Introduction
Approximately 30% of dogs that enter shelters in Australia are euthanased (Marston & Bennett 2005; RSPCA 2009-2010). Because this represents thousands of dogs there is a strong imperative for behavioural assessments to be valid. Deficiencies in assessment have the potential to be a significant welfare concern if dogs are wrongly euthanased or if potentially dangerous dogs are sold as adoptable pets. According to Martin & Bateson (1993), the quality of a behavioural test (whether a test is a good measure, the right measure and a useful measure) is determined by three characteristics: reliability; validity; and feasibility. It is critical, therefore, that behavioural assessment protocols used to determine the adoptability of shelter dogs are supported by empirical evidence to show that they are accurate and meaningful (Taylor & Mills 2006). In addition to this, understanding the beliefs and attitudes of the adopting public, in relation to shelter dogs and common shelter practices, is needed to ensure shelter dogs meet adopter’s expectations and marketing campaigns are informed by research. My PhD aimed to address these concerns and comprised three parts: Part 1 involved a review of Australian shelter assessment protocols; Part 2 involved the development of a standardised protocol and evaluation of its reliability and validity, and; Part 3 investigated Australian’s beliefs about and attitudes towards shelter dogs and common shelter practices.

Part 1: A review of shelter assessment protocols currently used in Australia
Little was known about how dogs are assessed for adoption suitability in Australian shelters and pounds, so investigating this was the first step in my research. The aims of Part 1 were to review existing behaviour assessment protocols used in Australia and to ascertain whether shelter staff responsible for assessing dogs considered their protocol appropriate.

Review of behavioural assessment protocols used by Australian shelters
Data were collected from 11 Australian shelters and pounds in Victoria, New South Wales, Western Australia, Australian Capital Territory, South Australia and Queensland. Shelter and pound managers were invited to participate and if they consented, a visit to the establishment was organised or a time was scheduled to conduct a telephone interview with staff responsible for assessing dogs. Participating establishments ranged from large non-profit animal shelters to small council pounds. The number of dogs assessed each week ranged from eight to 70.

Observation of shelter assessment protocols and interviews with shelter staff
More than 50 shelter dog assessments were observed during visits to eight of the 11 Australian animal shelters involved in this study. Additional information collected during these visits included copies of the paperwork used during the various shelter assessments. Interviews were conducted with shelter staff directly involved with assessing dogs, either personally during shelter visits or by telephone.

Part 1: Results
A review of shelter assessment protocols currently used in Australia
The majority of the protocols we reviewed were developed in-house whereas two protocols were existing tests developed elsewhere. Protocols varied in terms of content and methodology (e.g. the number of subtests ranged from six to 54) and in terms of the
behaviour assessed. The only behaviour consistently assessed by all protocols was aggression towards people (See Table 1).

Table 1: Comparison of behaviour assessed in a sample of eight Australian shelter/pound’s dog behaviour assessment protocols

<table>
<thead>
<tr>
<th>Behaviour assessed</th>
<th>1</th>
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<th>5</th>
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<tbody>
<tr>
<td><strong>Aggression</strong></td>
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<tr>
<td>a) Towards people</td>
<td>✓</td>
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<td>✓</td>
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<td>b) Towards dogs</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
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<td>c) Towards cats</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>d) Pocket pets/livestock</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>Resource guarding</strong></td>
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<tr>
<td>a) Wet food</td>
<td>✓</td>
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<td>b) Dry food</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
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<td>✓</td>
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<td>c) Treats</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
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<td>d) Toy</td>
<td>✗</td>
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<td>e) Couch</td>
<td>✓</td>
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<tr>
<td><strong>Dominance/submission</strong></td>
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<td><strong>Reaction to handling</strong></td>
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<td><strong>Kennel behaviour</strong></td>
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<td><strong>Sociability</strong></td>
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<td><strong>Fear</strong></td>
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<td><strong>Obedience/leash manners</strong></td>
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<td><strong>Reaction to novelty</strong></td>
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<td><strong>Playfulness</strong></td>
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<td><strong>Excitability/arousal</strong></td>
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<td><strong>Separation anxiety</strong></td>
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Even when the behaviours that the protocols attempt to assess are somewhat similar the methods used to assess behaviour varied greatly. For example, resource guarding was assessed using wet food, dry food, treats, toys and furniture. A dog’s reaction to handling (assessed by all the protocols) was determined by its response to one or more of the following; stroking the dog’s back with a human and/or artificial hand; lifting the muzzle to expose the dog’s teeth or holding the muzzle closed; touching the dog’s ears, legs, paws or tail; pinching its paws; grooming the dog; placing the dog on a table; giving the dog a routine veterinary examination including taking its temperature; and holding the dog by its collar whilst giving the dog a ‘safe’ hug.

