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The Effects of Accents on Conservation Attitudes Towards Native Species

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A thesis submitted in partial fulfilment of the requirements for the degree of Masters of Science Communication

Centre for Science Communication, University of Otago,
Dunedin, New Zealand
January 2019

Abstract

This thesis aims to answer the question of whether people are more likely to want to conserve a flagship national species after hearing a distressing message about that species from someone with an associated accent, as opposed to an accent discordant with such a culturally emblematic animal. I was particularly interested in the case of koalas, with koala conservation messages being communicated with Australian vs. “foreign” accents. Specifically, it was hypothesised that a campaign about koalas in an Australian accent, geared towards an Australian audience, would most likely to lead to a positive (i.e., conservationist) change in behaviour and attitudes towards this iconic Australian animal. To explore this prediction, the matched-guise technique was used to test the difference between six treatments, comparing two species (koala and panda) between three different accents (Chinese, British and Australian). The results somewhat supported the hypothesis, with participants’ attitudes and behaviours being most positively affected when a distressing message about the endangered status of koalas was delivered with an Australian accent. As part of the creative component of this Masters thesis in science communication, these empirical results were then used to help create a 25-minute call to action film to help save the koala (No Place to Call Home).

Acknowledgements

Firstly I would like to give a big thank you to Jesse Bering, my supervisor. His guidance and advice was fundamental in getting me across the finish line. I thank him for reading over my very rough drafts and helping me define my ideas, I could not have completed the thesis without him.

Many people had a hand in helping me with my creative component. Without the support Neil Harraway, Robert Brown, Jeff Avery and Tom Koykka (NHNZ) I surely would have given up many times in the making of my 25-minute-film, so a massive thank you to them.

I would also like to thank Steve Ting, Sue Harvey, Victoria Alogna, and the class of SciComm 2018 for the unconditional support and help over the past two years, there's no way I could have survived without them. My parents and family, for their financial and mental support, I surely would have starved and broken down completely if it wasn't for their help.

To all the koala groups in my film (Koala Action Group, Koala Action Inc, Queensland Koala Crusaders, Moreton Bay Koala Rescue and Wildcare Australia) for their time during the making of and distribution of the documentary, I thank them. The amount of people the film has reached and touched already thanks to their distribution is more than I could have ever hoped for.

So to everyone who has helped me this past 2 years who I have mentioned, and to those I have forgotten, thank you, thank you, thank you.

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1. Introduction

The conservation of biodiversity is one of many environmental issues that ecologists and other scientists are tackling today. Those who have researched the importance of biodiversity know not only how critical it is for sustaining healthy ecosystems, but also how important such efforts are for human health and wellbeing (Balvanera et al., 2001; Miller 2005; Nelson et al., 2009; Sandifer, Sutton-Grier, & Ward, 2015). Vital environmental outputs (ecosystem services), such as clean air, clean water and pollination of crops, are enabled and maintained by healthy, viable ecosystems rich in biodiversity (Díaz, Fargione, Chapin, & Tilman, 2006; Cardinale et al., 2012). However, many ecosystems are currently under threat due to human activity and habitat incursion; therefore, it is important that they are protected.

There are many ways in which individuals, groups and governments can help to protect vulnerable ecosystems. One way to promote change in attitudes towards conservation, which should in turn prompt behavioural intervention, is with the use of a flagship species. Flagship species can be defined as "*popular, charismatic species that serve as symbols and rallying points to stimulate conservation awareness and action*" (Barua, Root-Bernstein, Ladle & Japson, 2011, p. 431). For example, the World Wide Fund For Nature (WWF), selected ten charismatic species worldwide around which to concentrate their fundraising efforts, with a single species, the panda, as the emblem of their general campaign. People tend to be drawn to charismatic species such as the panda, which could explain why individuals tend to be willing to donate to save it (Kontoleon & Swanson, 2003). Given this, it makes sense that WWF would use that charisma factor to help raise funds for their overall mission, which is currently to conserve nature and reduce the most pressing threats to the diversity of life on Earth (World Wildlife Fund, 2017, WWF Home page). In addition to being charismatic, many high-profile species, used by WWF and similar organizations, are often very closely associated with their habitat (i.e., the image of the panda is intertwined with the bamboo forests of China). As many people are aware of the need to protect vital habitat for endangered species to thrive, people should be willing to pay for the conservation of their habitat. Protection of a species overall habitat will not only conserve the species in question but has the potential to protect other wildlife and ecosystems as well, which is often the conservationist goal (Bowen-Jones & Entwistle, 2002).

However, the use of the "flagship species" method has been debated amongst scientists, with some questioning its overall usefulness of protecting broader ecosystems (Roberge & Angelstam, 2004; Williams, Burgess, Rahbek, 2006). Although a flagship species can be beneficial to promoting conservation efforts for their native habitats (in turn protecting other, perhaps less charismatic species which occur in the same area), the habitat in question is not necessarily a biodiversity hotspot, which implies an area of significant biodiversity value which is threatened by biodiversity loss (Kontoleon & Swanson, 2003). Roberge and Angelstam's (2004) evaluation of umbrella species (a term used in conservation biology to refer to a species conferring protection to a large number of naturally co-occurring species) argues that there is no single species that can ensure the conservation of all co-occurring species, because some species are inevitably limited by ecological factors that are not relevant to the species in question. For example, whilst processes at a landscape or bioregional scale usually affect birds and mammals, with their large home ranges, species with a small home range such as invertebrates or non vascular plants are often more affected by threats at a finer spatial scale (Roberge & Angelstam, 2004).

Despite ongoing debates surrounding umbrella flagship species and whether they can buffer human incursion into a broader, at-risk ecosystem, marketing approaches that rely on such immediately recognizable animals have in fact been very successful at promoting pro-environmental change within communities and engaging the general public (Home, Keller, Nagel, Bauer, & Hunziker, 2009; Schlagloth, Santamaria, Golding, & Thomson, 2018). A case study that assessed a small Australian community (Ballarat), found a positive change in peoples' attitudes to protect habitat in the name of the koala, an iconic and beloved Australian species (Schlagloth et al., 2018). The attitudes of the community were measured and monitored towards a Comprehensive Koala Plan of Management for Ballarat City Council, after a community engagement program was implemented. These findings suggest that the koala is a highly influential flagship species that can be used for the purpose of conservation education while also serving as an effective umbrella species for broader forest and biodiversity conservation.

Environmental campaigns that use a flagship species which are linked closely to cultural identity are thought to be particularly successful (Hammerschlag & Gallagher, 2017). The bald eagle for example, once facing extinction and thought not able to recover from human threats (Lawrence, 1990), has since been listed as 'Least Concern' (BirdLife

International, 2016). Although there is no formal documentation of the campaign using cultural identity to promote the conservation of the bald eagle, there is no doubt that the bald eagle holds significant cultural value in the United States and could have play a role in the success of its recovery (Lawrence, 1990). This example does demonstrate the time it takes to establish attachment to a cultural iconic species, as despite the eagle being the national emblem, the species was still subjected to poisoning and shooting almost until extinction.

Regarding Australian biodiversity, such findings of the benefits of showcasing culturally iconic flagship species would suggest that species such as the koala or kangaroo, for example, are ideal candidates for a tactical marketing approach (Hammerschlag & Gallagher, 2017; Schlagloth et al. 2018). Although kangaroos, among other animals, are inseparable from the Australian landscape, the present work is focused on the koala (*Phascolarctos cinereus*), a national animal symbol—and in Queensland, the state's faunal emblem. The koala holds cultural and historical significance. Indigenous Australians have a long history with koalas, as they hold an honoured place in many of their creation myths (dreamtime stories) (Haigh, 2009). European explores first wrote about koalas as the "New Holland Sloth", due to its sleepy and simple nature, over 200 years ago (Haigh, 2009). However the sleepy marsupial is far removed from a sloth. Defining subspecies of koalas is currently under debate but the current threats to the endemic and unique species, as only living member of its family Phascolarcitidae, should be reason enough to conserve the living legend (Sherwin, Timms, Wilcken & Houlden, 2001). So it may come as a surprise that such an iconic species is often neglected and has become threatened.

