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Tick-box exercise: choice architecture of online classified pet advertisement websites can improve reporting of compliance with legal requirements

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The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has been the global standard for monitoring international trade in wildlife for the past half-century, but compliance is imperfect, in part because of misunderstandings regarding the details of in-country regulations. One such regulation is the need to report details of an Article 10 certificate (A10) for the sale of certain species, with the aim of regulating domestic trade within the EU and UK. For two commonly traded species requiring A10 certificates, we collected data from two UK websites on the frequency of reporting the correct paperwork. One website contains a free text field and a tick box to capture information on A10 certificates, whereas the other solely contains a free text field. For each species, the tick box captured A10 certificate ownership in 99% of advertisements—significantly higher than the free text field on that website. In 92% of advertisements, the tick box encouraged reporting of the unique A10 number. The presence of a tick box also encouraged higher reporting of A10 ownership in the free text field, which probably reflects improved disclosure rather than the legality of advertisements. These results suggest that the choice architecture of websites can have a significant impact on the disclosure of the correct information.

1. Introduction

The global trade in pets and ornamental plants is taxonomically diverse and economically lucrative [1,2], and its size has resulted in a range of concerns, including the decline of wild populations owing to unsustainable harvesting [3,4]. Legislation aimed at a more sustainable use of animals and plants is one method to prevent the decline and extinction of wild populations [5], the most notable of which is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) [6].

CITES controls the international wildlife trade and lists species on appendices I–III according to the level of risk posed by trade to their long-term survival. However, within CITES processes and implementation, there remains flexibility within the 185 Parties to the Convention to go beyond CITES requirements and implement stricter controls on their domestic trade in wild animals. In the UK, the domestic legislation that implements the CITES requirements is called the Control of Trade in Endangered Species Regulations 2018 (COTES) [7]. In some circumstances, regional categorization of species within the domestic implementing legislation may be higher than that of the global CITES appendices. An example of this are the European tortoise species (*Testudo graeca*, *Testudo hermanni* and *Testudo marginata*) within the European Union (EU) and UK, where the species are currently listed as Annex A (the EU and UK system's equivalent to appendix I), a higher level of listing than their CITES global categorization within appendix II [8].

An additional feature of COTES legislation is the introduction of Article 10 certificates (A10) to regulate domestic trade within the EU and UK for Annex A species, which is not a requirement under CITES internationally. At an operational level, this means that within the UK it is necessary to hold an A10 for the commercial display or sale of these species [9]. A10s are issued by the Animal and Plant Health Agency, the UK's CITES management authority, and each certificate has a unique reference number [9]. Since 2018, it has been a legal requirement under COTES that the A10 number should be displayed in any advertisement for the sale of an Annex A species (Regulation 6, COTES 2018). There are no criminal sanctions available within the COTES regulations to enforce this requirement; instead, it is enforced solely through civil sanctions, such as 'stop notices', and variable monetary penalties [10–12]. These sanctions are intended to stop illegal activity from occurring or continuing, and support compliance with the regulations using an advisory and educational approach [10–12].

As with any intervention aimed at fostering behaviour change, compliance with CITES and COTES legislation is imperfect. At the broadest scale, the illegal international trade in some appendix I species is considerable [13,14], with complex trade dynamics [15]. At a finer scale, when focusing on domestic trade, a single species, in a single country, via a single route of sale, information related to a seller holding the required A10 certificate may be poor (consciously or otherwise). For example, only 16% of the text fields in UK online classified advertisements of *T. hermanni* contained reference to the necessary A10 certificates [16]. In this case, there may have been a shortfall in advertiser knowledge of what an advertisement should contain to meet website guidelines, comply with existing legislation and effectively make a sale. This poor level of communication related to the necessary certification within a legal and easily monitored route of sale suggests that conservation- and welfare-oriented interventions need to consider human behaviours more effectively to better support and direct people towards the desired outcome(s) [17].

For online advertisements, there are numerous ways in which the website-user interface can be designed with a view to meeting their objectives [18]. Specifically, the environment in which users make decisions on which information to include in an advertisement (the 'choice architecture'; [19]) can incorporate features aimed at influencing the decisions that people make (e.g. the information they include). These features are often called 'nudges' [20]. Typically, online classified advertisement sites have free text fields to allow an item description and related details to be listed. However, while free text fields are beneficial for expanding on details, the lack of restrictions when formulating text can cause a substantial cognitive load [21], leading to uncertainty about the most relevant information to include. Tick boxes are an aspect of choice architecture that can nudge users to include the information necessary to ensure a legal and sustainable trade, such as the presence of relevant licences or permits. Tick boxes are often used (to varying degrees of success) in the online advertisement of age-restricted physical products, such as alcohol [22] and tobacco [23]. They have also been used in healthcare settings to support practitioners in including the correct aspects of pre-anaesthesia health-checks in humans [24], and in the verification of professional certification (for example, for healthcare practitioners purchasing restricted medical supplies; [25]). These studies suggest that while the use of tick boxes can improve desired outcomes, they do not provide a silver-bullet solution to meeting best practice guidelines or the law, and they must be used with caution and monitored appropriately. Their limited efficacy as a nudge in these cases can be broadly attributed to two aspects of human behaviour—first, people

