Table S1: Research into humans' abilities to correctly infer the affective states of cats and dogs from expressions and vocalisations

Species	Paper	No. animal subjects	No. adult human participants	Source of signals/expressions	How animals' states were induced/determined
Dog	Bloom & Freidman 2013	1	3	Whole face (still images) including ears	Informal 'common sense' contexts used to induce hypothetical modular emotions; thus subjective. Specific images were then selected by experts.
Dog	Dalla Costa et al 2014	9	230	Whole face (still images)	Assumed from dog's context ('food', 'alone', 'context'); thus subjective.
Dog	Dermibas et al 2016	3	71	Whole body (from videos)	Not manipulated: judged by experts from the videos, and this used as 'gold standard'
Dog	Faragó et al 2017	18	40	Pre-recorded growls	Three contexts: guarding food from a conspecific; threatened by a stranger; playing tug-of-war with the owner. (Participants were scored as correct for judging context; affective assessment were not judged correct or incorrect)
Dog	Flint et al 2018	9	1095	Whole body (from videos)	Judged as fearful by expert consensus
Dog	Jacobs et al 2017	16 total, but each participant saw 7	1,438	Whole body (from videos)	Judged as aggressive by expert consensus
Dog	Kujala et al 2017	30	34	Whole face (still images)	Pre-categorised as negative/threatening; positive/pleasant and neutral facial expressions, but rationale not presented.
Dog	Lakestani et al 2014	9	120	Whole body (from videos)	Judged as friendly, aggressive or fearful by expert consensus.
Dog	Molnár et al 2010	26	45	Recorded barks	Dogs were in six diverse contexts. 'Common sense' used to infer related modular emotions (but rationale was not

					spelled out).
Dog	Pongrácz et al 2005	19	36	Recorded barks	Dogs were in six diverse contexts. Participants were scored as correct for judging context; affective assessment were not judged correct or incorrect.
Dog	Pongrácz et al 2011	8	20	Recorded barks	Dogs were in three contexts (‘stranger’, ‘alone’, ‘play’). Participants were scored as correct for judging context; affective assessments were not judged correct or incorrect.
Dog	Scheumann et al 2014	7 ‘negative’, used to create 24 sound clips; and 8 ‘positive’; used to create 24 sound clips	28	Recorded barks and growls	Aggressive/defensive dogs assumed to be in negative affective states (even if they ‘win’); playing dogs assumed to be in positive affected states; rationales not given.
Dog	Schirmer et al 2013	24	64	Still images of the face taken from videos	Positive: Dog presented with a known reinforcer (play or food depending on the individual); Negative: dog isolated, and image selected while whining or showing similar ‘signs of distress’
Dog	Tami & Gallagher 2009	8	60	Whole body (from videos), during social interactions	Affect/motivation identified by experts.
Dog	Taylor et al 2009	32	33	Recorded growls and barks	Aggressive approach by strange human; play with owner
Dog	Wan et al 2012	16	2,163	Whole body (from videos)	Affective states (happy’ or ‘fearful’) judged by experts.
Cat	Belin et al 2008	36 cats (+ 36 rhesus macaques)	12	Recorded meows	Positive affect contexts (food-related and affiliative interactions) and negative affect contexts (agonistic interactions and distress)

					(adapted from Nicastro & Owren 2003, but without providing rationale for inference of affective states)
Cat	Ellis et al 2015	10	10	Recorded meows	Four contexts: trapped in an unusual room in house; when called by and physically interacting with owner; during normal meal preparation; when food withheld after meal preparation (adapted from Nicastro & Owren 2003)
Cat	Holden et al 2014	16	68	Whole face (still images)	Judged as pain-free or painful by an attending veterinarian using a numerical rating scale
Cat	Nicastro & Owren 2003	12	28	Recorded meows	Five contexts: before feeding; when antagonised by owner; when soliciting owner attention; when soliciting owner help to navigate an obstacle; when in an unknown environment. 'Common sense' used to infer related emotions (but rationale was not spelled out).

Table S2: Demographic characteristics of all survey participants, according to survey version.

