lowest levels in passive drugs dogs, which is again a reflection of the fact that such dogs must not frighten members of the public. Similarly, when considering "agility," the levels necessary for passive drugs work were deemed to be lower than those described by handlers of proactive drugs dogs, including those who handled passive as well as proactive drugs dogs.

Dogs that are trained to search for explosives carry out potentially dangerous work, and it is important that their handlers can easily control them. This explains why explosives dog handlers rated the importance and the desired levels of "obedience to human command" highest.

However, there were some significant differences that are less easy to explain. For example, "acuity of sense of smell" varied between different search disciplines; handlers of both proactive and passive drugs dogs rated it as most important, while explosives handlers rated it slightly less important. "Ease of adaption to a new handler" was also considered as more important by those who handled both proactive and passive drugs dogs.

Several differences in ideal levels were also counterintuitive, including those for "ability to learn from being rewarded," "tendency to hunt by smell alone," "ease of **adaptation** to a new handler," and "incentive to find an object which is out of sight."

One plausible explanation for some of these differences may be due to variation in levels of experience of the respondents. Those handlers who have handled both passive and proactive drugs dogs often provided a different opinion to the other handler types. Having experienced several types of dog may have increased these respondents' expertise and given them a better insight into desirable characteristics.

Current dogs deviated from their handlers' ideal levels for a large (73%) number of characteristics. Most marked deviations were seen in negative attributes, such as "motivation to obtain food," "tendency to be distracted when searching," "fear of specific things," and "level of aggression towards other dogs." Positive attributes, such as "acuity of sense of smell" and "incentive to find an object which is out of sight" tended to deviate less from the ideal. This suggests that search dogs could be brought closer to the ideal by paying additional attention to avoiding negative attributes during selection. If dogs were selected that exhibited less motivation to obtain food, a lower tendency to be distracted, and were less

likely to display aggression, then the final product might be of higher quality. However, the reasons for the inappropriate levels of these attributes may be multiple. They could be due to unrealistic expectations of the handlers, in which case these attributes should be accepted and taken account of during training. Alternatively, they may be a result of training procedures, which may place insufficient emphasis on these characteristics. Further research is required to examine ways of improving the most important and/or deviant of the attributes. Potential methods of improvement may include breeding search dogs, selecting dogs of known genetic lines, rearing young dogs according to a regime that maximizes their success, or altering training techniques to modify their behavior.

This collation of the opinions of experienced search dog handlers should be regarded as only a first step in examining search dog selection. The next stage could be to examine the factors that constitute a successful search dog through behavioral studies of individual dogs, assessing the extent to which each attribute contributes to the dog's overall success. Champness (9) has examined this for Australian drugs search dogs, but restricted her analysis to Labrador Retrievers. Similar studies of different breeds and different types of search work would be useful.

Acknowledgments

We would like to thank HM Prison Service, HM Customs and Excise, the Joint Services Defence Animal Centre, UK Army (Royal Army Veterinary Corps and Royal Military Police), Royal Air Force, Ministry of Defence Police, Surrey, Thames Valley, Lancashire, South Wales, Dyfed Powys, and Durham Police Services. Our sincere thanks to the representatives of these agencies who distributed the survey and to all the respondents without whose help this study would have been impossible.

References

1. Almey H, Nicklin S. How does your dog smell? A review of canine olfaction. *J Defence Science* 1996;1:345–52.
2. Murphy JA. Assessment of the temperament of potential guide dogs. *Anthrozoös* 1995;8:224–8.
3. Murphy JA. [Describing categories of temperament in potential guide dogs for the blind](#). *Appl Anim Behav Sci* 1998;58:163–78.
4. Serpell JA, Hsu Y. [Development and validation of a novel method for evaluating behavior and temperament in guide dogs](#). *Appl Anim Behav Sci* 2001;72:347–64. [\[PubMed\]](#)
5. Svartberg K. [Shyness-boldness predicts performance in working dogs](#). *Appl Anim Behav Sci* 2002;79:157–74.
6. Myers LJ. The dog-handler team as a detection system for explosives: a tail to be told. *Crit Rev Optical Sci Technol* 1992;42:93–103.
7. Thesen A, Steen JB, Døving KB. Behaviour of dogs during olfactory tracking. *J Exp. Biol* 1993;180:247–51. [\[PubMed\]](#)
8. Adams GJ, Johnson KG. Sleep, work, and the effects of shift work in drug detector dogs *Canis familiaris*. *Appl Anim Behav Sci* 1994;41:115–26.
9. Champness KA. Development of a breeding program for drug detector dogs—based on studies of a breeding population of guide dogs [Ph.D. thesis]. Melbourne: University of Melbourne, 1996.
10. Bradshaw JWS, Goodwin D, Lea AM, Whitehead SL. A survey of behavioural characteristics of pure-bred dogs in the United Kingdom. *Vet Rec* 1996;138:465–8. [\[PubMed\]](#)
11. Bradshaw JWS, McPherson JA, Casey RA, Larter IS. Aetiology of separation-related behaviour in domestic dogs. *Vet Rec* 2002;151:43–6. [\[PubMed\]](#)
12. Miura A, Bradshaw JWS, Tanida H. Attitudes towards dogs: a study of university students in Japan and the UK. *Anthrozoös* 2000;13:80–8.

13. Serpell JA. The personality of a dog and its influence on the pet-owner bond. In: Katcher AH, Beck AM, editors. *New perspectives on our lives with companion animals*. Philadelphia: University of Pennsylvania Press, 1983;57–63.
14. Stevenson-Hinde J, Stilwell-Barnes R, Zunz M. Subjective assessment of rhesus monkeys over four successive years. *Primates* 1980;21:66–82.
15. Feaver J, Mendl M, Bateson P. A method for rating the individual distinctiveness of domestic cats. *Anim Behav* 1986;34:1016–25.
16. Wemelsfelder F, Hunter TEA, Mendl MT, Lawrence AB. [Assessing](#)

the “whole animal”: a free choice profiling approach. *Anim Behav* 2001;62:209–20.

Additional information and reprint requests:
Nicola J. Rooney, Ph.D.
Anthrozoology Institute
University of Bristol
Department of Clinical Veterinary Science
Langford, Bristol
Avon, BS40 5DU, UK