sometimes forget things, and second, people sometimes want to cheat. For example, research into the sale of age-restricted products (alcohol and tobacco) to minors in the USA suggests that tick boxes alone did not effectively reduce the illegal purchase of these products [22–24]. Even when the websites in question required age verification via a driver's licence at the point of purchase, the purchase could still be made if the participant was allowed to cheat (by entering a parent's licence number). However, making it harder to cheat by including stricter age-checks (e.g. by requesting social security numbers) or removing a participant's ability to use a parent's licence number did result in better compliance (i.e. sales were refused). Combined, these results suggest that if consumers are actively trying to make an illegal purchase, then tick boxes and requests for permit details would need to have a very clear audit trail back to the participant (in our case, the advertiser), to effectively ensure compliance. In the context of our study, this would mean a specific format of certificate number, or greater traceability of A10 certificate numbers and the animals to which they refer, both of which are currently lacking.

In the case of acting as a reminder of the required process or information (e.g. licence or permit numbers), tick boxes can supplement free-text fields to improve reporting of the necessary information. For example, the inclusion of tick box questions significantly improved outcomes (e.g. referral rates for cessation counselling or other types of support) when added to medical surveys as a reminder to request specific information about a patient's smoking history and plans for quitting [24,26]. However, despite improved outcomes in these cases, the use of tick boxes could not be relied on as a sole method of improvement, as efficacy was not 100%. So, while tick boxes and choice architecture can influence compliance to best practices in both the real and the virtual world, their use and efficacy within online advertisement of pets is, to our knowledge, unknown.

In this study, we investigate how information related to A10 ownership varies in free text fields compared to that in tick boxes. Specifically, for two popular pet classified advertisement websites, we addressed the following questions:

- (i) did websites vary in their level of advertisement of A10 ownership based solely on the content of their free text fields? and
- (ii) did the additional presence of an A10 tick box and 'Certificate Number' field improve the reporting of A10 ownership and certificate reference number compared to the free text of both websites (i.e. where there are intra- and inter-website differences in reporting rates between tick boxes and free text fields)?

Based on previous research in the online trade of pets in the UK [16], we predicted that free text would not frequently include information on A10 certificates and that tick boxes would result in a higher proportion of advertisements including details of A10 certificates [24,26]. Given the current level of scrutiny regarding online sales [27,28] and the trade in 'exotic' pets in the UK's devolved governments [29], we hoped to identify whether the choice architecture of online classified advertisements could encourage advertisers to improve their reporting of the necessary permits and optimize compliance with website guidelines, UK legislation and the aims and objectives of CITES. To do so, over a three-month period, we first collected pilot data on a broader range of species requiring A10 certificates before focusing on two commonly traded and kept species within the UK, the African grey parrot (*Psittacus erithacus*) and Hermann's tortoise (*T. hermanni*). While limited in scope to two commonly kept and traded focal species, this case study aimed to investigate the broad principle of whether the choice architecture of websites can affect A10 reporting, rather than the specifics of variation among a wide range of advertised species. We hope that this can inform future research into compliance with A10 requirements in other species, and with other regulations related to the UK pet trade, both online and in person. In providing this first step, we hope to highlight some principles that can help develop and guide the transparency of the UK pet trade, and to improve compliance with current best practice guidance.

2. Methods

Two commonly used websites for animal classified advertisements were the basis for our data collection, which are referred to here as site A and site B. We focused on these sites because they represent two of the most commonly used classified advertisement platforms, have actively engaged efforts to improve transparency and best practice guidelines within the UK trade (e.g. the Pet Advertising Advisory Group), and have different structures in terms of choice architecture. We chose not to disclose the website names here

because we felt that doing so could be perceived as criticism of the websites themselves, which could negatively affect their engagement with industry best practice guidelines and ongoing efforts to extend their transparency and practices. Being dedicated classified advertisement sites, they are structured in ways that aim to capture relevant information about the subject of the advertisement, thereby allowing comparisons to be made. By contrast, while other platforms, for example, social media sites, may advertise animals for sale, their lack of structure would make comparison of the efficacy of choice architecture difficult. Both site A and site B advertise pets of different types, but have notably different structures and choice architectures. These differences made the two sites ideal for comparing the efficacy of tick boxes and free text fields in recording how frequently A10 certificate ownership was communicated in advertisements. Specifically, site A contains a free text field, a tick box field named by the website 'CITES A10' and a related field 'CITES A10 Certificate Number'. By contrast, site B contains a free text field, and while it does contain a tick box prompting the advertiser with the text: 'Is Endangered Species', there is no clear reference to Annex A species or A10 certificates. When posting an advertisement on site A, it is possible to select the option 'No— this species does not require an A10 certificate', regardless of the species within the advertisement being placed, thereby making it possible for users to give incorrect information.