Variable	Category	Overall (n=6,329)		Survey Version 1 (n=3,211)		Survey Version 2 (n=3,118)	
		No.	%[1]	No.	%[1]	No.	%[1]
Gender	Male	1,509	24	776	24	733	24
	Female	4,659	74	2,346	73	2313	74
	Other	73	1	39	1	34	1
Age	18-24 years old	1,123	18	557	17	566	18
	25-34 years old	2,636	42	1,355	42	1281	41
	35-44 years old	1,268	20	630	20	638	21
	45-54 years old	691	11	370	12	321	10
	55-64 years old	385	6	183	6	202	7
	65-74 years old	129	2	60	2	69	2
	75-84 years old	17	0.3	11	0.3	6	0.2
	85 years or older	5	0.1	2	0.1	3	0.1
Education	Less than high school	34	0.5	15	0.5	19	0.6
	High school	846	13	437	14	409	13
	Trade school	175	3	83	3	92	3
	College	2,845	45	1,409	44	1,436	46
	Post-graduate	2,159	34	1,123	35	1,036	33
	Other	166	3	90	3	76	2
Ever lived with a cat(s)	No	450	7	237	7	213	7
	Yes	5,859	93	2,966	92	2,893	93
Currently live with a cat(s)	No	830	13	422	13	408	13
	Yes	5,035	80	2,544	79	2,491	80
Professional cat experience[2]	None	4,721	75	2,403	75	2,318	74
	Veterinarian	208	3	104	3	104	3
	Veterinary technician	618	10	313	10	305	10
	Animal shelter staff	248	4	121	4	127	4
	Animal shelter volunteer	613	10	321	10	292	9
	Cat sitter	424	7	226	7	198	6
	Cat trainer	75	1	32	1	43	1
	Other	311	5	163	5	148	5

[1] Note that participants could select 'prefer not to answer' for all demographic questions. As such, percentages do not always sum to 100%.

[2] Some participants had experience working in two or more positions.

Table S3: Generalised linear model output for video characteristics predicting the correct identification of feline affective valence.

Variable	Coefficient	Standard error	Z	*P* value
Video length	- 0.048	0.054	- 0.09	0.374
Face colour around eyes	- 0.019	0.077	- 0.25	0.801
Face colour around mouth	- 0.036	0.023	- 1.55	0.121
Modular affective state*	0.027	0.019	1.40	0.161

* These states were: ill or in pain; prevention from fulfilling a goal; retreat from an object, person, or situation; play; approaching an object or person; inactive with a favoured object or person, or in a favoured location.

Table S4: Final list of all videos included in online survey

Video	Survey version	Valence	Activity	Description of video	Video source	Original URL*	% of participants that correctly identified valence
1	1	Positive	Active	Cat playing	YouTube	https://www.youtube.com/watch?v=vYJOEJv1qTE	65%
2	1	Positive	Active	Cat approaching treats	YouTube	https://www.youtube.com/watch?v=BdZZwGevinA	89%
3	1	Positive	Active	Sylvie playing	Personal	-	87%
4	1	Positive	Active	Andes playing with favoured toy	Personal	-	89%
5	1	Positive	Active	Cat playing with pop-up toy	YouTube	https://www.youtube.com/watch?v=dF-1Q3ZK_80	37%
6	1	Positive	Inactive	Cat cuddling with owner	YouTube	https://www.youtube.com/watch?v=mioYrtJEWhY	85%
7	1	Positive	Inactive	Lincoln approached favoured human	Personal	-	51%
8	1	Positive	Inactive	Cat resting in owner's lap	YouTube	https://www.youtube.com/watch?v=r_ZjuGXOUDI	87%
9	1	Positive	Inactive	Cat laying in favoured spot	YouTube	https://www.youtube.com/watch?v=iwEYVRsgFcI	37%
10	1	Positive	Inactive	Cat rubbing against electric toothbrush	YouTube	https://www.youtube.com/watch?v=Z386L9Is480	68%
11	1	Negative	Active	Cat pawing at door to be let inside	YouTube	https://www.youtube.com/watch?v=FKqxoClnqcU	82%
12	1	Negative	Active	Cat moving away from human who repeatedly tries to touch him/her	YouTube	https://www.youtube.com/watch?v=io04Saz73Q0	34%
13	1	Negative	Active	Cat backing away from baby after meeting him/her for the first time	YouTube	https://www.youtube.com/watch?v=RT0pePvhU30&t=92s	86%
14	1	Negative	Active	Cat prior to vomiting	YouTube	https://www.youtube.com/watch?v=2aMkwdClmM8&t=4s *(since taken down)*	58%
15	1	Negative	Active	Cat pawing at door to be let inside	YouTube	https://www.youtube.com/watch?v=azTuj49vXgk&t=26s	26%
16	1	Negative	Inactive	Cat in pain	Veterinarian	-	68%
17	1	Negative	Inactive	Cat with viral infection	Veterinarian	-	40%
18	1	Negative	Inactive	Cat pulling head away from an orange slice	YouTube	https://www.youtube.com/watch?v=-Y_e4V5o8YU	68%
19	1	Negative	Inactive	Cat pulling head away from a strawberry	YouTube	https://www.youtube.com/watch?v=FXk9Mgsa2qU	25%
20	1	Negative	Inactive	Bolivar hiding in examination room of veterinary clinic	Personal	-	75%