With these sociocultural factors being so salient in people's mental representations of koalas and Australia, conservation platforms that capitalize on this beloved flagship species may be especially effective at garnering public support (Hammerschlag & Gallagher, 2017). For the creative component of this thesis, therefore, which was a 25-minute call-to-action documentary film (No Place to Call Home- see attached DVD in appendix 2) about threats to wild koalas in Queensland stemming from human activity, I used the charisma and cultural significance of the koala as a tool to promote attitude and behavioural change in an Australian audience. Hopefully, this film-based message will help to protect not only vulnerable koalas, but other native species in the Queensland region as well. Again, although the use of the term "umbrella species" has been the subject of debate (Roberge & Angelstam,

2004), there is little question that protecting koala habitat would in turn safeguard a diverse range of native flora and fauna that comprise local ecosystems.

However, although biodiversity conversation would be a nice side effect of the documentary, it was not the overall goal, as using a single species to protect a broader ecosystem is indeed problematic (Roberge & Angelstam, 2004; Williams et al. 2006). Instead the main objective of this documentary was to educate the Australian public about some of the devastating human-related factors that are impacting koalas, which should make the audience stop and think about the effects our actions. With the help of this flagship species, the film may contribute to changes in attitude and behaviour towards precious Australian wildlife.

With the assumption that the koala's iconic nature in Australia would help to persuade the public to adopt changes in their attitudes and behaviours relating to biodiversity preservation throughout the country, the question arose as to whether other cultural factors could also play a meaningful role in prompting pro-environmental actions. Specifically, when contemplating who would narrate my documentary, I considered whether hearing a person/s speaking about the plight of the koala with an Australian accent*,* as opposed to one speaking with an accent discordant to this iconic national species (e.g., Chinese accent, British accent, etc.), would be most effective from a science communication perspective. To inform my decision-making about this strategic production issue, I therefore conducted a controlled study investigating whether people were more likely to positively change their behaviour and attitude towards the conservation of a flagship species after hearing a distressing environmental message from a person with a culturally concordant accent to the species in question than they were to the same message from a speaker with a foreign accent.

1.2 What is an accent?

Accents are defined by differences in pronunciation by a group of people from a localized geographical area or circumscribed social grouping (Yan & Vaseghi, 2003). The way these differences in pronunciation come about is through differences in phonetic transcription and the acoustic correlates of speech (Yan & Vaseghi, S 2003). Configuration, positioning, tension and movement of laryngeal and supra-laryngeal anatomical parameters differ between accents, and are the reasons for the differences in acoustics (Yan & Vaseghi, 2003). These differences usually affect the tongue's movement and perhaps other active articulators'

movements. In practise and over time these movements become familiar and ingrained in the way one speaks; it can therefore be very difficult for a non-native speaker to reproduce the same accent as a native speaker (Yan & Vaseghi, 2003).

For the purposes of the present study, a *non-native accent* was defined as an accent acquired as the result of learning a new language that is not the speaker's native tongue. A *native accent*, by contrast, refers to accents from differing nations but sharing the same native tongue, e.g. American and British English. A distinction should be made between native and non-native accents, given that studies have shown that listeners tend to respond less favourably to speakers with non-native accents than they do those with differing native accents; this is perhaps due to the fact that those who share the same native tongue may share other commonalities (Gluszek & Dovidio, 2010). However, a native accent can be further distinguished by differing dialects. A *dialect* differs from an accent in the sense that the former is rooted in regional differences (Gill, 1994). For instance, while those from Australia and Canada have different native accents, individuals from the US southern state of Georgia would be said to have a different dialect from those in the West Coast state of California. However, as differing dialects are often mistaken for differing native accents, for the purpose of this study, focus will remain on differing native accents and non-native accents.

1.2 Accents within communication

Assuming their words are intelligible to the audience/listener, it may seem self-evident that a person's accent should effect on their ability to communicate effectively. However, whether or not the listener is aware of these influences on their receptivity to a message, a person's accent often plays a significant role in the communication dynamic. Research reviewed by Gluszek and Dovidio (2010), for instance, has shown that preverbal infants display a marked preference for speakers who use their native accent. In a study by Kinzler, Dupoux and Spelke (2007), for instance, the authors presented 5-6-months-olds from American English-speaking families with three alternating videos featuring two women, both of whom spoke American English but with different accents. One film was played forward (natural speech), the other was played in reverse (unnatural speech), and a control (which consisted of the same speech paired with equal-sized images of two distinctive geometric patterns). The study recorded how much time the subjects spent looking at each speaker, with the researchers

arguing that looking time is a reflection of familiarity and preference, just as they often show towards their mothers. The data revealed that preverbal infants had a clear preference towards the native speaker. Such findings suggest that early-developing preferences for native-language speakers may serve as a foundation for preferences towards certain accents later in life.

From an evolutionary perspective, these seemingly innate preferences for those who sound like us make adaptive sense. An accent is a heuristic signal that provides important information about a person's social and ethnic group identity, often triggering inferences about social significance and social power (Kinzler, Corriveau, & Harris, 2011). Evidence shows that children often have a preference to learn from those with the same accent/ from their own cultural group (Kinzler et al., 2011). Kinzler et al. (2011) had children watch videos of a person with an English native accent and a non-native English accent, who each spoke for 10 seconds, and then silently demonstrated different functions with novel objects. The results showed that the children selectively endorsed the silent object function provided by the native accented speaker over the non-native accented speaker. A similar effect has been found amongst university-level students (see Gill, 1994). Such a linguistic bias is observed in many universities, as evidenced by student feedback to classes taught by instructors with foreign accents (see Gluszek & Dovidio, 2010). Students tend to believe that teaching assistants with non-native accents have low English proficiency and are unintelligible, but on average undergraduates who are taught by such instructors do not perform worse in their classes (Fleisher, Hashimoto, & Weinberg, 2002). This kind of unwillingness to learn or listen to those with non-native accents, despite the latter's clear ability to communicate effectively through spoken means, appears also to have negative effects on how much the listener trusts the information being conveyed by "foreigners" (Gluszek & Dovidio, 2010).

The empirical literature on Australian accents is somewhat limited. However, Pittman (1990) recorded twelve Australian-born speakers (6 males and 6 females) reading a standard passage in one of three ways: 1. a reading using a nasal voice quality, referred to as the nasal (N) voice; 2. a straight reading, referred to as the usual (U) voice, and; 3. a reading in which the speaker tried to be as persuasive as possible, referred to as the persuasive (P) voice). These recordings were assessed by 80 Australian-born students for their perceived persuasiveness and other qualities. The results showed that certain source characteristics are important for

(Pittman, 1990). Characteristics of perceived persuasiveness include loudness, speech rate, pitch variation and pitch of the voice/accent in question (Pittman, 1990). Fast speech, for example, is usually seen as more competent, credible and confident, whereas higher pitch levels were interpreted as less truthful and potent (Pittman, 1990). These findings also revealed that Australians associated nasality with a low social status.