**Administration**

There was little consistency in the way the protocols were administered, partly because of constraints including limited availability of time and resources including limited staff available to conduct the assessments, insufficient training in assessing canine behaviour and lack of an appropriate area to conduct assessments. The duration of assessments ranged from five to 40 minutes (mean = 24 min). Assessments were conducted in various settings including a fenced-off, purpose built, outdoor area, inside a portable office building, in a veterinary consulting room and in a combination of indoor and outdoor locations. The number of people required to administer the protocols we reviewed ranged from one to three (mean = 2), however there were typically two people present; a scorer and a handler.
Scoring and interpretation procedure
The protocols varied considerably in the way they were scored. Scoring procedures included tick boxes labelled ‘Excellent’, ‘Good’, ‘Fair’, ‘Unsuitable’ and ‘Not tested’, scoring of A, B or C according to a brief description of what behaviours corresponded to each letter, written comments interpreting a dog’s behavioural response, a range of different numerical scales and yes/no to indicate presence and absence of a range of behaviours. For some protocols the responses provided did not adequately cover all possible behavioural responses a dog might display. There was no consistency between the protocols we reviewed either in terms of interpretation of behaviour observed during an assessment or in terms of interpretation of the results of individual assessments. In most cases there were no guidelines to assist scorers to interpret the results of individual assessments. Decisions regarding the fate of assessed dogs were therefore made subjectively.

Interviews with assessment staff
We interviewed 26 shelter staff directly involved with assessing dogs. Staff experience in assessing the behaviour of shelter dogs ranged from six months to 16 years (Mean = 2.5 years, SD = 3.3 years). Over three quarters (77%) of respondents had received training in the assessment of shelter dogs, whereas 23% had not. Staff lacked complete confidence when asked to rate their confidence (1 = extremely unconfident to 7 = extremely confident) that the current assessment protocol was the best one to use to maximise successful adoptions, 42% were “somewhat confident”, 23% were “very confident”, 15% were “neither unconfident nor confident”, 12% were “somewhat unconfident” and only 8% “extremely confident”.

Staff also lacked complete confidence when asked to rate their confidence (1 = extremely unconfident to 7 = extremely confident) in their ability to accurately assess dogs. Half (50%) were “somewhat confident” followed by “very confident” (35%), “extremely confident” (8%), “neither confident nor unconfident” (4%) and “extremely unconfident” (4%). Experience in assessing the behaviour of shelter dogs was not significantly correlated with respondent confidence in their current protocol (rho = .13, n = 26, p >.05). Experience did not correlate with confidence in their ability to accurately assess shelter dogs either. Indeed, the more experience staff had the less confident they were (rho = -.13, n = 26, p >.05).

Behaviours staff considered most important for inclusion in an assessment protocol were sociability (or friendliness) (23%), aggression (18%), reaction to handling (13%), resource guarding (12%), fear (10%) and anxiety (8%) and 77% said their current protocol included assessment of these behaviours. The majority (85%) agreed that their current assessment protocol could be improved by expanding the protocol to assess more behaviours (19%); having more time available for assessment (16%); having more staff training in assessing dogs (13%); having two people present during assessment (6%); and having a more standardised protocol (6%). All (100%) agreed that a standardised and scientifically validated assessment protocol would be beneficial, mainly ‘to create standardisation across the shelter industry in the way dogs are assessed’ (44%).