As there are over 800 species on Annex A [8], and therefore require an A10 certificate, we first conducted a short pilot study to adaptively test our data collection methods, such as search terms, suitable data collection time frame, ways to avoid including duplicated advertisements and to identify species that would be the foci of our study. For these reasons, the collection methods were not as standardized as the focal data collection, and so we do not formally analyse the pilot data. Pilot data collection took place from 1 November 2024 to 14 February 2025, three times per week. This involved searching advertisements and noting the species named against the regulations (full list given in [8]) to see whether they required ownership of an A10 certificate, whether the advertisement text contained any reference to licences or certification, and whether tick boxes and associated fields were completed correctly. The pilot data collected gave us a relative measure of advertisement frequency across species, and provided a rationale for focusing our main data collection on two of the most commonly traded species requiring A10s: the African grey parrot (*P. erithacus*) and Hermann's tortoise (*T. hermanni*).

We focused on these species because, first and foremost, they would yield large sample sizes, allowing us to meet our main objective of assessing whether choice architecture affects the reporting of A10 ownership. Within tortoise species on Annex A, we chose Hermann's tortoise because it was the most commonly kept species in the UK according to a sector survey [30], and they are commonly advertised via these particular online platforms, with some evidence that reporting of A10 certificate ownership is suboptimal [16]. We focused on African grey parrots because concerns have been raised about the legality of their trade generally [31–33], and especially via online platforms [34–36], suggesting that accurate and effective regulations are needed to support transparent trade dynamics. Both species have experienced extreme population declines in the recent past. *Testudo hermanni* is currently listed as Vulnerable on the International Union for Conservation of Nature (IUCN) Red List according to criteria A2acde+4acde [37], which indicates an observed, estimated, inferred or suspected decline in population of over 30% that is either in the past, or is ongoing (IUCN Red List Cats and Criteria). *Psittacus erithacus* is currently listed at a higher level of risk, being endangered according to criteria Endangered A2bcd+3bcd+4bcd [38]. Both species are listed by the IUCN Red List assessments as showing continued population decline, and the threat processes included for both species are 'Biological resource use: Hunting & trapping terrestrial animals'. Accordingly, *P. erithacus* has been included on CITES appendix I since 2017 [39] and *T. hermanni* on appendix II [40] since 1975, and Annex A since 1997 when the EU Wildlife Trade Regulations were introduced, meaning that within the EU and UK, both species have been subject to A10 certification requirements. Previous research suggests that online trade in both species has either not effectively communicated ownership of A10 certificates or that the online trade may be used as a cover for laundering illegally sourced and owned animals. Bielby *et al.* [16] highlighted a low level of communication of A10 ownership in *T. hermanni* advertisements on a single UK website, suggesting improvements in the system are possible. *Psittacus erithacus* is a highly traded species that would benefit from effective monitoring and identification of individuals [32,33,35,41,42]. For both species, there is also evidence that legal and illegal trade networks overlap [42,43].

Data collection on our focal species took place from 28 February until 9 July 2025. We used the terms 'Hermann tortoise' and 'African grey' as search terms in free text fields or 'parrots' and 'Hermann tortoise' from preset drop-down menus to identify suitable advertisements. We used common names to search for advertisements because preliminary data exploration suggested that including scientific

Table 1. Pilot data on advertisements of a broader range of A10 certificate requiring species, comparing the inclusion of A10-related information within site A (tick boxes versus free text fields) and between free text fields between sites A and B.

