

An International Online Social Survey of Public Attitudes Towards Cetaceans

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Abstract

Since prehistoric times, cetaceans have been important food sources, but they also have been seen as monsters of the sea, a perception that did not change much during the past centuries. Due to a better understanding of their biology in recent years, the public perception towards cetaceans has been evolving. Various studies have been developed aiming to evaluate the attitude and perception of humans towards cetaceans, but these have been local and focused on specific target groups. Our study aimed to evaluate the attitude of the public towards cetaceans on a wide scale by using an international online questionnaire distributed exclusively on social media. An attitudinal scale proposed by Kellert (1985) on a Likert scale matrix was used with nine statements referring to dolphins and nine referring to whales. Even though specific constraints occur from such types of research (e.g., mostly highly educated and young respondents from developed countries), 5,222 responses were collected from 107 countries in total. While Europe, North America, South America, and Oceania were well represented, the number of answers from Africa and Asia were

limited. Our results revealed a shift in the public attitude towards cetaceans, with the majority of people exhibiting a positive attitude following the global trend of a rising appreciation for wildlife. Whaling nations and ex-whaling nations that have continued that practice until recently exhibited a more negative attitude towards cetaceans, revealing the importance of culture, heritage, and memory in shaping attitudes. Finally, we discuss our findings under the light of the culture and history of different countries.

Key Words: dolphins, whales, public opinion, public attitudes, online surveys, social media

Introduction

Humans and cetaceans share a long and turbulent history. Since ancient times, cetaceans were seen as a food source in several regions but also as monsters of the sea (Papadopoulos & Ruscillo, 2002; Bearzi et al., 2010). While whaling became a very common activity in many parts of the world (e.g., Gardiner, 1998; Smith & Reeves, 2002; Brito, 2011), dolphin killing for human consumption was in fact relatively limited to a few countries

and for local use only (Robards & Reeves, 2011). However, many governments, especially during the 1900s, subsidized these activities as a measure to reduce competition with small-scale fishermen (Bearzi et al., 2004; Gonzalvo et al., 2015). Until the beginning of the 1900s, it was common to see pictures of people posing next to a cetacean corpse smiling, full of pride for having killed it or for just standing by the “beast” (e.g., Bearzi et al., 2010; Brito & Vieira, 2010; Brito & Sousa, 2011). By 1930, more than 30,000 whales were killed annually, with many populations near collapse (Francis, 1990). Whale meat consumption was a considerably important source of protein nationally until World War II, during which time a temporary decline in whaling was marked, but it resumed afterwards. In 1946, after the cessation of whaling during World War II, the International Whaling Commission (IWC) came into existence to “provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry” (Donovan, 2009). Many historical documents suggest that cetaceans were used for their oil for fuel rather than for food due to the difficulties in catching a fresh animal. Since 1986, a pause or “moratorium” was adopted for commercial whaling. The “Save the Whales” movement, which was at its peak in the 1970s, played an important role on the restriction of whaling and recently on captivity by turning existing negativistic and utilitarian attitudes towards marine mammals into appreciation and respect (Bekoff, 2009).

This overview outlines the evolution of public perception towards cetaceans, primarily in western and westernized communities, while highlighting the utilitarian and negativistic attitudes (Kellert, 1985) that are still present in certain countries. A number of studies have investigated the evolution of the current human perception towards cetaceans. These studies are usually conducted on a local scale (e.g., Aruba: Luksenburg & Parsons, 2014; Brazil: Alves et al., 2012; Zappes et al., 2014; Mintzer et al., 2015; Caribbean: Hoyt & Hvenegaard, 2002; Greece: Gonzalvo et al., 2015; Iceland: Einarsson, 2009; Japan: Bowett & Hay, 2009; Scotland: Howard & Parsons, 2006; United States: Barney et al., 2005; Peterson & Carothers, 2013) or address specific target groups, namely fishermen (e.g., Alves et al., 2012; Peterson & Carothers, 2013; Zappes et al., 2014; Gonzalvo et al., 2015; Manzan & Lopes, 2015; Mintzer et al., 2015), whale-watchers (e.g., Amante-Helweg, 1996), and students (e.g., Barney et al., 2005; Bowett & Hay, 2009). Occasionally, methods other than social science surveys (e.g., review of historical events and records) have been used (e.g., Bearzi et al., 2004, 2010; Brito

& Vieira, 2010). A few studies that aimed for an international scale (more than one country) primarily focused on whaling (Freeman & Kellert, 1992; Hamazaki & Tanno, 2001) rather than other aspects of cetaceans (Denham, 2015). More recently, an international study on social media focused on an investigation of attitudes and perceptions both on dolphins and whales was largely directed to the United States and India (Naylor & Parsons, 2018). However, in the latter study, (1) international coverage and homogeneous spatial distribution of the questionnaire was lacking: more than 95% of the respondents originated from two countries (i.e., the United States and India) with the remaining participants derived from 19 countries with one or two filled questionnaires; (2) participation was triggered by economic issues because an incentive of \$0.25 USD was offered to each filled questionnaire; and (3) the number of participants was significantly smaller than the present work (857 vs 5,222 in our study).