An accent that is rated as highly sophisticated, intelligible and associated with high prestige, however, does not necessarily mean that the audience will give automatic respect to the speaker (Powesland & Giles, 1975). Powesland and Giles (1975) showed that regional-accented speech was judged by listeners as being significantly more sincere than Received Pronunciation English, which is an accent characterized by its high prestige and often referred to as Oxford English/Queen's English. It could be assumed that that the regional accent of the speaker matched that of the listener and could have been a contributing factor as to why it was judged as more sincere. The regional accent also produced a significant shift in the listeners' (British general public) attitudes with regard to the argument being presented (for or against the use of capital punishment), such that the audience was more likely to align their views with those of the regional accent speaker. Powesland and Giles' (1975) study suggests that certain accents can be more effective than others when it comes to persuading listeners about contentious topics, and that this effect is not simply a function of the prestigiousness of the accent. These findings seem to also reinforce the idea that when the audience can easily identify with the speaker, they are more likely to trust the information being presented by this verbal communicator. Although both accent-message incompatibility (i.e., the degree to which the speaker and the message relates) and identification with the speaker (i.e., the listener's perceived similarity between herself and the speaker) both contribute to persuasiveness of the message, only identification with the speaker resulted in a change in attitude (Powesland & Giles, 1975).

1.2.1 Stigma surrounding accents

Overall, persons with non-native accents are perceived negatively; this includes being viewed as less intelligent (Lindemann, 2003; van Maastricht, Krahmer, & Swerts, 2016) and more difficult to understand (van Maastricht et al. 2016). However, certain accents tend to be regarded more favourably than others. English native accents, for example, are often

perceived as prestigious, pleasant and friendly even by non-native speakers of English (Bayard & Green, 2005). Such effects could be due to stereotypical portrayals of individuals with certain accents in the media and society at large. For example, Disney and other animation studios often use foreign accents to voice villains in their movies (Gluszek & Dovidio, 2010). The stigma attached to a non-native accent is often the reasoning behind why people with non-native accents often feel that they will be respected more if they were to speak without a foreign accent. Such thinking may lower the speaker's self-esteem, which could in turn affect how the listener responds (Gluszek & Dovidio, 2010); the speaker may sound less confident and create doubt in the listener.

A recent study by Fuse, Navichkova, and Alloggio (2018) found that bilingual speakers are better able to comprehend non-native accented speech than are monolingual speakers. In fact, bilingual speakers judged non-native speakers as being more intelligible (Fuse et al., 2018). Such results are seemingly at odds with previous findings showing that non-native speakers are often stigmatised. However, bilinguals' perception of non-native speakers as more intelligible could be due to identity-related commonalities inferred by the listener (e.g., speaking multiple languages) and possibly some of the stigma they themselves have received.

The stigmas associated with accents are also influenced by the listener's personal experience with the accent (Fuertes, 2002; Gluszek & Dovidio, 2010). Where they are from, how they were raised, how long they have been exposed to an accent, and being immersed in stereotypes promoted by mainstream media could all contribute to the listener attributing various qualities to those with a given accent. These linguistic stigmas are not necessarily always negative. Stigma associated with an accent can sometimes represent positive attributes as well. For example, amongst native English speakers in the US, Australian or English accents are sometimes perceived as being more prestigious than their own (Bayard, Weatherall, Gallois, & Pittam, 2002; Gluszek & Dovidio, 2010).

1.2.2 Identity

Cultural identity plays a major role in the communication of messages. Not only does being able to identify with the speaker help to ensure that a verbal message is conveyed convincingly and with authority, such an identification process also facilitates the

communication of less overt, non-verbal information between parties, such as underlying emotion. Dialect theory, for instance, argues that although emotion is a universal language, there are subtle differences in dialects, which sometimes makes it difficult to understand emotion expressions from groups culturally different to one's own (Elfenbein, 2013). In other words, accents are not just verbal cues, which signify cultural identity, but in fact can be also be non-verbal. These non-verbal accents were evident in a study by Marsh, Elfenbein and Ambady (2003), which found that participants could judge the nationality of Japanese nationals and Japanese Americans when the poser was displaying emotional expressions with greater accuracy than when the poser was simply displaying a neutral expression. In a meta-analysis by Elfenbein and Ambady (2002) whereby 182 independent samples from a total of 87 peer-reviewed studies (with the majority of these examining facial expressions), emotional communication was shown to be more effective between those from the same cultural group even through non-verbal means. Further studies have shown that such an "in-group advantage" is also present when communicating verbally through the same dialect (Laukka, 2016). In an experiment by Laukka (2016), for instance, non-linguistic vocal expressions from 100 professional actors (from five English-speaking nations) were recorded. The actors were instructed to convey 11 distinct emotional states (anger, contempt, fear, happiness, interest, lust, neutral, pride, relief, sadness and shame). These recordings were in turn judged by a total of 320 participants. The participants were asked to judge the emotional state which best described the emotion they were hearing in the stimuli. The results showed that emotion recognition accuracy was greater for same-culture than it was for other-culture judgements (Laukka, 2016). Such studies from the field of dialect theory, grounded on the evolutionarily informed "in-group advantage" theoretical argument, demonstrates just how important cultural identity is for effective communication.

The listener's ability to identify with the speaker seems to be highly significant in communication. So much so that in a study by Renovato, Louie, Medina, Enriquez and Velasquez (2008), identifying with the speaker seemed to play a more important role than the actual message being communicated. In this study, an actor skilled in accents provided the narration for a 5-minute documentary-style program about Quinceañas (a 15th birthday celebration throughout Latin culture). The actor recorded two narrations, one with a North American accent and the other with a Spanish-influenced accent. The results showed a preference amongst North American accented participants for their own accent, despite the topic being about an event celebrated in Latin culture. Identification with the speaker was a

stronger influence than whether or not the speaker was knowledgeable about (or at least was seen to be related to) the topic. Another study conducted in the US found that students were better able to recall information and to learn more effectively from a teacher with an American accent than they were to one with a British or Malaysian accent (Gill, 1994).

However, it remains unclear if similar effects as those reported by Renovato et al. (2008) and Gill (1994) occur outside of North America, as well as in more informal social settings. Indeed, other work has seemingly called into question the importance of listeners identifying with the speaker. In a study by Bayard et al. (2002), students in New Zealand, Australia and the US were asked to rate the personality characteristics and demographic traits of speakers who possessed New Zealand, Australia, North America, and RP English accents. The authors reported an overall preference for the American accent, arguing that this effect was likely due to American voices being so ubiquitous as the result of the country's global media saturation.

1.2.3 Australians and their accent

According to Cox and Palethorpe (2007), the Australian accent can be divided into three dialect subgroups: *Standard Australian English*, *Indigenous Australian English* and *Ethnocultral Australian English*. The standard Australian dialect is the dominant dialect used by the vast majority of the nation's speakers, and by global standards it displays relative regional homogeneity. This standardization could be due to Australia's fairly recent European white settlement; it may also suggest that national identity is a stronger psychosocial influence than regional affiliation (Cox & Palethorpe, 2007).

Standard Australian English is very rarely described as elegant or regal. In most media portrayals, it is mostly depicted with its characteristic nasal drawl, the over-pronunciation of vowels and absence of the letter 'r' and the use of an inflection- or intonation- at the end of sentences, which often makes statements sound like questions.

In a study by Bayard et al. (2002), Australians rated their own accent as being significantly less desirable than other accents (i.e., participants ranked their own accents third or fourth when presented with 8 different male/female accents, with the North American accent rated the highest). An earlier study similarly revealed that Anglo-Australians preferred British

accents to their own (Callan & Gallois, 1987). These effects could be due to North American voices being so ubiquitous in a media-saturated environment. These results are somewhat dated, however, and it is unclear how contemporary Australians view their own accents.

Current evidence therefore suggests that, under most circumstances, people's behaviours and attitudes tend to be more readily influenced when listening to a speaker who shares their own accent. On the other hand, several studies suggest that, at least historically, Australians find their own accents as less desirable than others. However, it seems plausible that the nature of the message may mediate this subjective judgement. In particular, the cultural relevance of the topic in relation to persuasion has not been systematically investigated. This could be due to the in-group advantage effect, which suggests that people find it easier to understand persons of the same cultural group. A similar effect is seen in the use of flagship species, whereby a flagship species is presumed to be more successful in changing attitudes and behaviour given its cultural significance to the audience. To test this hypothesis that attitudes and behaviour would be most positively affected when a distressing environmental message about an iconic national species was delivered in a native vs. a "foreign" accent, native Australians listened to speakers of different accents communicating the plight of the koala.