species	site A tickbox	site A free text	site B free text
African grey parrot (<i>P. erithacus</i>)	27 out of 27	12 out of 27	23 out of 43
Hermanns tortoise (<i>T. hermanni</i>)	53 out of 53	28 out of 53	24 out of 38
spur thighed-tortoise (<i>T. graeca</i>)	16 out of 16	7 out of 16	18 out of 30
marginated tortoise (<i>T. marginata</i>)	11 out of 11	9 out of 11	8 out of 9
star tortoise (<i>G. elegans</i>)	5 out of 5	4 out of 5	1 out of 1
radiated tortoise (<i>A. radiata</i>)	4 out of 4	4 out of 4	1 out of 1

names on these websites would yield very few, if any, extra advertisements. For each advertisement, we visually interrogated the text fields accompanying the advertisements for any language that could signify ownership of A10 certificates. To be as inclusive as possible, we used the following search terms: 'A10', 'CITES', 'license', 'paperwork', 'permit', 'microchip' and obvious misspellings and truncations thereof. For each advertisement, we therefore scored with a 1 or a 0 whether the free text field of the advertisement contained a reference to ownership of the relevant paperwork and whether any certificate details were included (i.e. the certificate number). Further, for advertisements placed on site A, we recorded whether the 'CITES A10' tick box and related 'CITES A10 certificate Number' fields were completed. To avoid duplicated advertisements within a website, we noted the A10 certificate number and/or the advertisement ID number, both of which were unique to a single advertisement. Our final data, therefore, consisted of advertisements for two species (*P. erithacus* and *T. hermanni*) on two sites, with each advert being scored for whether the free text field contained a reference to ownership of a CITES A10 certificate, and for each advert on site A, whether a tick box had been correctly completed. From these data, we calculated the proportion of advertisements communicating ownership of an A10 certificate for each combination of website, species and feature of choice architecture (free text or tick box).

To identify how species, website and choice architecture affected the likelihood of communication of A10 certificate ownership for each combination, we compared the proportion of advertisements communicating A10 ownership with a two-proportion z-test using the `prop.test` function in the base package of the software R [44]. Specifically, for each of our two focal species, we compared the proportion of advertisements communicating CITES A10 certificates between choice architecture features within one website (site A) and between the text fields of the two sites. This yielded four comparisons in total:

- (i) *Testudo hermanni*, site A tick box versus site A free text;
- (ii) *Testudo hermanni*, site A free text versus site B free text;
- (iii) *Psittacus erithacus*, site A tick box versus site A free text; and
- (iv) *Psittacus erithacus*, site A free text versus site B free text.

For a subset of these data, collected from 28 February until 30 April 2025, we also recorded, where it was present, the A10 certificate reference number. This allowed us to compare the levels of A10 certificate reference number reporting for our two focal species between the two websites and their choice architecture features.

3. Results

3.1. Pilot data

The pilot data presented in [table 1](#) suggest that for the African grey parrot, there was a difference in reporting of A10 ownership between the tick box on site A and free text fields of both site A (27 out of 27 versus 12 out of 27) and site B (27 out of 27 versus 23 out of 43). For the most commonly advertised tortoise species, Hermann's tortoise, the tick box on site A had elevated levels of A10 reporting compared

Table 2. Data on inclusion of A10 certificate reference numbers in different choice architectural features for our two focal species on site A and site B.

species	site A tick box	site A free text	site B free text
African grey parrot (<i>P. erithacus</i>)	29 out of 34	1 out of 34	0 out of 40
Hermann's tortoise (<i>T. hermanni</i>)	44 out of 45	0 out of 45	0 out of 49

to the free text field on the same site (tick box 53 out of 53 compared to 28 out of 53 for the free text) as well as compared to the free text field on site B (free text 24 out of 38).

For two other Mediterranean-advertised tortoises, *T. graeca* and *T. marginata*, tick boxes were associated with higher reporting of A10 certificate ownership compared to free text fields within site A (16 out of 16 versus 7 out of 16; 11 out of 11 versus 9 out of 11, respectively). When comparing the level of reporting of A10 ownership in free text fields between the two sites for these two species, there was relatively little difference in the data, as illustrated in [table 1](#).

Two less commonly advertised species, the star tortoise (*Geochelone elegans*) and the radiated tortoise (*Astrochelys radiata*), showed very little variation in reporting of A10 ownership between tick boxes and free text within a site, or in free text fields between sites.

3.2. Focused data collection

A flat datasheet of the values analysed in this section can be found in the supplementary materials, S1.

3.2.1. African grey parrot (*Psittacus erithacus*)

Within-site comparison in the African grey parrot highlighted that a tick box (60 out of 61) was significantly more effective than a free text field on the same site (41 out of 61) in capturing the ownership of the A10 certificate ($p < 0.001$). Similarly, free text fields in site A (41 out of 61) and site B (26 out of 71) exhibited significant variation in their inclusion of the correct certificate information ($p < 0.001$; [figure 1](#)).

