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Title: Code word usage in the online trade in ivory across four EU member States

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Abstract

Illegal wildlife trade is a rapidly evolving environmental crime that is expanding through e-commerce. Due to the nature of the internet, detection of online illegal wildlife and enforcement has proven to be difficult and time-consuming, often based on manual searches through the use of keywords. Due to the scrutiny the trade in elephant ivory has come under, sellers now use code words to disguise the trade, thus adding an additional level of complexity. Here we look at the use of 19 code words and phrases associated with the online trade in elephant ivory items on eBay across four European Union member States. Results show that, in spite of eBay’s ban on ivory, elephant ivory is still being offered for sale across all four EU sites we searched (183 ivory items offered by 113 sellers between the 18th January and 5th February 2017). Beyond the violation of eBay’s Terms and Conditions, other potential illegalities included offers for sale across international borders without mention of CITES permits requirements, and the offer of ivory that may be considered ‘unworked’, which violates EU regulations. Code word usage was found to be consistent across all four EU countries. While the rise of online wildlife trade is of concern, the growth of global markets may homogenise conventions within trading communities, such as in this case the code words used. Homogenisation of conventions may therefore offer opportunities in tackling the illegal online trade in wildlife.

Keywords: CITES; e-commerce; elephant; enforcement; illegal wildlife trade; keyword; linguistics; search term
Introduction

The illegal wildlife trade is an extremely lucrative environmental crime. The scale is vast and as a result estimating its extent is challenging. Current estimates suggest environmental crime is worth as much as $23 billion per year (Nellemann et al. 2016), making it the fourth most valuable illicit transnational trade after the trafficking of narcotics, humans and counterfeit items (UNGA 2015). With its global reach, the internet has become the focus of concern in terms of the illegal wildlife trade, with trade occurring over a variety of platforms including auction websites (Hernandez-Castro & Roberts 2015) and social media (Yu & Jai 2015; Hinsley et al. 2016); little has been found on the darkweb (Harrison et al. 2016; Roberts & Hernandez-Castro 2017). As a result, governments and businesses have been called to take action to tackle the growing problem of the illegal online wildlife trade (WWF/Dalberg 2012).

However, identifying suspected illegalities online is time consuming; often involving manual keyword searches (Hernandez-Castro & Roberts 2015).

The online trade in elephant ivory represents an interesting case, as the term ivory is used both for the material (including elephant, mammoth, hippo, narwhal and walrus tusks, as well as sperm whale teeth) and for the colour. As such, use of the search term “ivory” will result in a large proportion of unrelated items (Hernandez-Castro & Roberts 2015). Further, with the push for businesses to ban the trade in ivory to adapt to current legislations (e.g. eBay’s ban on items with >5% ivory – Coghlann 2008), the trading community has developed a number of code words to disguise the trade. Added to this already challenging situation, it is unclear whether these code words are common within the trading community or specific to a particular country, language or trading community.
In this study, we analysed the use of 19 code words for elephant ivory (IFAW 2014; and used in a previous study (Hernandez-Castro & Roberts 2015)) across eBay market places in four linguistically different European Union (EU) countries. Understanding how search terms associated with the illegal wildlife trade, including code words, are used across different languages will not only help inform future research into the illegal online wildlife trade, but also streamline the manual search by law enforcers.

**Methods**

The study was approved by the University of Kent’s Research and Ethics Committee (ref. no. 0321617). The research was conducted on the open, publicly available, auction website eBay, across four linguistically different eBay market places, namely the eBay UK (ebay.co.uk), eBay France (ebay.fr), eBay Italy (ebay.it) and eBay Spain (ebay.es). eBay was chosen as previous studies had shown continuing trade in elephant ivory (e.g. Hernandez-Castro & Roberts 2015) and as it represented a stable platform used across several different countries. The specific marketplaces were selected based on the linguistic abilities of one of the authors (SA), and because they fall within the EU, allowing free trade between member States.