The present study sought to assess the current attitudes of the public towards cetaceans on an international scale using a unique protocol based on the most commonly used attitudinal scale (Kellert, 1985) with a sample that was administered online. The main goal was to provide a baseline for future studies that will facilitate a better understanding of public perception of cetaceans and how cultural, historical, and other drivers can affect attitudes. The investigation of attitudes towards wildlife, especially of protected and endangered species such as cetaceans, is of high priority for detecting misconceptions and negativistic perceptions that can undermine conservation efforts. On the other hand, positive attitudes can bring out positive behaviors towards the animals (Thompson & Mintzes, 2002) and boost conservation and protection efforts when necessary.

Methods

Social media seemed to be ideal for communicating studies to a large global audience with both limited effort and budget, as compared to conventional methods such as personal interviews, telephone surveys, or online paid survey platforms. Duggan et al. (2015) found that as of 2014, 74% of adults surveyed were using online social networking sites, while 2.6 billion people are using social media globally (Statista, 2016). Despite the weakness of the sampling protocol, mostly due to the absence of random selection, the present study is one of the few trying to identify potential drivers and factors affecting the attitude of the public towards both dolphins and whales in extended spatial coverage.

Questionnaire

Our questionnaire (see Supplementary Appendix in the “Supplementary Material” section on the *Aquatic Mammals* website: https://www.aquaticmammalsjournal.org/index.php?option=com_content&view=article&id=10&Itemid=147) consisted of two sections. The first part included questions on the demographic characteristics of the respondent and one closed-form question with four fixed answers on the respondent’s participation in educational activities related to the marine ecosystem in the past. The second part consisted of 19 statements (Table 1). The choice of the statements was based on the most commonly used attitudinal scale (Kellert, 1985) in which nine attitudinal dimensions are described. For each of the nine dimensions, one question for dolphins and one for whales was prepared as shown in Table 1. A last statement was also added (G – Hunting dolphins/whales is wrong) to cross check the summarized outcome of the above statements. Answers were codified using a 0 to 4 Likert scale (0 = totally disagree; 4 = totally agree).

Dissemination

The questionnaire was translated into 22 languages (i.e., English, Spanish, Italian, Greek, Portuguese, French, German, Dutch, Swedish, Turkish, Bulgarian, Serbian, Ukrainian, Russian, Latvian, Lithuanian, Arabian, Simplified Chinese, Traditional Chinese, Japanese, Malay, and Filipino) to eliminate biases resulting from linguistic barriers. While these languages cover the majority of the European, American, Middle Eastern, eastern Asian, and Southeast Asian countries, most native African languages are missing (e.g., Swahili, Afrikaans, and so on). However, in almost all African countries, English, French, Portuguese, Spanish, and/or Arabian are official languages. The translations were uploaded on a digital platform and distributed through social media. Social media encompasses various word-of-mouth online forums, including social networking sites, digital audio, images, movies or photo content platforms, blogs, company-sponsored discussion boards, chat rooms, and Internet discussion boards (Mangold & Faulds, 2009). For this study, we mainly used Facebook, Twitter, LinkedIn, and blogs, while mass media, namely newspapers, were used in some countries. The distribution of the questionnaire took place during six consecutive months from September 2015 to March 2016.

Data Analysis

Descriptive statistics (i.e., estimation of means and standard deviations) were applied to all statement scores. In order to measure the degree of agreement/disagreement on the 18 statements

assessing the attitude of the respondent towards cetaceans, we estimated the sum of the values for each of the five levels of each statement (i.e., 0, 1, 2, 3, and 4). Spearman non-parametric correlation was used to identify the degree of correlation between pairs of statements (D and W) measuring the degree of agreement/disagreement of the participants towards dolphins and whales (Zar, 1999). The non-parametric Chi-square test (χ^2 test) was used to examine a possible relationship between the participants’ demographic characteristics (i.e., age, sex, continent of origin, and education level) and the statement involved with the experience gained through the engagement in marine projects. The scores obtained from each of the 19 statements were used to measure the attitude of the participants towards cetaceans. A cluster analysis was also used to identify the spatial heterogeneity of participants’ responses to the 18 statements (excluding the question of hunting dolphins/whales), measuring the attitude of the respondent towards cetaceans. The cluster analysis was applied to a matrix comprising the sum of the scores for the five levels per each statement, only including the countries with more than 100 participants (25 countries). The matrix was then transformed with the Ward method (complete linkage distance) and converted into a triangular matrix of similarities using the Euclidean coefficient (Hair et al., 1998). The non-parametric multivariate analysis of variance PERMANOVA test was used to determine the differences between the groups of country–fishing gear combinations identified from the multivariate analysis (Anderson & Walsh, 2013). Thereafter, each group was compared with the scores obtained from each of the 19 statements measuring the attitude of the participants towards cetaceans by using the non-parametric test of Kruskal-Wallis (H: $p < 0.05$). Whenever a significant difference was detected ($p < 0.05$), the non-parametric post-hoc Tukey-test was used to identify the responsible factors (Zar, 1999).