3.2.2. Hermann's tortoise (*Testudo hermanni*)

Within-site comparison of Hermann's tortoises suggested that a tick box (64 out of 65) was significantly better than a free text field (50 out of 65) in communicating the presence of a CITES A10 certificate ($p < 0.001$). Between-site comparison of free text fields outlined a similar difference with site A (50 out of 65) and site B (48 out of 102) exhibiting significant variation in their inclusion of the correct certificate information ($p < 0.001$; [figure 2](#)).

There was a marked difference in the reporting of A10 certificate reference numbers within site A's choice architecture features ([table 2](#)). In advertisements for African grey parrots on site A, 29 out of 34 advertisements included a reference number, while only one of those 34 contained a reference number in the corresponding free text field. None of the 40 advertisements for African grey parrots on site B included an A10 reference number in the free text field. The same pattern was true of advertisements for Hermann's tortoises: site A tick boxes contained A10 reference numbers in 44 out of 45 advertisements, while free text contained the information in none of the 45. No A10 reference numbers were given in the free text fields of 49 advertisements on site B during this period. A flat sheet of the data analysed in this section is available in the supplementary materials, S2.

4. Discussion

The size and scope of the trade in pet animals and ornamental plants has directly led to the decline and local extinction of multiple species [45,46]. Effective legislation to prevent overharvesting while promoting sustainable use of natural resources is important for conserving biodiversity and meeting obligations to the UN Sustainable Development Goals [47]. CITES appendices have been used for almost half a century, with this in mind, but there are concerns about the level of compliance within this existing framework. In part, lack of compliance may be owing to purposely illegal activities [48], but in some circumstances it may be a result of lack of clarity around regulations [49], in this case, details of what paperwork and infor-