21	2	Positive	Active	Cat playing with pop-up toy	YouTube	https://www.youtube.com/watch?v=OmRJa8NbAdI	87%
22	2	Positive	Active	Cat playing fetch	YouTube	https://www.youtube.com/watch?v=rRisU9qH5GY	31%
23	2	Positive	Active	Cat chasing laser from laser pointer toy	YouTube	https://www.youtube.com/watch?v=-EltFtYze7Y	76%
24	2	Positive	Active	Cat playing with feather wand toy	YouTube	https://www.youtube.com/watch?v=mIR-e1NNjvc	44%
25	2	Positive	Active	Luke receiving scratches in favoured spot on the body, as confirmed by purring	Personal		86%
26	2	Positive	Inactive	Cat being petted by owner	YouTube	https://www.youtube.com/watch?v=zxeeysNrEvM&feature=iv&src=	56%
27	2	Positive	Inactive	Louie kneading in favoured resting spot	Personal	-	77%
28	2	Positive	Inactive	Cat resting in owner's lap while owner plays piano	YouTube	https://www.youtube.com/watch?v=zgbsRc1IKfQ	36%
29	2	Positive	Inactive	Cat cuddling with owner	YouTube	https://www.youtube.com/watch?v=TQXPtCmXip0&t=3s	57%
30	2	Positive	Inactive	Cat eating treats	YouTube	https://www.youtube.com/watch?v=IoS0-gdj33Q&t=4s	73%
31	2	Negative	Active	Cat backing away from orange peel	YouTube	https://www.youtube.com/watch?v=IXfkIBEMlYI	43%
32	2	Negative	Active	Cat meowing and pacing at door to be let inside	YouTube	https://www.youtube.com/watch?v=TvcCLuQ2Cts	17%
33	2	Negative	Active	Cat walking on moving treadmill, with food at top of treadmill	YouTube	https://www.youtube.com/watch?v=hBO0VsYFsgw	68%
34	2	Negative	Active	Cat struggling to escape from towel 'burrito' restraint	YouTube	https://www.youtube.com/watch?v=wAp24386UUg	68%
35	2	Negative	Active	Cat struggling during restraint for physical examination at veterinary clinic	YouTube	https://www.youtube.com/watch?v=PqaZ8QMoqzw	75%
36	2	Negative	Inactive	Cat prior to vomiting	YouTube	https://www.youtube.com/watch?v=2aMkwdClmM8&t=4s *(since taken down)*	49%
37	2	Negative	Inactive	Cat pulling back from human who repeatedly tries to pet him/her	YouTube	https://www.youtube.com/watch?v=okdWWfCX7rQ	76%
38	2	Negative	Inactive	Cat in pain	Veterinarian	-	52%
39	2	Negative	Inactive	Mousie receiving medication for pain	Personal	-	61%
40	2	Negative	Inactive	Cat hiding after returning from veterinary clinic	YouTube	https://www.youtube.com/watch?v=kF3lNr2Xidg	18%

* Links were active as of last access on Sept 21, 2019 *(unless otherwise specified)*.

Supplementary Methods: Questions asked to all participants during the online survey

For each of 20 videos:
Please watch the following video: [embedded video]
This cat is feeling…

- Positive
- Negative
- Prefer not to answer

Then:

1. In which country do you currently reside?
   [Dropdown menu with list of all countries]
2. What is the highest level of education you have completed?
   - Less than high school
   - High school
   - Trade school
   - College
   - Post-graduate
   - Other
   - Prefer not to answer
3. Which gender category do you identify with?
   - Female
   - Male
   - Other
   - Prefer not to answer
4. What is your age?
   - Under 18
   - 18-24
   - 25-34
   - 35-44
   - 45-54

- 44-64
- 65-74
- 75-84
- 85 or older
- Prefer not to answer

5. Is your vision normal or corrected to normal?
   - Yes
   - No
6. Have you already read or heard about cat facial expression research?
   - Yes
   - No
7. Do you currently live with or have you lived with a cat in the past (excluding childhood pets)?
   - Yes
   - No

7a. (Display only if answer yes to question 7) How many cats are currently in your household?
[Dropdown menu with all whole numbers from 0 and 9, plus '10 or more' as the upper limit]

7b. (Display only if answer yes to question 7) Approximately how many years have you lived with cats NOT including childhood pets?
[Dropdown menu with all whole numbers from 0 to 79]