Based on the results of Part 1, the Behavioural Assessment for Rehoming K9’s (B.A.R.K.) was developed, with additional input from experts, and the reliability and validity of the test was evaluated. The B.A.R.K. comprised 12 subtests, designed to assess a dog’s reaction to real life scenarios, and comprised of the most common components already assessed by the shelters reviewed in Part 1, behaviours that shelter staff indicated as important during interviews plus additional components considered important by experts. The B.A.R.K.
Protocol is designed to be administered by two people; a handler who administers the test and an observer who scores the dog’s behaviour.

**Scoring dog behaviour**

Five behavioural traits (anxiety, fear, friendliness, compliance and activity level) were scored on a scale from 0 to 10 for each step of the 12 subtests. Anxiety, fear and activity level were scored where 0 = absence of the behaviour (non-anxious, non-fearful, non-active) and 10 = extreme presentation of the behaviour (extremely anxious, extremely fearful, extremely active). Compliance and friendliness were scored where 0 = presence of the behaviour (compliant, friendly) and 10 = extreme absence of the behaviour (extremely non-compliant, extremely non-friendly).

**Evaluation of the reliability of the B.A.R.K. protocol**

The B.A.R.K. was implemented into a regional Victorian animal shelter for evaluation of the protocols inter-rate and test-retest reliability. A total of 48 dogs were assessed on two separate occasions over a six week period. The dogs were given at least three days to acclimatise to the shelter environment before the first assessment took place. The first assessment was scored independently and simultaneously by two assessors to determine the inter-rater reliability of the protocol. The second assessment took place 24 hours later and was scored by one of the original assessors to determine the test-retest reliability of the protocol.

**Evaluation of the validity of the B.A.R.K. protocol**

Several Australian animal shelter organisations were invited to participate in the validation study and five agreed to participate. Workshops were run at participating shelters during which staff were trained in the administration and scoring of the B.A.R.K. protocol. Instructions and scoring sheets were provided and staff were observed assessing and scoring dogs until we were satisfied they were competent. At the completion of each workshop, each shelter agreed to; assess as many dogs as possible using the B.A.R.K. protocol, as well as their usual assessment protocol; invite owners of newly adopted dogs, included in the study, to participate in a post adoption survey, and; send all the completed assessments and new adopter consent forms to the investigators.

After several months, and due to unforeseen circumstances, it was evident that the data collection from the participating shelters was extremely poor. Two shelters did not collect any data after the work shop, one assessed one dog and another assessed two in the months following the workshop. The highest data collection rate from a participating shelter over six months was 13 dogs. Follow up telephone calls and emails to the shelter staff involved did not improve the rate of data collection and it was decided that we would collect the data ourselves to ensure that sufficient data was collected.

A total of 102 dogs were assessed while housed in Australian shelters over a 12 month period. The dogs were given at least three days to acclimatise before the assessment took place. New owners of dogs that were subsequently adopted (n = 89) were invited to participate in a post adoption survey and those who agreed, and were contactable (n = 74), were telephoned between four and eight months after the adoption of their dog and the post adoption survey was completed.

**Post adoptive survey**

The post adoptive survey comprised 5 sections. Questions in Section 1 related to details about the dog that participants adopted and included questions such as ‘Do you still have
the dog you adopted?’ and ‘How old is the dog you adopted?’ Section 2 asked questions about the selection process and included questions such as; ‘What was the main reason you decided to get a dog’; ‘how much planning (and research) went into your decision to adopting your dog’; and; how important were certain factors, such as size, coat type, general appearance and the behaviour of the dog, in influencing your selection of your dog.’ Section 3 asked participants about their new dog’s behaviour. New owners were asked to indicate how often (never, rarely, sometimes, often, and very often) their dog had exhibited several behaviours since they had them. Examples include toileting in the house, destructive behaviour, hyperactive behaviour, being too noisy and growling or snapping at a person whilst eating. Other questions in Section 3 related to where the dog sleeps, how often it’s exercised, whether the new owner has taken it to obedience training and how well the dog has adjusted to its new home. Finally, participants were asked to rate (not at all, somewhat, moderately, very or extremely) how anxious, fearful, friendly, active and compliant their new dog is. These scores were compared to the mean scores for the same behavioural attributes scored in the B.A.R.K. protocol.