Results

Questionnaire Results

A total of 5,222 questionnaires were collected from 107 countries worldwide. Descriptive statistics of the sample structure based on respondents’ demographic and socioeconomic characteristics are given in Table 1. Twenty-five countries cumulatively contributed 77.7% of the total number of sampled questionnaires, with the contributions from each country ranging from 1.52 (Mexico) to 8.9% (Greece). More than half of the participants lived in Europe (57.5%), and the majority lived in coastal areas (96.2%). The wide majority of respondents (48.5%) were between 18 to 29 years of age with a male/female ratio of 41:58

Table 1. Sample structure based on respondents' demographic and socioeconomic dispersion criteria

Variable	N	%	Variable	N	%
<i>Age</i>			<i>Continent</i>		
< 17	75	1.44	Africa	218	4.17
18-29	2,530	48.48	Asia	520	9.96
30-39	1,074	20.58	Europe	3,000	57.45
40-49	705	13.51	North America	605	11.59
50-59	548	10.5	Oceania	445	8.52
> 60	287	5.5	South America	434	8.31
<i>Sex</i>			<i>Coastal/Non-coastal</i>		
Female	3,052	58.45	Coastal	5,021	96.15
Male	2,170	41.55	Non-coastal	201	3.85
<i>Father's profession</i>			<i>Mother's profession</i>		
Farmers/Fisherman	113	2.46	Farmers/Fisherman	87	3.67
Civil servant	379	8.26	Civil servant	155	6.54
Freelance professional	2,200	47.94	Freelance professional	980	41.33
On pension	457	9.96	Housewife	313	13.2
Private employee	612	13.34	On pension	17	0.72
School professor	585	12.75	Private employee	387	16.32
Unemployed	30	0.65	School professor	317	13.37
Worker	213	4.64	Unemployed	15	0.63
<i>Education</i>			<i>Worker</i>		
Associate's degree	341	6.55	Worker	100	4.22
Bachelor's degree	1,898	36.43	<i>Country</i>		
Graduate degree	1,565	30.04	Greece	523	8.94
High school degree or equivalent	747	14.34	United States	353	6.04
Less than high school degree	136	2.61	Australia	349	5.97
Some college but no degree	523	10.04	Italy	342	5.85
<i>Live abroad</i>			United Kingdom	315	5.39
Yes	2,224	42.59	France	287	4.91
No	2,998	57.41	Spain	275	4.70
<i>How long</i>			Ukraine	188	3.21
<1	191	10.08	Germany	179	3.06
1-5	1,271	67.07	Brazil	132	2.26
6-10	295	15.57	Philippines	129	2.21
11-20	105	5.54	South Africa	123	2.10
21-30	30	1.58	Argentina	118	2.02
> 40	3	0.16	Portugal	116	1.98
<i>Participation in marine projects</i>			Sweden	112	1.92
> 1 year before	610	11.84	Canada	109	1.86
0-6 months before	561	10.89	Japan	108	1.85
6-12 months before	190	3.69	South Korea	105	1.80
Never	3,791	73.58	Turkey	102	1.74
			Denmark	101	1.73

The relative importance that respondents gave to basic attributes revealed a high percentage of strong positive attitudes (value 0 when statement was negative and value 4 when statement was positive) in all of the 18 statements (Table 2). The vast majority of the respondents accepted the importance of cetaceans for the functioning of marine ecosystems (for each statement, the percentage contribution of each level was higher than 75%). In contrast, strong disagreements (value 0) were estimated in a high percentage for the statements involving cetaceans for their importance in entertainment (for each statement, > 73%), unwillingness to participate in a dolphin/whale-watching (for each statement, > 65%), and not to have special interest in those animals (for each statement, > 51.5%) (Table 2).

holding a bachelor's (36.4%) or a master's/doctoral degree (30%). The majority of parents' professions were freelancers (47.9% for fathers and 41.3% for mothers). About three-fifths (73.6%) of the respondents had never participated in any educational projects related to the marine ecosystem, whereas a small percentage (11.8%) had been involved in projects more than a year before the present study was conducted. More than half of the participants have never lived abroad, whereas 67.1% of the rest lived abroad for 1 to 5 years.