2. Methods

2.1 Design

2.1.1 Experimental design

To address the question of whether native accents associated with flagship species influence attitude and behaviour change when hearing conservation-related arguments, a 2 (species: koala v. panda) x 3 (accent: Australian v. British v. Chinese) between-subjects design was used. The koala and the panda were chosen because they are both nationally iconic and threatened species that hold significant cultural value. The Australian and Chinese accents, respectively, reflect this cultural association with each species; the British accent was used a control ("neutral") accent that is regularly used in documentary programming/campaigning of threatened species (e.g., David Attenborough). A total of six treatments were therefore tested.

The design of this experiment therefore allowed comparisons of whether there was a difference in attitude/ behaviour towards a certain species (koala or the panda) and towards a certain accent (Australian, British or Chinese). Importantly, it enabled us to determine if there is a significant interaction between species and accent (i.e., are Australian participants more likely to have a positive change in attitudes/behaviour if they hear a message about the koala in an Australian accent). Each condition was comprised of a 30-second audio clip about either koalas or pandas delivered in one of the three accents, which participants would listen to before answering a serious of questions.

2.1.2 Survey design

The survey was administered using the survey tool Qualtrics and consisted of the following 15 agreement-related statements, followed by a donation question:

1. I think it is important that **China/Australia** see the value in **panda/koala** conservation.
2. The conservation of **pandas/koalas** is not important to me.
3. I think the protection of **pandas/koalas** is important for the environment.
4. I don't think it is important to protect **pandas/koalas** for future generations.
5. I don't think it is important to protect quality habitat for **pandas/koalas.**
6. I would like to participate in **panda/koala** conservation.

7. I would like to know more about **panda/koala** conservation.
8. I will not take action in order to save the **panda/koala.**
9. I am concerned that I am personally not doing enough to save the **panda/koala.**
10. Upon finding a sick/injured **panda/koala** I would not attempt to help.
11. I clearly understood what the speaker was saying.
12. I do not trust what the speaker said was true.
13. I identify with the speaker.
14. The speaker does not seem friendly.
15. The speaker has compelled me to take action in order to save the panda.
16. For participating in this survey you have been entered in a draw to win $50. If you win the money how much would you like to donate towards **panda/koala** conservation?

** The survey was used in each treatment choosing the associated species/country highlighted in bold.

Questions 1-10 were adopted in modified form from studies in which participants' attitudes towards the conservation of animals, plants and conservation areas were measured (Rinkus, Kramer, & Dobson, 2016; Williams, Jones, Clubbe, & Gibbons, 2012; Kim, Airey, & Szivas, 2011). The questions were reworded to make them applicable to the present study. Questions 11-15 were devised from Gluszek and Dovidio's (Gluszek & Dovidio, 2010), which examined stigmas associated with certain accents. All items were all presented using a 5-point Likert scale (with 1 = strongly disagree and 5 = strongly agree).

Question 16 was used to assess behavioural impact of the communicated message and was posed as a sliding scale ($1-$50), allowing participants to indicate how much money they would like to donate to the species' conservation if they won the $50 prize drawing.

2.2 Participants

A total of 155 adult Australian participants (76 females, 78 males; M_{age} = 32.95 years, *SD* = 11.15) were used in this experiment. A mixture of resources were used to source these participants, with the majority of the participants being recruited through crowdsourcing websites. Microworkers was the main source of the participants; however Amazon Mechanical Turk and Facebook were also employed to obtain participants. A study by Crone and Williams (2017) evaluating the usefulness of Microworkers as a crowdsourcing tool in

psychological studies, found that it produced valid psychological data from Australian participants. For this reason Microworkers was chosen as the main source for the recruitment of data.

As part of the preselection, participants were asked if they considered themselves to be Australian, and could proceed only if the answer to this forced-choice item was affirmative. Therefore, although there was no way to ensure that all participants spoke with a native accent, this much was assumed.

2.3 Procedure

A matched-guise technique was used to eliminate any bias towards the speaker. Through the use of this technique a professional voice coach who specialises in accent coaching was hired to perform all three accents (Australian, Chinese, and British) while narrating the audio messages for each of the six treatment conditions. The conservation message was as follows:

*"The **koala/panda** is an iconic species of **Australia/China**. The species is endemic to their country, meaning they can't be found in their natural environment anywhere else in the world. Sadly, the **koala/panda** is declining at an alarming rate. This is mainly due to the country's habitat clearing and fragmentation. So few are left in the wild that if something is not done soon the **koala/panda** will inevitably become extinct."*

The particular treatment determined which word highlighted in bold was used, but other than that the message was kept the same for all six conditions.

To assess the accuracy of the accents for each of the recordings a pre-survey was conducted. A recording of each accent was sent to 15 Australian students, and each student was asked to comment on where they thought the speaker was from. All three accents were sent to Australian students as this was an Australian based study, and it was important for Australian listeners to believe the accents were genuine. The comments from the pre-survey were relayed to the speaker to refine each accent. Once the accents were refined, each audio file was uploaded to Qualtrics and placed at the beginning of the corresponding treatment survey.

Once the survey was live, it was uploaded onto Microworkers and was active for two months. Sufficient data were not collected so the survey was then uploaded to Amazon Mechanical Turk for another two weeks. During this time a link to the survey was posted on Facebook.

Upon completion of the survey, all participants were informed that they would be entered in a prize drawing to win $50 (which enabled us to measure the impact of the conservation message on behavioural change as a reflection of their intended donation amount).

Due to the way in which the survey was designed the analysis of the results were broken down into four sections; Importance, Concern, Connection to speaker and Donation. The results from the survey questions related to importance and concern, were used to analyse the overall attitudes toward the species (Koala or Panda), after hearing the distressing environmental message. Questions related to connection to speaker were also used to interpret participant's overall attitudes. However, the results from this section were used to analyse the differences in attitudes towards each accent, rather than the species. Finally, the results from donation was used to interpret people's behavioural response, and determine how likely participants were to take action towards koala or panda conservation after hearing the distressing environmental message about said species.

Within each of the 4 sections a two-way ANOVA was used to test whether there was a significant interaction between species and accents, i.e. were the participants more likely to respond positively to the species if they heard the associated accent.

3. Results

It was hypothesised that Australians' attitudes and behaviour would be most positively affected when a distressing environmental message about an iconic national species (the koala) was delivered in a native vs. a "foreign" accent. To assess this statement the following hypothesis were formed;

1. There is a significant difference between attitudes (importance/concern) depending on what accent the participant heard.
2. There is a significant difference between behaviour depending on what accent the participant heard.
3. There is a significant difference between attitudes (importance/concern) towards the koala and the panda.
4. There is a significant difference between behaviour towards the koala and the panda.
5. There is a significant interaction of attitudes (importance/concern) between the species and which accent is heard.