Part 2: Results

Inter-rater and test-retest reliability

The inter-rater reliability of the B.A.R.K protocol was measured using Pearson’s Correlations to compare scores from two independent assessors scoring each dog at the same time. Mean scores from both assessors for each behavioural attribute (anxiety, compliance, fear, friendliness and activity level) were obtained for each of the 12 subtests. The inter-rater reliability of the B.A.R.K. protocol was quite good with almost all correlations ranging from weak to strong and statistically significant. Only four of the correlations were not statistically significant at the 0.05 level. The behavioural trait with the highest average inter-rater reliability correlation was ‘Fear’ with a mean correlation of .79 across all BARK subtests.

The test-retest reliability of the B.A.R.K protocol was also measured using Pearson’s Correlations to compare scores given by one assessor on two separate occasions (24 hours apart). Mean scores from both assessments for each behavioural attribute (anxiety, compliance, fear, friendliness and activity level) were obtained for each of the 12 subtests. The test-retest reliability was not as good as the inter-rater reliability however most correlations ranged from weak to strong and statistically significant, with a perfect correlation (100% agreement) for the test-retest reliability of ‘compliance’ and ‘friendliness’ on the ‘Resource guarding wet food’ subtest. However several correlations were weak and not significant at the 0.05 level. The behavioural trait with the highest average test-retest reliability correlation was ‘Compliance’ with a mean correlation of .79 across all BARK subtests.

Predictive validity

The predictive validity of the B.A.R.K protocol was measured using Spearman’s Correlations to compare scores from the B.A.R.K. protocol with responses from the post adoption behaviour survey. Mean scores for each behavioural attribute (anxiety, compliance, fear, friendliness and activity level) recorded in the BARK protocol were correlated with overall ratings of these behaviours from new owners. There was a small negative relationship between Anxiety scores obtained during the B.A.R.K. compared to new owner scores \(r = -0.225, n = 67, p = 0.067\), a medium and statistically significant relationship between Fear scores from the B.A.R.K. protocol and owner ratings \(r = 0.434, n = 67, p = 0.000\) and a small and statistically significant relationship between scores for Activity Level \(r = 0.255, n = 67, p = 0.037\).
**Feasibility of the BARK protocol**

The feasibility of the B.A.R.K. protocol could not be determined due to the poor participation rates. Many factors contributed to the well intentioned shelters being unable to commence or continue participating in this study. These included adverse weather incidents (major floods, bushfires and cyclones) and lack of time and staff resources.

**Part 3: What do current and potential dog owners think about shelters dogs and shelter practices?**

Having investigated how Australian shelters are assessing shelter dogs and having assessed the reliability and validity of the BARK protocol, we wanted to know what current and potential dog owners think about shelter dogs and shelter practices. To do this, we surveyed 1,600 Australian’s via an online survey which investigated beliefs and attitudes towards shelter dogs and common shelter practices.

The ‘Public Attitudes towards Animal Welfare Shelter-Dogs (PAAWS-D)’ Survey was developed on the basis of a review of the literature and a focus group with dog experts (trainers, vets, behaviourists and psychologists) and comprised four sections. Section A consisted of questions relating to participants’ demographic information. Section B included questions about the participant’s attitudes towards future acquisition of a companion dog. For example, participants were asked to indicate the likelihood that they would obtain a dog in the future, using a five point scale (1 = very unlikely to 5 = very likely) and their preference for either an adult dog or puppy, assessed using a seven point scale (1 = strong preference for puppy to 7 = strong preference for adult). Participants were also asked how likely they would be to obtain a new dog from several different sources (animal shelter, rescue organization, council pound, breeder, friend or family member, pet shop, newspaper/classifieds advertisement) and how important it was that the new puppy/adult dog had 26 different traits when it was first acquired (e.g. is toilet trained, healthy, walks well on lead, is trainable, is calm, is affectionate etc).

Sections C and D asked participants to indicate their level of agreement on a 5 point scale (1 = strongly disagree to 5 = strongly agree) with 13 statements about their beliefs and attitudes towards animal shelters (e.g. shelters sell good quality dogs, adult shelter dogs often have behavioural problems, shelters are trustworthy) and 10 statements about shelter practices (e.g. it is important that the behaviour of shelter dogs is assessed prior to adoption). Participants were also asked to indicate how important they thought it was that shelters assess dogs for 18 different behaviours (e.g. fear, anxiety, aggression towards people, aggression towards other dogs) prior to making them available for adoption (1 = extremely unimportant to 5 = extremely important).