Following Harrison et al. (2016), we consulted a list of 30 code words and phrases previously identified by the International Fund for Animal Welfare (IFAW 2014) as being associated with the online trade in ivory products. Of the 30 code words, 19 were selected; excluded words or phrases were those that represented redundancy, were too generic or had an unreliable translation. Each code word was translated
from English to French, Italian and Spanish. During the analysis, each code word was anonymised and assigned a random alphabetical letter to avoid compromising ongoing enforcement efforts.

A systematic search was conducted over a 21-day period, between the 18th January and 5th February 2017; this was the time taken to conduct a single search of each of the four website using all the code words. For consistency, searches for a particular code word were conducted at the same time across all four marketplaces, and restricted to the ‘Header’ and ‘Description’ of the adverts, and the ‘Antiques’ section. Each search was performed only once. All items of the resulting search were scrutinised if the total number of items was less than 5,000. In cases where searches resulted in more than 5,000, a sample of the first 100 items were analysed due to time availability. For each elephant ivory item identified, the details and sale characteristics (i.e. code word used, item number, username, item location, postage options and information regarding the object’s age and certifications) were recorded. Postage options were classified into three categories, specifically ‘Within country’, ‘Within the rest of the EU’ or ‘Outside the EU’.

Given the lack of access to the physical items, identification of elephant ivory items was based on the most precise available indicator, which was the presence of Schreger lines in the images; a unique structure indicative of elephant ivory (Locke 2008); the only other characteristic being the shape of the item in the case of unworked ivory. An alternative option was to discounting other materials associated with ivory used such as man-made materials, bone, horn and antlers, and other ivories including hippo, narwhal, sperm whale and walrus. A 2-person Kappa analysis
was performed using a 100 items sample to test identification consistency among researchers (i.e. raters 1 and 2). Cohen's Kappa was calculated to confirm identification consistency. Differences in the classification of items were then discussed among researchers until an agreement was reached.

Results

Elephant ivory identification consistency

Kappa analysis was used to determine the coefficient of agreement between two raters' identification of elephant ivory or non-elephant ivory based on a sample of 100 items and showed a good level of agreement (k = 0.67, p < 0.01). During a follow-up consultation, a technical issue experienced by rater 2 using the eBay's image zoom feature was identified as the main cause of difference in classification of items between raters. After reanalysis following the correction of the zoom issue, agreement was achieved for 14 of the 15 disputed items (k = 0.98, p < 0.01).

Elephant ivory items' sale characteristics

A total of 15,152 adverts were analysed resulting from the 19 code words searched across the four websites, leading to the identification of 183 unique elephant ivory items. Of these 183 unique items, 84 (1.14% of the total number of adverts analysed on the country’s website) where found on eBay UK, 55 (1.42%) on eBay France, 44 (1.42%) on eBay Italy and 42 (6.35%) on eBay Spain. These items where offered for sale by 113 unique sellers. Most sellers (n = 86, 76%) were offering a single ivory item at the time of the survey, with a median of 1 item per seller and a maximum of 14 (Figure 1).
Of the 21 items located outside the EU trading area, 20 were in the USA and 1 was in Israel (Figure 2). All other items were located within the EU in the four countries of study, except for a substantial number that were for sale in Germany (n = 26, 14%). There was a significant difference in the distribution of items on offer among the categories ‘Within country’ and ‘Within the rest of the EU’ in each of the four countries’ eBay sites ($\chi^2 (3) = 51.3, p < 0.05$), with the UK being under represented and Spain over represented in terms of numbers of items located within the EU. The category ‘Outside the EU’ was excluded from the test as it only applied to the UK.

In terms of the postage options available for the items whose physical location fell within the four countries of study (n = 59 for the UK, n = 35 for France, n = 23 for Italy and n = 12 for Spain), there was a significant difference across countries in distribution of items among the categories ($\chi^2 (6) = 31.6, p < 0.01$), with Spain being over represented for number of items for sale within the EU (Figure 3). Due to several low expected counts (41.5%), a Fisher’s Exact test was also conducted, producing analogous results ($p < 0.01$).