The comparison of the participants' demographic characteristics with the responses in each of the 19 statements revealed that there were no significant (χ^2 test; $p > 0.05$) differences among pairs of statements relating either to dolphins or to whales. Responses were significantly (χ^2 test; $p > 0.05$) dependent on continent for all 18 statements, with the participants from North and South America (and occasionally Europe and Oceania) exhibiting the most intense attitude (either positive or negative attitudes in nine out of 18 statements each), and those originating from Africa-Asia exhibiting moderate attitudes in 16 statements and positive attitudes in two statements (i.e., D3 and D4), whereas all the other continents exhibited negative attitudes. The youngest participants significantly (χ^2 test; $p > 0.05$) exhibited a more positive attitude, while females significantly (χ^2 test; $p > 0.05$) exhibited positive attitudes in eight out of 12 statements. For the remaining four statements, both males and females significantly (χ^2 test; $p > 0.05$) disagreed for the statements exhibiting extreme interest in cetacean watching (D7-W7) and for those exhibiting their objection to cetacean captivity and dolphinarium (D9-W9). Participants with an advanced degree of education significantly (χ^2 test; $p > 0.05$) exhibited positive attitudes in six out of 11 statements. The mother's profession was significantly (χ^2 test; $p > 0.05$) independent of the statements, whereas the inverse was significantly (χ^2 test; $p > 0.05$) true for the father's profession for the statements D3 (Farmers/Fishermen totally agreed), D5 (Workers totally disagreed), D6 and W6 (Farmers/Fishermen and to a lesser extent Unemployed and Workers totally disagreed). Participants from coastal countries significantly (χ^2 test; $p > 0.05$) disagreed for the statements D2, W2, and W7, whereas they significantly (χ^2 test; $p > 0.05$) totally agreed for the statements D8 and W8. Finally, the experience gained by living abroad and through the engagement in marine projects were significantly (χ^2 test; $p > 0.05$) dependent on almost the same pairs of statements relating either to dolphins or to whales (Figure 1). The participants who have never lived abroad or been involved in a marine project within a year significantly (χ^2 test; $p >$

0.05) disagreed for D6-W6 and D9-W9, whereas those who have lived abroad and got involved in a marine project within 6 months significantly (χ^2 test; $p > 0.05$) agreed for D1-W1 and D8-W8.

A cluster analysis applied on the sum of the scores obtained from each of the 18 statements reported for different countries (i.e., for those with more than 100 participants) revealed the significant (PERMANOVA test: pseudo F-ratio = 62.50; $p < 0.05$) formation of six groups of countries, whereas two countries, Japan and the UK, were disaggregated separately. Four out of the six groups consisted of adjacent countries in terms of spatial and/or cultural aspects: Australia-USA (A), Portugal-Brazil (B), South Korea-Philippines (C) and Norway-Denmark (D). In contrast, the two remaining groups, E and F, consisted of a number of different countries at distant locations from each other and with different cultural issues (Figure 2).

The mean total scores of all statements were combined (see Table 2) together with the 95% Least Significant Difference confidence intervals for each formed cluster group (see Figure 2). Superscript letters highlight the significant ($p < 0.05$; Tukey-test) different groups: a>b>c>d. A χ^2 test was used to identify the degree of dependence or independence between the participants' demographic characteristics and the experiences gained by living abroad and through involvement in marine projects with each of the 19 statements per formed cluster group. Results revealed significant ($p < 0.05$) dependence in each group between the scores of statements and the demographic features. For group A, young people (up to 29 years old for 13 out of 19 statements) and females (for five statements) significantly (χ^2 test; $p > 0.05$) exhibited a positive attitude. In addition, very few demographic features were significantly (χ^2 test; $p > 0.05$) dependent on the scores of the statements for group B (i.e., education in two statements with those having a high school degree choosing to totally disagree). For group C, the participants with a bachelor's degree (for seven statements) and those with fathers who are civil servants significantly (χ^2 test; $p > 0.05$) exhibited a moderate to high acceptance. For group D, young people (up to 39 years old for four statements) and those having a bachelor's degree (for two statements) significantly (χ^2 test; $p > 0.05$) chose from moderately to totally agree. For group E, fathers' profession (six statements) and sex (four statements) were the significant (χ^2 test; $p > 0.05$) contributing factors with either freelancers and private employees or males choosing to totally or moderately agree, respectively. For group F, females (for four statements) significantly (χ^2 test; $p > 0.05$) exhibited a high score of agreement; whereas for the UK, the project involvement (for four statements) was the significant (χ^2 test; $p >$

Statement	Demographic characteristics			Father	Mother	Coastal/non		Have you ever	Project
	Age	Sex	Education	Profession	Continent	Coastal	lived abroad	involvement	
D1	●	●	○	○	○	●	○	●	●
D2	○	○	○	○	○	●	○	●	●
D3	●	○	○	○	○	●	●	○	○
D4	●	○	●	○	○	●	●	○	○
D5	●	●	●	●	○	●	○	○	○
D6	●	●	○	○	○	●	○	○	○
D7	●	○	○	○	○	●	○	○	○
D8	●	○	○	○	○	●	○	○	○
D9	●	○	●	○	○	●	○	○	○
W1	●	○	●	○	○	●	○	○	○
W2	●	○	○	●	○	●	○	●	○
W3	●	○	○	○	○	●	○	●	○
W4	○	●	○	○	○	●	○	○	○
W5	○	○	●	○	○	●	○	○	○
W6	○	○	○	○	○	●	○	○	○
W7	○	○	○	○	○	●	○	○	○
W8	○	○	○	○	○	●	○	○	○
W9	○	○	○	○	○	●	○	○	○
G	○	○	○	○	○	●	○	○	○
No of P<0.05	17	9	11	5	0	19	5	9	7

Figure 1. Results of χ^2 test for the comparison of participants' demographic characteristics and the experience gained through involvement in marine projects with each of the statements. Statement codes are presented in Table 2. Black, grey, and white circles indicate $p < 0.01$, $p < 0.05$, and non-significant cases, respectively.