8. Do you have employment or volunteer experience that might have improved your knowledge of cat behaviour? (e.g. veterinary technician, shelter staff, etc…)
   - Yes
   - No

8a. (Display only if answer yes to question 8) Please select all that apply:
   - Veterinarian
   - Veterinarian technician/assistant
   - Shelter staff
   - Shelter volunteer
   - Cat sitter

- Cat trainer/behaviourist
- Other: [open text box]

9. Lexington Attachment to Pets Scale (see Johnson et al. 1992 for full list of questions).

Supplemental Results

In the main statistical model, survey version had a significant effect: although participants in Version 2 still scored significantly above chance (binomial test $p<0.001$), with a mean score of 11.14/20 (56%), they were 0.74 times as likely as participants in Version 1 to correctly identify the valence of a cat's state.

To further explore this unexpected effect, additional *post hoc* models were built using the same methodology as described in the main text. Interactions between survey version and gender, professional experience, and activity all proved significant (all $p<0.05$). This was because in Version 2, as shown through contrasts, gender and professional experience were no longer significant predictors of success (effect of being a woman OR=0.98, 95% CI=0.95-1.02, p=0.425; effect of having professional experience OR=1.03, 95% CI=0.99-1.07, p=0.197). However, interactions with other predictors (age, day completed, valence, activity, LAPS) were not significant, and these had significant effects in both survey versions.

To then look at survey version effects on the analyses of individuals who performed significantly above chance (≥15/20), Version 1 generated more of these high scorers than Version 2 ($X^2=272.05$, $p<0.001$); but again even in Version 2, that 5% (175/3118 participants) with sum scores above chance was significantly different from the number scoring below chance (with only 14/3118 participants scoring ≤5/20; binomial test $p<0.001$). Furthermore, in the sub-model comparing high scoring individuals to other participants, survey version did not significantly interact with any of the variables that had been predictive in the final sub-model (see main text: thus gender, age, professional experience, day completed; all $p>0.05$): these variables significantly predicted high scores across both survey versions. Thus women and those with professional experience were significantly likely to be high scorers in both survey versions: a consistent finding.

As to why survey version had an effect at all, *post hoc* tests did not reveal any immediate differences between the videos included: on-screen video size and number of YouTube views (an indicator of popularity) did not differ between survey versions ($t_{38}=1.29$, $p=0.21$ and $t_{25}=-0.18$, $p=0.57$, respectively). However, by chance 85% (17/20) of the videos had been selected by author JC in Version 1, whereas 65% (13/20) of those in Version 2 had been selected by LCD. To investigate whether this explained the survey version effect, an additional *post hoc* main model was built with "author ID" included as a predictor. "Author ID" proved to have significant main effects (OR=0.53, 95% CI=0.51-0.54, $p<0.001$), as well as interacting with cat valence, activity, and gender (all $p<0.05$), while survey version became no longer significant (OR=0.98, 95%CI=0.95-1.01, p=0.163). Next we therefore sought to find methodological differences between these two authors. Criteria for video clip selection had been strictly outlined, and upon re-examining a random subset of the original videos, both authors selected the same segment, indicating that they did not differ in their editing style. However, there had been no set methodology for searching for videos on YouTube. To investigate whether this in turn may explain the author effect, LCD and JC independently searched for 20 new videos, each using the same criteria as they had before, but now tracking all their search terms along with all rejected and accepted videos. Both authors were found to reject the same videos,

indicating that they used the same prescribed inclusion/exclusion criteria, as planned. However, the acceptable new videos that they found did not overlap, and the two authors were also found to have spontaneously used very different search terms. Thus one author (JC, whose videos had then proven easier for participants to score correctly) often searched for specific situations and extreme examples (e.g. *cat runs for treats, mother cat playing with kittens, cat with tail injury, cat in pain*); the other author (LCD, whose videos had then proven hard for participants to score correctly) instead used more general open-ended terms or searched for less extreme cases (e.g. *cat likes, cat loves, cat wants inside, cat doesn't like smell*). We therefore suspect that the differing search terms used for YouTube videos by the two authors caused the unexpected difference between the two survey versions. (Furthermore, YouTube personalizes search results based on previous search histories, which will produce different search results on different computers even when similar search terms are used: a second likely reason for the discrepancy between the two authors).

Overall, gender and professional experience thus did not interact with survey version in the 'high scorer sub-model' (despite doing so in our main model), and as such, *consistently* predicted significantly high sum scores for overall performance across both survey versions. Our main conclusions therefore stand. The unexpected survey version effect itself appeared to be due to the differing search styles of the authors primarily responsible for the videos of each version: a finding useful for any researchers wanting to use similar methodologies in the future.