Information regarding the declared age of the items and certifications was found in the ‘Heading’ or ‘Description’ of most items (n = 139, 76%). One object was reported holding an antiquity certificate, 82 (45%) were dated by sellers as pre-1947, though without using the term ‘pre-convention’, and 40 (22%) were simply described as ‘antiques’. A minority were also described as ‘vintage’ (n = 7), ‘old’ (n = 3) or ‘original’ (n = 2). Only one Italian seller reported holding CITES permits for both items found for sale. Two sellers explicitly mentioned eBay’s Terms and Conditions in relation to the sale of elephant ivory. Finally, 5 of the items where in the original, easily
recognisable form of tusks, either highly polished or carved but still obvious due to their shape.

**Code words and phrases’ usage across countries**

Of the 19 code words analysed, 6 accounted for nearly 80% (n = 276) of the total number of elephant ivory items found for sale across the four eBay websites (Table 3). The code words usage was compared across countries through the analysis of their rank order. There were significant correlations between pairs of countries in the rank order of the code word hits, with a p-value < 0.01 for each pair (France v Italy $r_s = 0.876$, France v Spain $r_s = 0.797$, Italy v Spain $r_s = 0.874$), except for all comparisons with the UK (UK v France $r_s = 0.701$, UK v Italy $r_s = 0.595$, UK v Spain $r_s = 0.668$), which was significant at $p < 0.05$. Results for code words with a fixed sample size of 100 items were excluded from this analysis to avoid biases, as they are possibly not representative of the complete list of items.

**Discussion**

While ivory sales on eBay have been banned since 2009 (Coghlan 2008), elephant ivory is still being offered for sale across the four analysed countries. However, as noted in a previous study (Yeo et al. 2017), three-quarters of the trade was by sellers offering only as single item; although one individual was offering 14 items, the next highest number of items offered by a single seller was 6 items (Figure 1).

Besides two sellers explicitly making the false statement that they complied with eBay’s Terms and Conditions (see eBay 2017a, 2017b, 2017c), a number of analysed items were potentially illegal for reasons other than the violation of the
website’s regulations, specifically regarding international, EU and national legislation.

In fact, most sellers identified in this study were willing to sell outside of the EU, made no explicit mention as to whether the items were ‘pre-convention’ (45% were described as pre-1947) other than wording related to the age of the item (e.g. ‘antique’). There was a further lack of acknowledgement regarding the need for a CITES permit for international trade, particularly into and out of the EU. Presence of a CITES permit was mentioned by only one seller who was not willing to send the two items for sale outside their country. Finally, five items of ivory were found to potentially violate the EU’s regulations as they may represent unworked ivory. While in most cases the tusk was carved, the shape was still obvious; defining what is worked or unworked is contentious (pers. comm.). According to the EU regulations Article 2w of Regulation (EC) No 338/97 defines worked ivory to be “specimens that were significantly altered from their natural raw state for jewellery, adornment, art, utility or musical instruments … Such specimens shall be considered as worked only if they … require no further carving, crafting or manufacture to affect their purpose”. Further, pre-convention antiques that remain substantially unaltered from their natural state (i.e. are still in the form of a tusk) do not qualify as ‘worked specimens’.

Difference between countries did exist in terms of the volume of ivory items found for sale in each of the four countries, with a higher volume in the UK. The lower overall volume of ivory items found on eBay France, Italy and Spain could be due to the sellers’ preferential use of different auction websites in these countries. Further, unlike other countries, there were a higher number of items being offered from outside the EU (mainly US) into the UK. In contrast France, Italy and Spain had high
numbers of items for sale from other EU countries, notably from Germany, overall
differentiating the four markets in their characteristics.

Identification of elephant ivory items based on the unique Schreger lines was found
to be consistent based on Kappa analysis, even after brief training. However, the
number of photographs and their quality was a limiting factor. While Schreger lines
appears to be a simple and reproducible method for manual identification online
trade in elephant ivory, basing identifications purely on the presence of Schreger
lines is likely to be an underestimation of the total volume of ivory for sale.