> 0.05) contributing factor, with those involved for more than 1 year or less than 6 months exhibiting a positive attitude.

Discussion

The present study is the first international public attitude survey about cetaceans and covers a high spatial dispersion and a large number of volunteer participants. Such studies can improve the conservation of threatened species by helping conservationists to prepare custom-tailored actions that will address gaps of knowledge and misconceptions (Bennett, 2016). Our work aims to contribute towards advancing cetacean conservation.

Public Attitudes Towards Cetaceans

Attitudes can be shaped by various factors such as age (Kellert, 1976), education level (Kellert, 1996; Thompson & Mintzes, 2002; Barney et al., 2005), gender (Kellert & Berry, 1980), contact with the target animal (Kellert, 1985), locality, nationality (Phillips et al., 2012), and others. In our study, nationality, age, gender, level of education, and participation in conservation activities emerged as the most significant factors (Figure 1).

Location, whether expressed as continent (Figure 1) or country (Figure 2), was the most significant factor affecting all attitudinal scales of the respondents. Respondents from North and South America

and to a lesser extent from Europe and Oceania exhibited significantly more pronounced (either positive or negative) attitudes when compared with the ones originating from Asia and Africa, the latter exhibiting contrasting attitudes in certain cases. When cluster analyses were performed at the country level, six groups were formed (Figure 1), while two countries (Japan and the UK) disaggregated separately. The formation of four groups consisted of culturally/historically related countries: Norway–Denmark, Portugal–Brazil, USA–Australia, and South Korea–Philippines. The diversity of attitudes towards animals around the world is highly related to influences of different cultures. Spatial grouping can set the framework of resource characteristics (e.g., public awareness) that are critical to the design and assessment of citizen science programs that monitor marine cetacean resources (Chase & Levine, 2016). Key drivers often include religion, traditional practices, use of animals, and climate conditions, and all of them have been shaped by the history of each region (Phillips et al., 2012). In Western societies, the former utilitarian attitude (e.g., food items, clothing, and so on) is currently declining (Manfredo et al., 2003; Bekoff, 2009; Phillips et al., 2012), while the concept of animal welfare and ethical animal treatment is on the rise (Blomqvist, 2015). In general, all Western countries exhibited a more positive attitude than the countries from Asia (Africa is not included since