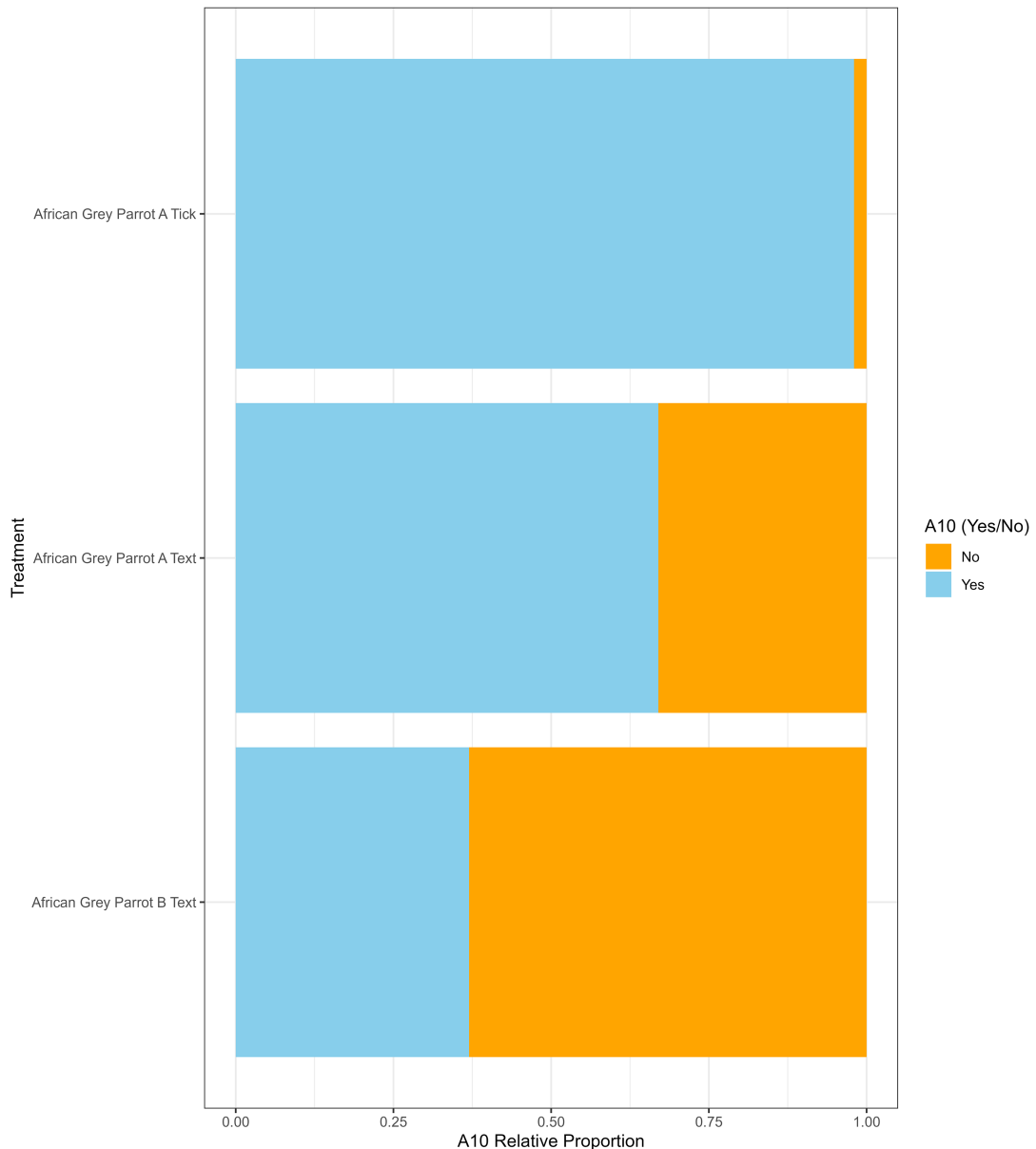


Figure 1. Proportion of total advertisements of African grey parrots (*Psittacus erithacus*) communicating ownership of A10 certificates for each of site A tick box ($n = 60$ out of 61), site A free text ($n = 41$ out of 61) and site B free text ($n = 26$ out of 71). Two proportion z-tests indicated that proportions of A10 details in site A text and tick boxes significantly varied from each other, as did site A and site B free text.

mation is required when buying or selling animals and plants. The data presented in this study suggest that, for domestic trade within the UK, the choice architecture of classified online advertisement websites can significantly affect the level of reporting ownership of the necessary trade-related certificates. Specifically, the addition of a simple tick box and a short text field for reporting the ownership of an A10 certificate significantly increased the reporting frequency in two widely traded species: Hermann's tortoise and the African grey parrot. The broader implications are that some simple interventions improve transparency within the UK's legal domestic trade in exotic pets, the importance of which is only likely to increase given current policy discussions surrounding the future of the trade and hobby [28,50,51].

To our knowledge, this study represents the first focused effort to investigate the effect of choice architecture on aspects of the legal online pet trade. In our data, A10 certificate ownership was captured by tick boxes in 98% of advertisements (124 out of 126) across the two focal species, with a similarly high proportion giving A10 reference numbers (73 out of 79—92%—across both focal species). This suggests that although not perfect, the addition of this feature could improve compliance with industry standards and best practices (e.g. [52]) by both individuals placing advertisements and the websites upon which