3.1 Importance

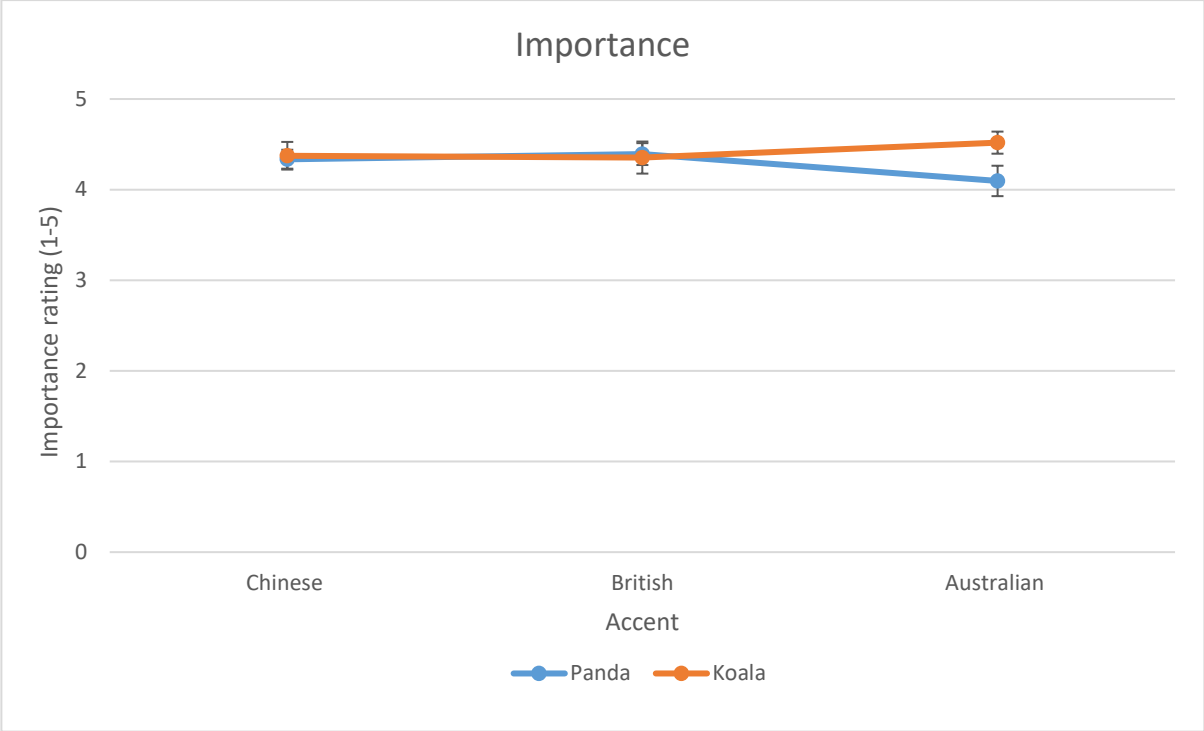

Figure 1. Difference in average of importance related questions (Questions 1-5, see section 2.1.2) between each 6 treatments (see section 2.1.1). Each question was measured on a 5 point Likert scale (1= felt strongly not concerned, 2= felt somewhat concerned, 3= felt neither concerned nor not concerned, 4=felt somewhat concerned, 5= felt strongly concerned).

Importance rating scores were subjected to a two-way analysis of variance having two levels of species (koala, panda) and three levels of accent (Australian, Chinese, British). All effects were statistically significant at the .05 significance level.

The main effect of species yielded an F ratio of $F(1, 155) = 1.477$, $p > .05$, indicating that the mean importance rating was not significantly greater for koala ($M = 4.42$, $SD = 0.76$) than for the panda ($M = 4.28$, $SD = 0.68$). The main effect of accents yielded an F ratio of $F(1, 155) = 0.116$, $p > .05$, indicating that the mean importance rating was not significantly greater for Australian ($M = 4.32$, $SD = 0.76$), British ($M = 4.37$, $SD = 0.76$) or Chinese ($M = 4.35$, $SD = 0.72$). The interaction effect was also non-significant, $F(1, 155) = 1.53$, $p > .05$.

Figure 1 shows no effect between how important Australians rated the koala and panda after hearing a distressing message in the Chinese and British accent. On average, however, Australians rated koalas as more important and rated the panda as less important when hearing a distressing message (about either the koala or panda) in an Australian accent over the British and Chinese accent.

A Pearson correlation was used to assess whether questions 1-5 were sufficiently correlated to be assessed together under the term Importance. The results showed that overall, all questions were sufficiently correlated, $r(155) = > 0.3$. Question 4 and Question 2 did not fit the assumption, $r(155) = 0.242$. However, was not excluded from the results, as each question was sufficiently correlated to all other questions grouped under Importance.

3.2 Concern

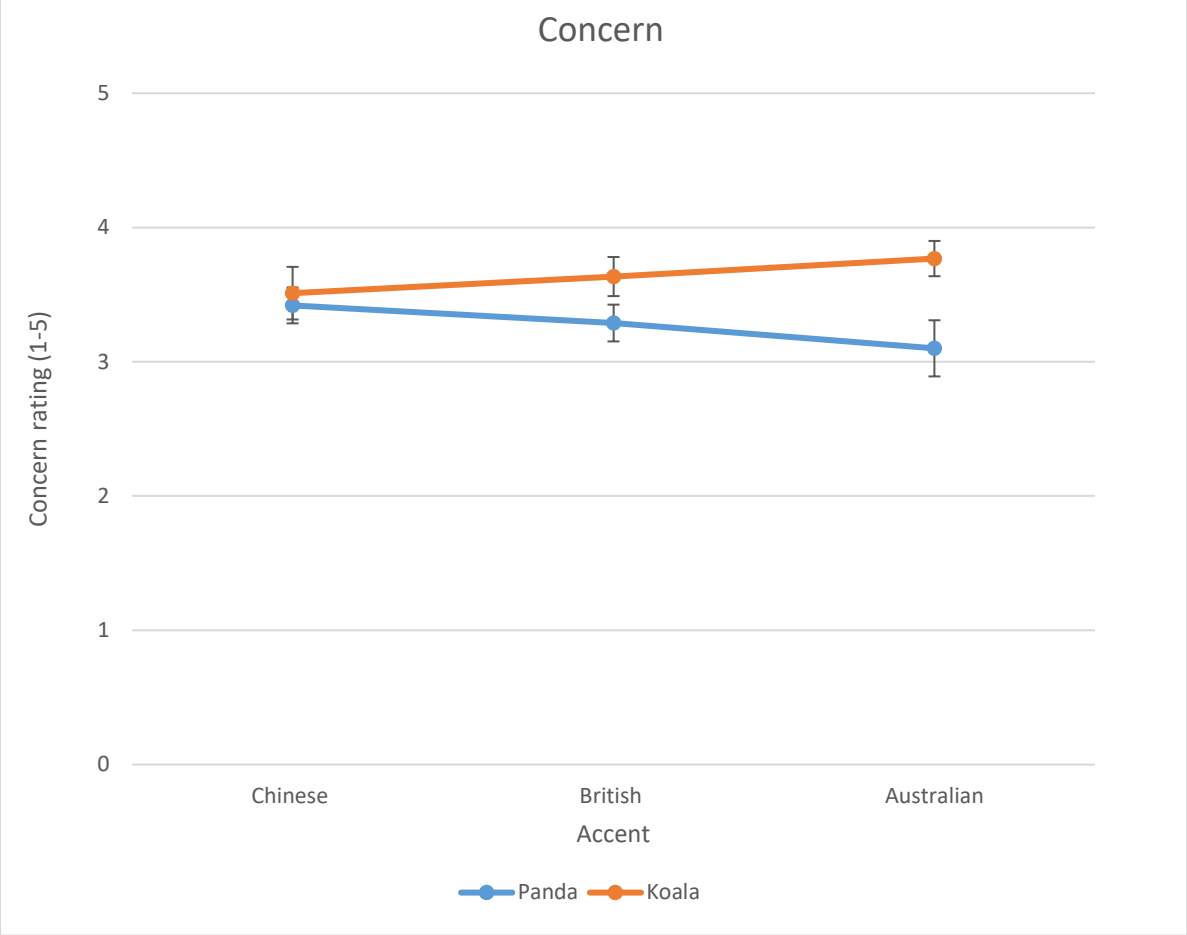

Figure 2. Difference in average of concern related questions (Questions 6-10, see section 2.1.2) between each 6 treatments (see section 2.1.1). Each question was measured on a 5 point Likert scale (1= felt strongly not concerned, 2= felt somewhat concerned, 3= felt neither concerned nor not concerned, 4=felt somewhat concerned, 5= felt strongly concerned).