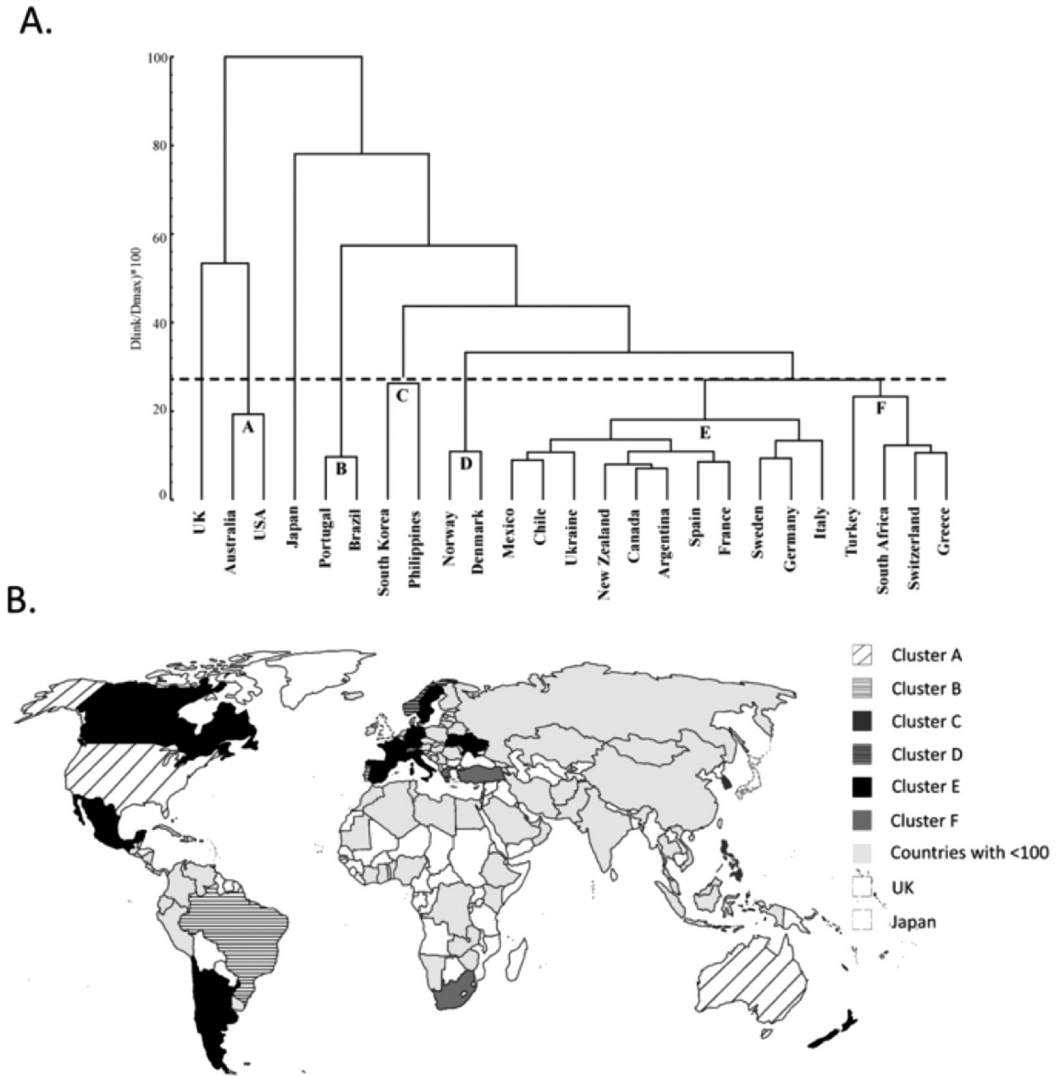


Figure 2. (A) Cluster analysis of the 25 countries on a matrix comprising the sum of the scores for the five levels that consisted of each of the 18 statements for the countries with more than 100 participants (A, B, C, D, E, and F display the clusters); and (B) visualization of the clusters along with the total number of countries that participated in the study with at least one questionnaire. A χ^2 test between pairs of groups from the cluster analysis showed that the greatest differences were noted for the comparisons with the statements D9-W9 (totally agree for group B and moderately agree for group D), D2-W2 (totally agree for groups C and F), and D8-W8 (totally disagree for group B and moderately agree for group D). As mentioned above, Japan and the UK exhibited a different pattern when compared with the other country groups. For Japan, in 13 out of 18 statements (D2-W2, D4-W4, D5-W5, D6-W6, D6-W6, and D9), the percentage contribution for each of the four levels per statement ranged from 7.4 to 41.7%, exhibiting a quite dispersed attitude. For the UK, although the results between each of the comparisons were similar, a completely negative attitude for 10 out of the 18 statements was shown; whereas for the remaining statements, a totally positive attitude was exhibited. Based on the total scores, significant ($H: p < 0.05$) differences among groups in most of the statements were exhibited as follows (see Figure 3): (1) Japan (lowest values for statements D5, D6, D7, and D8, whereas highest scores for statements W2, W3, W4, W5, W8, and W9); (2) UK (lowest scores for statements D3 and D4); (3) group B (lowest scores for statements W6 and W7, whereas highest scores for statements D9 and W1); and (4) group D (lowest scores for statements D1 and D2).

Table 2. Percentage contribution of the level scores (0, 1, 2, 3, and 4) estimated from the 18 statements measured the attitude of the respondent towards cetaceans (dolphins and whales)

Statement (Attitude)	%	%	%	%	%
<i>Dolphins</i>	0	1	2	3	4
D1 – There is a special bond between humans and dolphins. (Aesthetic)	7.11	8.42	21.79	28.54	34.15
D2 – We should manage dolphin populations to sustain fish stocks. (Dominionistic)	42.24	14.95	14.98	11.63	16.20
D3 – Dolphins are important for the functioning of marine ecosystems. (Ecologicistic)	1.69	1.60	5.54	15.86	75.30
D4 – Dolphins have feelings just like humans. (Humanistic)	4.72	6.20	16.01	27.63	45.43
D5 – I wouldn't approach a dolphin in the wild because I am scared. (Naturalistic)	42.98	19.88	17.56	9.25	10.33
D6 – I don't have any special interest in dolphins. (Negativistic)	51.77	18.49	15.03	8.06	6.66
D7 – I wouldn't like to go dolphin watching. (Neutralistic)	65.05	13.45	8.06	4.53	8.91
D8 – I would like to learn more about the biology of dolphins. (Scientific)	8.69	6.44	16.02	22.47	46.38
D9 – Dolphins are important because they entertain us (in Dolphinarium). (Utilitarian)	73.02	12.8	6.91	3.10	4.18
<i>Whales</i>					
W1 – There is a special bond between humans and whales. (Aesthetic)	11.26	14.62	29.6	22.64	21.89
W2 – We should manage whale populations to sustain fish stocks. (Dominionistic)	43.53	14.26	14.61	10.59	17.01
W3 – Whales are important for the functioning of marine ecosystems. (Ecologicistic)	1.73	1.50	5.12	15.33	76.32
W4 – Whales have feelings just like humans. (Humanistic)	6.27	8.65	19.30	26.38	39.41
W5 – I wouldn't approach a whale in the wild because I am scared. (Naturalistic)	29.59	17.67	20.58	13.36	18.79
W6 – I don't have any special interest in whales. (Negativistic)	51.54	18.42	14.61	8.03	7.41
W7 – I wouldn't like to go whale watching. (Neutralistic)	65.81	13.34	8.10	3.86	8.89
W8 – I would like to learn more about the biology of whales. (Scientific)	8.45	6.62	16.26	21.91	46.77
W9 – Whales are important because they entertain us (in Dolphinarium). (Utilitarian)	74.88	11.97	7.31	2.58	3.26
<i>General statement</i>					
G – Hunting dolphins/whales is wrong.	4.51	2.63	4.32	7.40	81.13