There were surprising correlations in usage of code words for the sale of ivory across
all four EU countries, even though they differ linguistically, suggesting such
conventions maybe to some extent homogeneous beyond individual markets.
Correlations were highest between France, Italy and Spain, potentially due to the
closer linguistic relationships. Of the 19 code words that have been associated with
the trade in elephant ivory, 6 made up the vast majority of the items traded (80%).
Restricting the code words used in the search will therefore reduce the amount of
effort considerably if the search is conducted by hand, as is currently the case.
Further, should new code words be identified, it would be beneficial to share these
between law enforcement agencies, even if there are linguistic differences. Machine
learning, based on code words and other attributes of advertisements for elephant
ivory (e.g. Hernandez-Castro & Roberts 2015), offer opportunities to automate the
process of identification for law enforcement agencies as well as marketplaces.
Illegal wildlife trade is a lucrative transnational environmental crime that warrants concerted efforts (Economic and Social Council 2013). The internet offers a global reach to sellers and buyers, and at first sight it may present enforcement officers with a potential problem due to its scale. However, the global market may result in homogeneity of conventions for communication. In the case of sale of elephant ivory, code words usage was comparable across the four countries and translatable across the four languages analysed. It is less clear how these conventions further translate across different online platforms such as between free-text social media and classified advert platforms (e.g. Facebook and Craigslist), or structured auctions sites (e.g. eBay), or other platforms that use limited text and/or tags (e.g. Instagram or Twitter). We therefore suggest that further research should explore the characteristics of these platforms. However, if there exists a ‘digital fingerprint’ of ivory trade or wildlife trade across platforms, languages and countries, global monitoring of wildlife trade would be worthwhile and potentially easier than perceived.

**Acknowledgements**

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**Author Contributions**

DLR conceived the product, SA collected the data and performed the analysis, and SA and DLR wrote the manuscript.

**References**


International, Gland, Switzerland.


Biographical Sketches

Sara Alfino holds a Master's Degree in Conservation and International Wildlife Trade from the University of Kent and is passionate about researching on socio-ecological systems.

David Roberts is a Reader in Biodiversity Conservation with an interest in the wild trade, both legal and illegal, from livelihoods to end consumers, but with a particular interest in the online trade. Before moving to the University of Kent he worked for 8 years as an orchid specialist at the Royal Botanic Gardens, Kew, where he became interested in CITES and the wildlife trade.
Figure 1: Frequency of ivory items found per seller across four eBay sites
Figure 2: Number of ivory items found per physical location on the four eBay websites searched.
**Figure 3:** Number of ivory items found per postage option on the four eBay websites searched

- **Country:**
  - **UK:**
    - Within country
    - Within the rest of EU
    - Outside EU
  - **France:**
    - Within country
    - Within the rest of EU
    - Outside EU
  - **Italy:**
    - Within country
    - Within the rest of EU
    - Outside EU
  - **Spain:**
    - Within country
    - Within the rest of EU
    - Outside EU
Table 3: Number of ivory items found per code word on the four eBay websites searched

<table>
<thead>
<tr>
<th>Code words (anonymised)</th>
<th>Number of ivory items found in each country (%age of the number of items searched per code word)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UK</td>
</tr>
<tr>
<td>A</td>
<td>30 (2.7%)</td>
</tr>
<tr>
<td>B</td>
<td>11 (4.2%)</td>
</tr>
<tr>
<td>C</td>
<td>1 (25.0%)</td>
</tr>
<tr>
<td>D</td>
<td>2 (3.2%)</td>
</tr>
<tr>
<td>E</td>
<td>1 (0.7%)</td>
</tr>
<tr>
<td>F *</td>
<td>2 (2.0%)</td>
</tr>
<tr>
<td>G</td>
<td>4 (2.9%)</td>
</tr>
<tr>
<td>H</td>
<td>1 (9.1%)</td>
</tr>
<tr>
<td>I</td>
<td>3 (0.1%)</td>
</tr>
<tr>
<td>J *</td>
<td>10 (10.0%)</td>
</tr>
<tr>
<td>K *</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>L *</td>
<td>7 (7.0%)</td>
</tr>
<tr>
<td>M</td>
<td>15 (3.6%)</td>
</tr>
<tr>
<td>N *</td>
<td>1 (1.0%)</td>
</tr>
<tr>
<td>O</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>P</td>
<td>2 (0.5%)</td>
</tr>
<tr>
<td>Q *</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>R *</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>S</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>
Code words whose search was limited to the first 100 items