Concern rating scores were subjected to a two-way analysis of variance having two levels of species (koala, panda) and three levels of accent (Australian, Chinese, British). All effects were statistically significant at the .05 significance level.

The main effect of species yielded an F ratio of $F(1, 155) = 8.033$, $p < .05$, indicating that the mean concern rating was significantly greater for koala ($M = 3.64$, $SD = 0.78$) than for the panda ($M = 3.28$, $SD = 0.83$). The main effect of accents yielded an F ratio of $F(1, 155) = 0.023$, $p > .05$, indicating that the mean concern rating was not significantly greater for

Australian (M = 3.45, SD = 0.93), British (M = 3.46, SD = 0.73) or Chinese (M = 3.46, SD = 0.81). The interaction effect was also non-significant, $F(1, 155) = 1.643$, $p > .05$.

Figure 1 shows Australians felt more concern towards the koala over the panda despite the accent in which the distressing message was delivered. Although the effect is not significant, Australians on average were more concerned about koalas when the distressing message was delivered in an Australian accent than when the message was delivered in a Chinese or British. As a general trend, participants were also more concerned about pandas when the distressing message was delivered with a Chinese accent over the British and Australian. The British accent appears to be neutral, in comparison to the more polarising Australian and Chinese in relation to concern about pandas and koalas.

A Pearson correlation was used to assess whether questions 6-10 were sufficiently correlated to be assessed together under the term Concern. The results showed that all questions were sufficiently correlated, $r(155) = > 0.3$, except for question 10 $r(155) = < 0.3$. As Question 10 did not sufficiently correlate with any of the other questions grouped under Concern it therefore excluded from the results.

3.3 Connection to Speaker

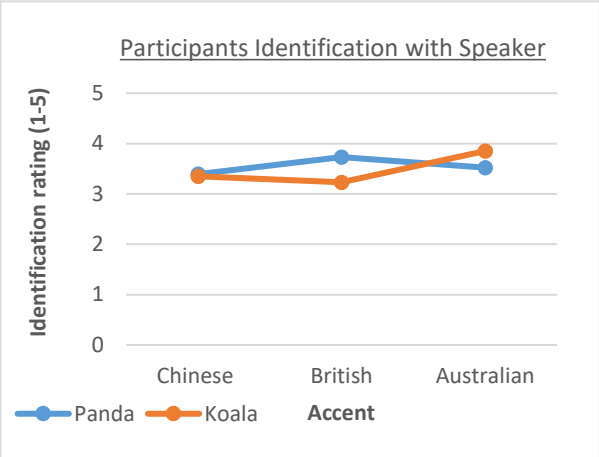

Figure 3. Difference in average response to question 13 (see section 2.1.1). Each question was measured on a 5-point Likert scale (1= felt they strongly did not identify with the speaker, 2= felt they somewhat identified, 3= felt they neither identify with the speaker nor do they not identify with the speaker, 4=felt they somewhat identify with the speaker, 5= felt they strongly identify with the speaker).

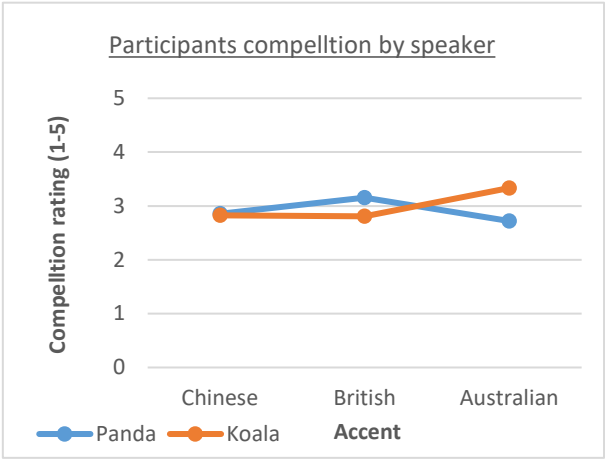

Figure 4. Difference in average response to question 15 (see section 2.1.1). Each question was measured on a 5-point Likert scale (1= felt they were strongly compelled by the speaker, 2= felt they somewhat compelled, 3= felt they were neither compelled by the speaker nor were they not compelled by the speaker, 4=felt they were somewhat compelled by the speaker, 5= felt they were strongly compelled by the speaker).

A Pearson correlation was used to assess whether questions 11-15 were sufficiently correlated to be assessed together as the factor Connection to Speaker. The results showed that majority of the questions did not sufficiently correlate, $r(155) = < 0.3$. As majority of the questions insufficiently correlated, questions 11-15 were analysed separately. Questions 13 and 15 were the only 2 questions that did sufficiently correlate $r(155) = < 0.3$ ($r(155) = 0.561$). The average response of the two questions are represented in Figure 3 and 4 above.

Connection to Speaker rating scores for both questions 13 and 15 were subjected to a two-way analysis of variance having two levels of species (koala, panda) and three levels of accent (Australian, Chinese, British). All effects were statistically significant at the .05 significance level.

The main effect of species yielded an F ratio of $F(1, 155) = 8.033$, $p < .05$, indicating that the mean connection to speaker rating was significantly greater for koala ($M = 3.64$, $SD = 0.78$) than for the panda ($M = 3.28$, $SD = 0.83$). The main effect of accents yielded an F ratio of $F(1, 155) = 0.023$, $p > .05$, indicating that the mean connection to speaker rating was

significantly greater for Australian (M = 3.45, SD = 0.93) than British (M = 3.46, SD = 0.73) and Chinese (M = 3.46, SD = 0.81). The interaction effect was also non-significant, $F(1, 155) = 1.643$, $p > .05$.

Figures 3 and 4 shows on average participants felt they identified more with the speaker, and were mostly compelled by the speaker when the message was about koalas and delivered in an Australian accent. People on average were also least compelled to save the panda when the message was delivered in an Australian accent (seen in figure 4).