only South Africa, which is also a Commonwealth Member, was incorporated in the analysis). A general shift in the attitude of the public towards cetaceans (Thompson & Hickey, 2012) was also revealed by our findings. The important and long-term influence of tradition in people's attitudes was also evident in the responses of whaling nations (Japan–Norway–Denmark) and in some nations that have recently quit whaling (Portugal–Brazil) (responses of D3–W3; dominionistic attitude).

Another study showed that respondents from Asian countries exhibited less concern for animal

welfare than European countries (Phillips et al., 2012), and our results are in line with this finding. The attitudes of South Korea and the Philippines generally appear to be closer to the whaling nations; however, in statement G, both exhibited a much more negative attitude towards cetaceans as they considered dolphin culling/whaling ethical. Japan showed the most negative attitude towards cetaceans and was placed separately from the other analyzed countries. Similar results were found by Kellert (1991) in his more generic work on the Japanese perception of wildlife. Although the

extent of demand for cetacean meat has changed dramatically over time, cetacean products are still important in some locations (e.g., Taiji) but not for the rest of Japan. Whale meat became a major source of protein in Japan after World War II due to the decimation of agriculture during the war. This national characteristic or mentality may lead either to public acceptance of influential vocal opinions—for instance, from politicians—which are often taken up and spread within the society by the media, or to being “neutral” with regard to a subject (Okamoto, 2001).

Likewise, the UK could not be grouped with the rest of the clusters as the answers were highly diverse within the country and no specific result could be displayed. We believe that this is due to the highly multicultural society of the country (Morrell, 2008), especially in urban areas from where most of the answers originated. Further, Australia and the United States, which were grouped together (Figure 2), appeared to be closer to the UK rather than groups E and F. This can be explained by the same reasons referred to for the UK since both Australia and the United States are also considered highly multicultural countries (Befu, 2001; Australian Bureau of Statistics,

2011). The same trend appears with Switzerland, another multicultural country (Bloemraad et al., 2008) that is grouped with countries of different cultures (Figure 2).

The youngest respondents exhibited a more positive attitude towards cetaceans regardless of their nationality in line with the findings of similar studies (Kaczensky et al., 2004; O’Byrhim, 2006; Røskaft et al., 2007; Shibia, 2010; van Dalum, 2013; Denham, 2015). It is important to highlight that especially in the case of cetaceans, the eldest respondents from particular countries (e.g., Portugal, Brazil, Greece, Italy, and Spain) were adolescents when the exploitation of cetaceans officially stopped. Perception towards wildlife is well shaped at this age (Keliher, 1997), which might explain their current deep-rooted negative picture of these animals. On the other hand, the majority of the youngest respondents grew up in an environment of high respect and fascination for cetaceans, primarily dolphins (Nekaris et al., 2017). Females exhibited a more positive attitude, specifically a higher aesthetic, ecologicistic, and naturalistic attitude, while males exhibited a more utilitarian and dominionistic attitude in accordance with the findings of another study