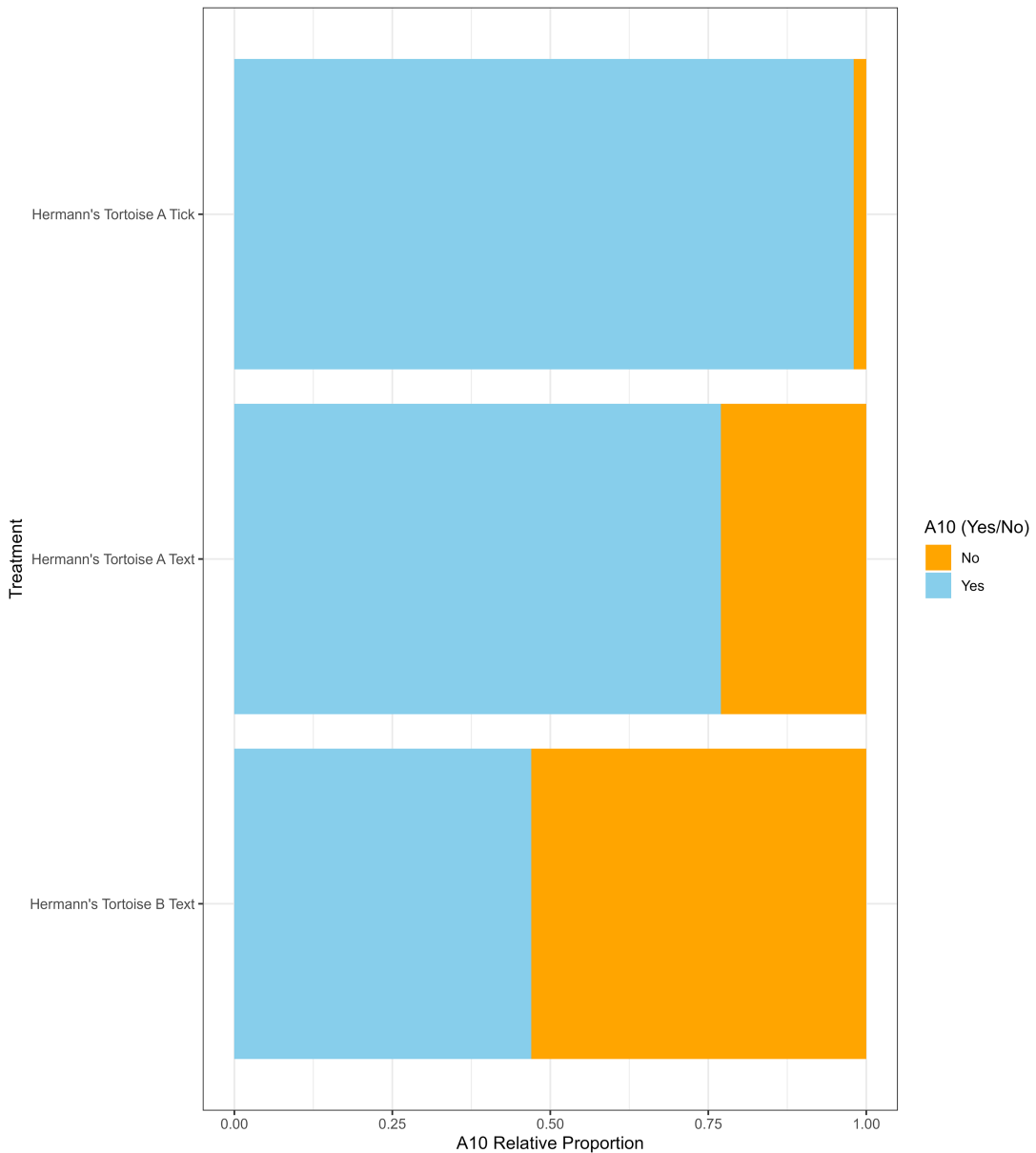


Figure 2. Proportion of total advertisements of Hermann's tortoise (*Testudo hermanni*) communicating ownership of A10 certificates for each of site A tick box ($n = 64$ out of 65), site A free text ($n = 50$ out of 65) and site B free text ($n = 48$ out of 102). Two proportion z-tests indicated that proportions of A10 details in site A text and tick boxes significantly varied from each other, as did site A and site B free text.

they were placed. Given the high rate of inclusion of certificate details when a tick box was present, it seems likely that they may have played the role of a memory aid to prompt a participant's memory of what information is relevant to the task at hand. The inclusion of tick boxes also increased reporting of A10 certificates within associated free text fields (i.e. for both species, the text field reporting of A10 ownership was significantly higher on site A, which included a tick box). This point speaks to the importance of website features both for directly capturing relevant information and as a nudge in other aspects of website design. To better understand the necessity of nudges, it would be useful to quantify the awareness of paperwork requirements and the reasons behind those requirements for both sellers and buyers, both online and more generally. This would allow a more detailed understanding of when and where choice architecture is likely to be effective, and where more focused information would provide a better foundation for improving compliance.

Pilot data on a broader range of tortoise species largely support these findings and highlight the importance of choice architecture in meeting sector-led best practice guidelines. However, there are some exceptions that are worth noting. Ownership of necessary certificates in two other commonly kept and

advertised species of tortoise, *T. graeca* and *T. marginata*, was reported more commonly using the tick box feature than the free text field of either site. This is consistent with our main data analyses of *T. hermanni* and *P. erithacus*. However, for the radiated tortoise (*A. radiata*) and the star tortoise (*G. elegans*), there was little difference between the reporting of A10 certificates between tick boxes and free text fields, albeit with a limited sample size. The difference between these two species and the data obtained from others is striking, but the precise mechanism behind this higher frequency of reporting is hard to decipher. While radiated tortoises in particular can be expensive (> £2000), and this could help explain an improved awareness of certificate requirements in this taxon, this price is broadly comparable to African grey parrots, for which reporting was relatively poor in free text fields. More detailed analyses of factors related to the likelihood of reporting, which could include the background and type of advertiser (e.g. resale versus breeder or licensed business), the price of the animals being advertised, their taxonomic group, the origin of the animals being advertised and their relative availability, would be an interesting field of future research. The applications of this detailed knowledge would be useful in identifying the location and type of interventions necessary to improve the reporting of compliance.

After this study was conducted, the Department for Environment, Food and Rural Affairs launched a consultation on regulatory reforms to the legislation that implements CITES within the UK. One of the proposals put forward in the consultation was to exempt captive-bred individuals of three Mediterranean tortoise species (Hermann's tortoise, marginated tortoise and spur-thighed tortoise) from the requirement to apply for A10 certificates when selling these animals or otherwise using them commercially in the UK, aside from Northern Ireland. This was because these species are commonly captive-bred, and they are considered to be at low risk of illegal domestic trade [10]. The government's response to the consultation results, published in February 2026, confirmed this proposal would be taken forward, and the legislative changes are expected to be finalized during 2026 [11]. Although these three tortoise species will no longer require A10 certificates, the findings of this study will continue to have applications for other Annex A species present in the UK pet trade, and more broadly in other aspects of the online advertisement of pets.