3.4 Donation

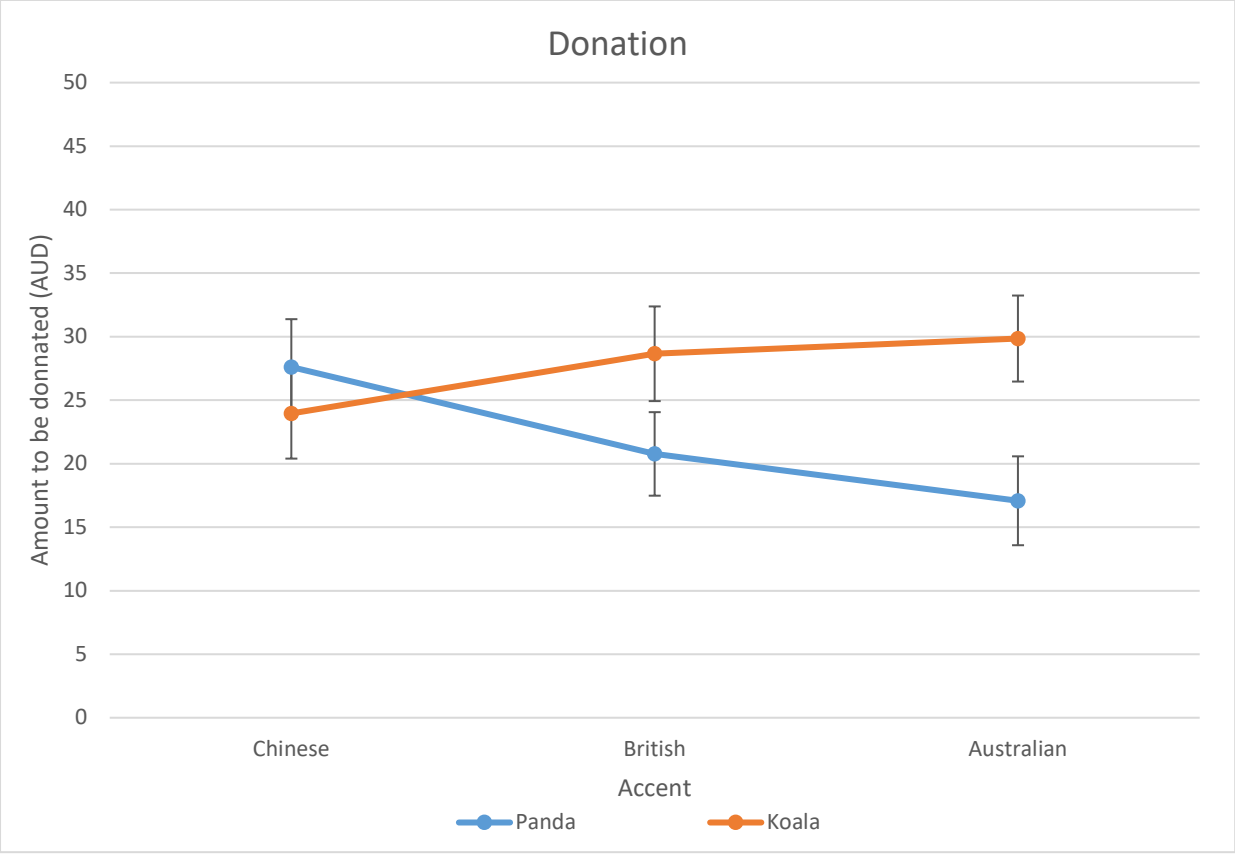

Figure 5. Difference between each 6 treatments (see section 2.1.1) in the average amount to be donated (out of $50) if the participant was to win the $50 prize drawn from partaking in this study. Each participant had equal chance in winning the $50 cash prize and were aware they were in the draw.

Donation scores were subjected to a two-way analysis of variance having two levels of species (koala, panda) and three levels of accent (Australian, Chinese, British). All effects were statistically significant at the .05 significance level.

The main effect of species yielded an F ratio of $F(1, 155) = 3.803$, $p = 0.053$, indicating that the mean donation was not significantly greater for koala ($M = 27.66$, $SD = 17.87$) than for the panda ($M = 22.03$, $SD = 18.48$). The main effect of accents yielded an F ratio of $F(1, 155) = 0.211$, $p > .05$, indicating that the mean donation was not significantly greater for Australian ($M = 23.71$, $SD = 18.53$), British ($M = 24.71$, $SD = 18.18$) or Chinese ($M = 25.96$, $SD = 18.61$). The interaction effect was also non-significant, $F(1, 155) = 1.643$, $p = 0.065$.

Figure 5 shows similar trends to the results from the concern related questions (see Figure 2). On average Australians were more likely to donate to koalas. The results from the two-way ANOVA showed that the difference in amounts donated to koalas and pandas were not significantly different ($p = 0.053$). Overall, however, the participants were least likely to donate to the panda cause when the message was delivered in an Australian accent, and most likely to donate to this cause when the message was delivered in a Chinese accent. The opposite effect was seen with the donation to the koala, where participants were more likely to donate after hearing the distressing message in an Australian accent and least likely to do so when the message was delivered in a Chinese accent.

4. Discussion

Overall, the results from this study provided weak support for the hypothesis that people's attitudes and behaviour would be most positively affected when a distressing environmental message about the koala is delivered in an Australian accent. The results showed Australians in general showed more support toward the koala (K) over the panda (P), and a preference to the Australian (A) accent over the British (B) and Chinese (C). Overall the participants seemed to connect least with the Chinese speaker. As seen in Figures 1, 2 and 5 the averages were more positive in treatment AK (Australian-Koala) than any of the other six treatments. However, no statistically significant differences involving these manipulated variables were found. The behavioural response did, however, yield a 93.5 % confidence level in support of the claim that behaviour towards a species is significantly affected by accent. In other words, a person was likely to donate more money to the panda cause after hearing a distressing environmental message in a Chinese accent, and more to the koala after hearing a distressing environmental message in an Australian accent (see section 3.4).

Although the results were not statistically significant, there was a clear trend seen in Figure 5, which supported the original hypothesis. With the limitation of a small sample size used in this experiment, further research would be required to test whether the results were the product of a false positive, or whether the increase in sample size would result in a statistically significant difference. With such a clear trend it is suspected that an increase in sample size should lead to more accurate results that will support the hypothesis.

It is also interesting to note that there was no significant difference in attitudes or behaviour between each of the 3 accents. This is contradictory to previous studies, which suggest that listeners are more likely to positively respond to those with the same native accent as themselves (Fleisher et al., 2002; Gluszek & Dovidio, 2010; Kinzler et al., 2011).

To further discuss these results and for a more in depth discussion about the difference in result for attitudes and behaviour this section was split into four sections, Importance, Concern, Connection to Speaker, and Donation, as seen in the above results section.

4.1 Importance

The measure of importance was used as one of two measurements assessing differences in attitudes between the six treatments. However, the results suggest a listener can believe a species is important without really feeling concern towards the species (see difference in overall average of Figure 1 and Figure 2). The results also showed that both koalas and pandas were rated as quite important despite which accent was heard (importance rating of the two species was not statistically significant). This could be due to the fact that both are well known species and are highly charismatic. The message of the panda has already been used a lot in global marketing campaigns such as the WWF, and this campaign has been very successful in raising concern for the panda (Kontoleon & Swanson, 2003). Due to these global campaigns the panda is likely to already be seen as important by the vast majority of Australians. This exposure to the panda could explain why Australians viewed the panda as equally important to their own threatened native species, the koala. This exposure could also explain why, despite how important the listeners believed the panda to be, there was overall more concern for the koala.

It is also interesting to note that whilst both the Chinese and British accent seemed to have no effect on how important Australians believed the koala or panda to be, Figure 1 shows a slight difference between the species when the message was delivered in an Australian accent. These results could to an extent support the main hypothesis, as Australians did rate the koala as more important in treatment AK than in any other treatment. Reasoning for this could be explained by the strong cultural value of the koalas in Australia (Schlagloth et al., 2018), however is more likely to be a cause of accents as the species were rated equally between the other 2 accents.

It is clear that in this case the topic had more of an effect on how important a species was than the accent heard by the speaker, as interestingly the AP treatment received the lowest importance ranting out of all other six treatments. In other words, despite the speaker having an Australian accent the panda was seen as less important. This could be the result of multiple factors, the most likely being a false positive due to small sample size. Further investigation would need to take place to assess this claim.

4.2 Concern

As stated in the above section, Australians showed less concern the panda on average despite believing both species were important. This could be because people believe something is already being done to save the species (Kontoleon & Swanson, 2003), and there is not much they can personally do. This theory would also help support the reasoning to why there was a statistically significant difference between the koala and the panda. The koala, being an Australian species, is more affected by their personal actions than the panda. However, more research would need to be done to fully assess this claim.

As with importance, most concern was shown for the koala in treatment AK over any other treatment, which further supports the hypothesis that Australians' attitudes towards the koala are more positively affected after hearing an environmental message in an Australian accent. Attitudes were most likely heavily influence by the strong cultural influence of the koala, which has been shown to have a positive effect on attitudes in past studies (Schlagloth et al., 2018).

Other similar trends between importance and concern were also evident, such as the least amount of concern being shown for the panda when the message was delivered in an Australian accent. It is interesting to note that in both importance and concern this was apparent. If this result was due to false positive, it is unlikely that the results would reflect such similar trends.