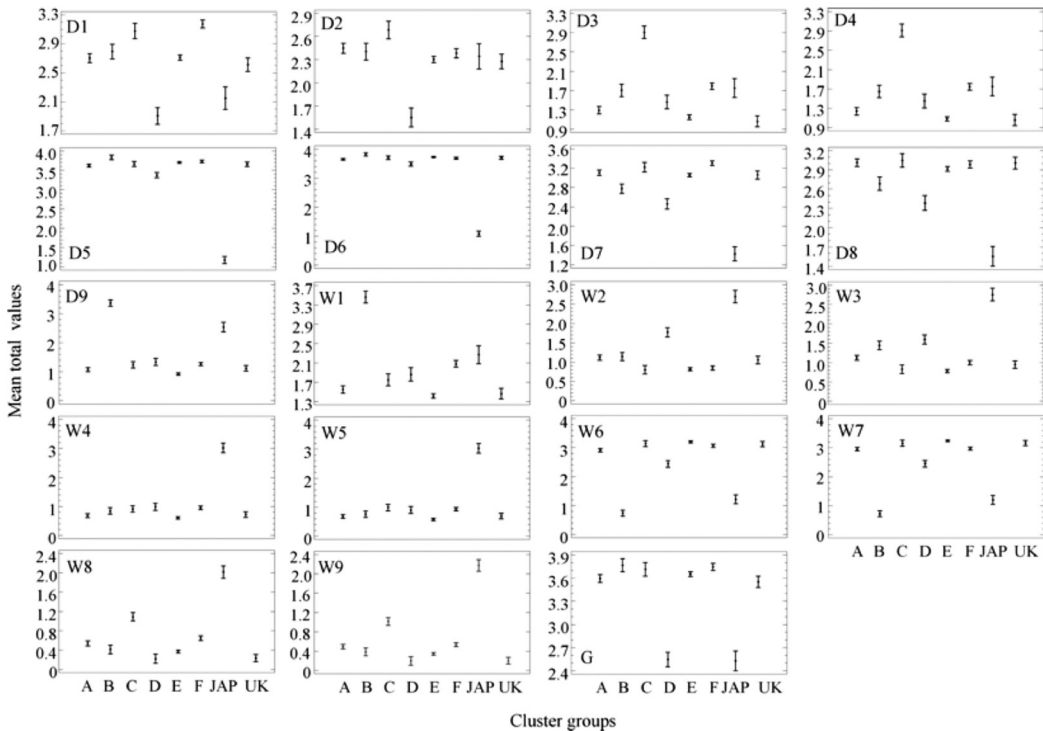


Figure 3. Box-Whisker plots of the mean total scores of all statements (from Table 2) for each cluster of countries (as in Figure 2)

(Thompson & Mintzes, 2002). Father's profession was found to play a significant role, especially for dolphins, but only for children with fathers working as fishermen or agriculturists. The latter might be a result of the fathers' direct transfer of experience due to their close engagement with nature. However, in other studies, the parents' profession has been regarded as an important sociocultural agent, having a direct effect on shaping children's pro-environmental attitudes (Arnold & Doctoroff, 2003).

A universal disapproval of cetaceans in captivity (D9-W9) was found in the analysis that was in agreement with the strong controversy started against captivity and dolphins during recent years (Blomqvist, 2015). Many non-government organizations (NGOs) and foundations are campaigning against this practice, with SeaWorld Entertainment, Inc. being the flag "enemy." The topic is considered one of the hottest among animal rights activists who serve the general demand for ending mammal captivity, as cetaceans are considered flagship species in this effort. It is characteristic that one of the most impactful documentaries, *Blackfish*, fundamentally contributed to the elimination of SeaWorld's breeding program in less than 3 years while fostering high public participation, knowledge gaining, and attitude change (Burford & Kalil-Schutten, 2017), although there is a great deal of controversy on this opinion. Our results display this current trend.

Attitudes lead our intention to act and are crucial for developing pro-environmental behaviour. Nowadays, cetaceans are facing various threats that are mostly related to anthropogenic impacts (Parsons et al., 2015). Therefore, understanding the attitude of the public and the drivers affecting it in different countries and regions can serve to conduct customized awareness campaigns and effectively incorporate the public on conservation policy implementation (Teel & Manfredo, 2010; Bennett, 2016). Hereby, we presented the study with the largest sample on this specific topic, utilizing data collected via social media. The results of this sample helped us to understand how culture can affect attitudes of modern societies.

Constraints

Data deficiencies were mostly related to the lack of truly global coverage in the data collection and that the demographic spread of the participants was skewed. Although further research effort should be made, especially on developing a feasible design that would be based upon more representative samples, which, in turn, would increase the global coverage in the data collection, we consider that the present study sheds light on critical aspects affecting the public attitude towards whales and

dolphins. By understanding public perception and the drivers affecting it, custom-tailored actions and focused campaigns can be designed for enhancing public participation in conservation of species that are facing various anthropogenic threats (Teel & Manfredo, 2010). While social media are easy to use, the translation of the original questionnaire into other languages (22 in our case) was of utmost importance for the success of the study and to smooth out biases of the final sample occurring from different educational levels in countries with no native English speakers.

However, even with the large number of users and the potential of the method, the questionnaire's circulation in Asia and Africa was rather limited. Asia (including the Arab States) and Africa are the areas with the lowest Internet coverage, especially when compared to Europe and North America (Internet Society, 2014). Specifically for Asia, the countries with more Internet and social media users are China, Japan, and South Korea. The fact that in China, Facebook and Twitter (our core social media) are not used explains the low number of responses from that country. Africa was the greatest limitation of our study with only one country (South Africa) included in the final analysis; therefore, the total number of responses from this continent was extremely low. More limitations occurred due to the demographic situation of the majority of respondents and their educational level. As has been highlighted (Smith, 2008), various factors determine who can and cannot respond to an online survey. In our study, most of the respondents were between 18 to 39 years old (~70%) and were highly educated (~70%), regardless of country and region. This finding is comparable to other surveys (Curtin et al., 2000; Moore & Tarnai, 2002), which were mainly completed by highly educated young people. Moreover, educational attainment is characterized as an important driver of Internet use (Lenhart et al., 2010), and ~70% of global Internet users are between 15 to 44 years old (Statista, 2016). In the near future, it is expected that more people will gradually obtain access to the Internet, and subsequently to social media (Duggan et al., 2015). Thus, it is highly possible that the above limitations will progressively even out.

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