In the broader scope of the UK pet trade, the implications of our findings could extend beyond A10 certification within UK classified advertisement sites. The subject of keeping exotic pets is currently being discussed within the UK's devolved governments, and new policies and legislation could be implemented in the future [28,29]. Two pieces of legislation that have gained traction among advocates of change in the exotic pet sector involve, first, the use of 'Positive lists', which are a list of species that may be legally kept [53], and, second, pre-purchase knowledge checks [28,54]. For either or both suggested interventions to be effective, one important aspect would be the ability to verify the species identity of the animals being traded, and the certification of the owner's knowledge status, which could be made more effective with carefully designed choice architecture in related websites. Moreover, industry-led efforts to better manage the online sales of certain species or breeds could benefit from targeted choice architecture in website design. For example, recent trade policies and guidance documents have been developed to more responsibly manage the sales of animals known to suffer poor welfare on account of deleterious genes [55], or that pose significant husbandry challenges to the less experienced owner [56–58]. Previous research on the online advertisement of reptiles suggests that some of these species and breeds are advertised via these platforms [16,59]. In these cases, website design that nudges advertisers and websites to transparently log, exclude or monitor the contents of their advertisements could significantly support the efficacy of these policies. Our analyses suggest that these aims would require careful thought into choice architecture and the nudges required to effectively and accurately capture the necessary information when animals and/or plants are advertised, whether online or in person.

Clearly, though, there are major limitations to this approach, and in many cases, simple tick boxes and other similar behavioural nudges would be insufficient in efforts to ensure compliance. A large proportion of the wildlife trade is illicit [48] and most points along the supply chain are poorly known [5] and probably highly difficult, expensive and dangerous to monitor and control [48,60]. The implications of this study are therefore small in scale, focusing on a relatively transparent, easily monitored route of advertisement and sale, and should not be used to advocate the use of such approaches in other, broader aspects of the pet trade. Further, even at the scale of the UK exotic pet trade, it would be much more difficult to monitor and improve the efficacy of targeted legislation on less easily accessible, less transparent internet platforms (e.g. social media, dedicated forums, chat groups and the dark web; [61]). This lack of control via these other routes of sale perhaps highlights the benefits of trying to regulate online trade effectively on engaged classified advertisement sites to avoid displacing trade to less easily monitored routes of sale. The legal trade is also commonly closely linked to illicit trade, with the mechanisms and processes of the former sometimes being used as a cover for

illegal trade [60], which may be a particular concern in the two focal species within these analyses [41–43,62,63]. Our study was only able to identify which advertisements communicated ownership of A10 certificates, which neither tells us whether advertisers actually possess those certificates, nor whether the certificates advertised were genuine. At present there is no actual mechanism to checking the validity of a given A10 certificate. Further research to trace A10 certificates in a range of species could highlight useful aspects of trade dynamics, such as the average number of transactions experienced by different species, and the level of actual compliance with the current regulations.

The exotic pet trade in the UK is at a crossroads. Its taxonomic diversity and size have resulted in significant welfare concerns [28,29], leading to multiple stakeholders calling for legislative change [50,51,64]. Several such changes have been advocated with a view to improving the sustainability of the trade and the welfare of the animals involved [28,29,54]. However, when designing and introducing interventions aimed at behaviour change, it is important to carefully consider the likely compliance levels [65] and how the system supports people throughout the supply chain in adhering to regulations and communicating effectively that they are doing so [49]. Our data suggest that some highly visible routes of trade are amenable to simple improvements that can significantly increase how well an advertiser reports their compliance with existing best practice guidelines and regulations. By extension, future interventions could benefit from coordinated efforts to design choice architecture that will support transparency and traceability throughout the supply chain and in people's homes. Ultimately, doing so would be to the benefit of the welfare of the animals involved and the sustainability of their wild populations.

Ethics. Although we did not require ethical approval for this research, we did give careful consideration as to whether we should name the websites that were the source of this data and add a greater degree of transparency. We chose not to because the two sites that we used have been engaged and active in improving their own advertising standards. We felt that naming the websites could be counterproductive in our aim of constructively improving the design of advertisement websites, in that it could be perceived to be a criticism of their methods and websites. Instead, by omitting their names, we believe that the majority of readers would focus on the data and main findings (tick boxes can improve reporting of compliance), rather than the 'who' of which site had this useful feature, versus which did not.

Data accessibility. Data has been uploaded as supplementary material files `data.csv` and `data_a10_cert_numbers_flat_data.xls`. Supplementary material is available online [66].

Declaration of AI use. We have not used AI-assisted technologies in creating this article.

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