To investigate the unusual fact that both measures for attitudes were negatively effected by the Australian accent in the case of the panda, further research must take place. Perhaps the reasoning for this trend has something to do with the unusual pairing of panda with the Australian accent. A previous study shows that the topic and accent can effect how genuine a message seems (Powesland & Giles, 1975). In this case perhaps when they heard an Australian speak with such distress over the panda the listeners interpreted that as less sincere than hearing the same message in either a Chinese or British accent.

To summarise the findings of how Australian attitudes were affected, there appeared to be no evidence suggesting that attitudes towards a species were more positively affected by accents.

In other words, despite this being true in the case of the koala and the Australian accent, it was not entirely the case for the panda and the Chinese. The results showed that participants were most concerned for the panda when the message was delivered in a Chinese accent but importance showed no real difference. Importance seems to be affected by some sort of bias towards the panda, perhaps due to the global marketing campaign. Concern seems to be less affected by this bias, and could be argued to be more significant than importance to lead to behavioural change, which is the overall goal in conservation campaigning.

4.3 Connection to speaker

The results from this section were originally intended to help provide evidence for the findings in sections 4.1, 4.2 and 4.4. However, the only results worth noting found in this section were from questions 13 and 15 (see section 2.1.2). When grouped, the results showed a statistically significant difference between the interaction of species and accents. Yet, when analysing Figures 3 and 4 the results did not entirely support claims made in sections 4.1, 4.2 and 4.4. In the case of the British accent, in other sections the listener's attitudes and behaviour was more positively affected when referring to the koala. However, listeners felt more connected to the speaker in the treatment when the speaker talks about pandas. If connection to the speaker was to have an effect on much the listeners supported their claims, this would not have been the case. It was therefore concluded that Australian listeners' connection to the speaker had little effect on how positively attitudes and behaviour was towards a species. This is contradictory to the study conducted by Renovato et al., which suggested connection between the speaker and the listener was a stronger influence than the message itself or how much the speaker and message were related. However, it is important to note that limitations of this study, such as limited sample size and unwarranted grouping of the questions due to insufficient correlation could have affected these results. Further study is needed to assess these claims.

Still, there could be reasoning to explain why participants felt such a high connection to the speaker in the BP treatment. Hearing an environmental message about the panda with a British accent may be the treatment listeners are most familiar with. Familiarity could be less jarring than unfamiliarity, which could explain why the BP treatment was rated so highly.

Focusing on the Australian accent the results did seem to reflect the results seen in other sections as the AK treatment was rated more highly than the AP. As the majority of these results were not clear however, it is likely this was just a correlation and does not provide sufficient evidence to be causation. Again, further study is required to test these claims.

4.4 Donation

Donation was used to assess behaviour. The results from this section provide evidence to support the idea that positive behaviour towards a species is most likely affected after hearing a distressing environmental message from a person with an associated accent to the species in question, as opposed to an accent discordant to said species. Donation seemed to have the strongest results out of all three section analysing behaviour and attitudes to support this claim, and along with the other sections also provides further support for the main hypothesis, which was Australians would most likely be positively affected by the AK treatment.

Although the interaction between species and accent was not statistically significant, donation was the closest to being significant, and was the only section that showed a clear trend in which pandas received more of a donation when the message was delivered in a Chinese accent. In other words, although participants rated treatment AK over treatment AP, donation was the only section that showed the same trend for CP and CK. This is interesting to note as although people believed they felt pandas and koalas were equally important and felt similar concern for both, when it came down to how much they were willing to donate, they felt more of a need to donate to the panda when the message was delivered in a Chinese accent over any other accent. This difference in behaviour and attitudes reflects the difficulty in having a true impact on what people do. Even if one says they are convinced by a message and show concern, does not necessarily mean the person is willing to act on that claim.

The results from this section are particularly interesting as within the communication of environmental science the goal is often to change peoples' behaviour, due the importance of maintaining healthy and viable ecosystems and their services (Balvanera et al., 2001; Díaz, Fargione, Chapin, & Tilman, 2006; Cardinale et al., 2012; Miller 2005; Nelson et al., 2009; Sandifer, Sutton-Grier, & Ward, 2015). These findings will be useful when determining who should voice environmental campaigns and to make environmental organisations more aware

of useful tools such as pairing culturally significant species with their associated accent. This is important as the more affective an environmental campaign the more likely real changes will be made to help preserve biodiversity and ecosystems.

5. Conclusion

A current review of the literature suggested that both flagship species and accents could have a big impact on the way a message was communicated. Flagship species were found to be more effective when they were culturally value (Schlagloth et al., 2018). Ones accent also holds cultural significance to a listener, which is thought to result in more effective communication (Gluszek & Dovidio, 2010). With the combination of both a culturally significant species, koala, and the Australian accent, it was hypothesised that Australian listeners would be more likely to change their attitudes and behaviour towards the koala. To test this hypothesis matched-guise technique was used to test the difference between six treatments (CK, CP, BK, BP, AK, AP). The results somewhat supported the hypothesis, that attitudes and behaviour will be most positively affected when a distressing environmental message about the koala is delivered in an Australian accent, as the AK treatment was rated the highest. However, this different was not significant. With a clear trend in the data it is thought that without the limitation of the small sample size of this study, results could be significant. The results also highlighted that listeners' attitudes towards a species may not exactly reflect their behaviour towards said species. These finding were found to be highly useful for those wanting to create an effective environmental campaign.

6. Link

My creative component, 25-minute call to action film about koalas, had many voices. In other words, I had interviewed six different people from six differing koala groups. Of the six, two of which, did not have an Australian accent. I conducted this experiment to test whether that would have an effect on how convincing my film would be. The results concluded it is likely that hearing an Australian accent talk about the koala will affect behaviour, at least in an Australian context. As the aim for a call to action film is for people to take action (exhibit behavioural change), I chose to have a narrator with a strong Australian accent. The narrator is one of the strongest voices in the film. The knowledge gained from this experiment guided choices made throughout the film, in hopes of effectively communicating the environmental science showcased. Note that foreign accents were not excluded from the film as I believe the information they shared was still valuable. However, to make their argument stronger their statements were supported by the narrator with an Australian accent.

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Appendix 1- Participation information sheet

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part, there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?

The aim of this project is to test the effectiveness of oral delivery of Science Communication. The project is part of a Masters of Science Communication.

What Types of Participants are being sought?

The participants will be recruited online via online surveying platforms. All participants must be over 18, currently living in Australia and consider themselves Australian. A total of 300 participants will be required for this experiment, recruited via an online survey platform. Each participant will be entered in a draw to win $50.

What will Participants be asked to do?

Should you agree to take part in this project, you will be asked to

Listen to a short 30-40 second audio clip, and then complete a survey. The total time spent participating in the survey should take 5 minutes.

Please be aware that you may decide not to take part in the project without any disadvantage to yourself.

What Data or Information will be collected and what use will be made of it?

Basic demographics data will be collected (age and gender), as well as the answers from the survey. All personal information will be kept completely anonymous. This information will be analysed as a part of a Masters in Science Communication. Only the student (Sian Tetther) and supervisor (Jesse Bering) will have access to the data.

- The data collected will be securely stored in such a way that only those mentioned below will be able to gain access to it. Data obtained as a result of the research will be retained for **at least 5 years** in secure storage. Any personal information held on the participants may be destroyed at the completion of the research even though the data derived from the research will, in most cases, be kept for much longer or possibly indefinitely.

- The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your anonymity.

Can Participants change their mind and withdraw from the project?

You may withdraw from participation in the project at any time before completion of the survey and without any disadvantage to yourself.

What if Participants have any Questions?
If you have any questions about our project, either now or in the future, please feel free to contact either: -

Sian Tetther and Jesse Bering

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This study has been approved by the Department stated above. However, if you have any concerns about the ethical conduct of the research you may contact the University of Otago Human Ethics Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix 2- No Place to Call Home