The questionnaire was uploaded onto a web page and was made available to members of the Australian public with access to the internet. The aim in this study was to ascertain whether beliefs about and attitudes towards shelter dogs and shelter practices may help explain why many people appear reluctant to adopt ‘preloved’ animals.

**Part 3: Results**

Most participants reported they would be likely to obtain a new pet dog in the future. However, the sample was split more or less evenly between those who would prefer a puppy, those who would prefer an adult and those who had no age preference. Respondents most frequently indicated they would obtain a new pet dog from a rescue organization, animal shelter or council pound, rather than from other sources. Friendliness was deemed the most important trait to consider when acquiring a new pet dog whereas
traits considered least important in a new puppy/adult dog included ‘obeys commands’, ‘walks well on lead’, ‘is toilet trained’, ‘does not chew household items’, ‘comes when called’ and ‘is not destructive when left alone’.

In general, participants held positive beliefs and attitudes towards adult dogs and puppies supplied by shelters, agreeing ‘that their family and friends would approve of them obtaining a new puppy/adult dog from a shelter’, ‘that shelters have a good selection of dogs available’ and ‘that shelters are trustworthy’. Participants generally disagreed with statements that they would ‘never adopt an adult dog from an animal shelter’, ‘never adopt a puppy from an animal shelter’ and ‘that puppies from shelters often have health problems’. This suggests that attitudes towards shelters are generally positive among current and potential dog owners, although it is important to note that just over a third of participants agreed that adult shelter dogs often have behavioural problems. It is well established that behaviour problems are commonly cited as a reason for relinquishment (DiGiacomo et al 1998) and it has been proposed that this might explain why visitors to a rescue shelter only show an interest in a relatively small proportion of available dogs (Wells & Hepper 2001).

Participants also agreed that it is important that methods used to assess the behaviour of shelter dogs are scientifically proven to work. Considering the current lack of appropriate scientifically validated assessment protocols available for use in Australian shelters (Mornement et al 2010), potential adopters may be concerned about the reliability of these tests. Behaviours considered most important for inclusion in a behaviour assessment protocol were aggression (towards people, other dogs, other animals, around food), ‘reaction to handling’, ‘friendliness’, ‘fear of other dogs’, ‘anxiety’, ‘escaping’, ‘activity level’, ‘reaction to separation’ and ‘fear of strangers’. These results are consistent with those of Part 1 which found that shelter staff rated sociability (or friendliness), aggression, reaction to handling, resource guarding, fear and anxiety as the most important behaviours to include in a shelter dog assessment protocol.

Limitation of the research
The most notable limitation was that any dog that displayed aggressive behaviour prior to the B.A.R.K. assessment taking place was excluded, for safety reasons, from the sample. This resulted in a biased sample of ‘friendly’ dogs. This limitation was unavoidable as an ethics application to include potentially dangerous dogs in the study would not have been approved. In addition, the test-retest reliability of the protocol was assessed only once, 24 hours after the initial assessment. Further research is required to investigate the effect of duration in the shelter on dog behaviour and the test-retest reliability of the B.A.R.K.

Conclusion
From an animal welfare and human health perspective, it is imperative that shelter dogs are assessed for their suitability as pets prior to adoption and that protocols used are based on scientific evidence and developed in consultation between shelters and animal behaviour specialists. This consultation process will allow shelters to work within the constraints they face, with the resources available, whilst utilising the most up-to-date and relevant information concerning the assessment of shelter dog behaviour. However, even if done in best possible ways there are still limitations; a valid behavioural assessment protocol may not always guarantee that adoption is successful. For this reason, other strategies, such as basic obedience training, rehabilitation, adopter-dog matching programmes, ongoing support to resolve behavioural issues that arise post adoption and effective marketing
strategies, should be used to maximise successful adoptions, improve shelter dog welfare and public perceptions of shelter dogs.

References


