Visual metaphoricity across languages:

The greenhouse effect and the carbon footprint in educational videos

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Abstract

This paper proposes a comparative approach to visual metaphors in Chinese-Mandarin and British-English educational videos about the climate crisis. In the English language, many theoretical concepts are described metaphorically: this is especially true for the "greenhouse" effect and the carbon "footprint". However, in Chinese-Mandarin, the metaphorical meaning of these two expressions seems to differ ("the amount of emitted carbon").

The existing literature has shown that metaphors are prevalent in educational discourse about the climate crisis (Manca and Spinzi 2022) as they can fulfil a pedagogical function (Augé, 2022a; Deignan, et al., 2019). We therefore ask how different degrees of metaphoricity are realised visually, in educational videos aimed at children.

To address this question, we compiled a dataset of 43 educational videos explaining the concepts of the "greenhouse effect" and the "carbon footprint" in English and Mandarin languages. Our analysis sheds light on the different educational uses of visual metaphors in both languages. This paper aims to illustrate such differences through the qualitative analysis of 9 visual occurrences extracted from our dataset, which all use metaphors following different educational strategies. For instance, English videos transform the verbal source concepts of the "greenhouse effect" and "carbon footprint" metaphors into visual source concepts (visual representations of a literal "greenhouse" and a literal "footprint"). In contrast, Chinese-Mandarin videos rely on a plurality of different source concepts to represent and explain different features of the "greenhouse effect" and "carbon footprint".

We conclude that the visual source concepts represented in Chinese videos not only explain climate science to children (like in English videos), but they also alert children to the danger of environmental inaction.

Keywords: Climate crisis; greenhouse effect; carbon footprint; educational videos; metaphoricity

1. Introduction

This paper proposes an investigation into the use of visual metaphors in educational videos about the climate crisis. Existing research has long identified cultural and linguistic variations in the realisation of metaphors across countries (Augé, 2019; 2022a; 2023; Kövecses, 2005). Such variations are particularly prevalent in the discourse of climate crisis: the climate crisis represents a global phenomenon, which yet affects different parts of the world in different ways (Gattey, 2021; Sachs 1993). As metaphors are attached to people's experiences and subjectivity (Musolff, 2016), different experiences of the climate crisis ultimately result in different metaphorical realisations employed to conceptualise such complex and subjective experiences (Augé, 2023). Thus, the United Nations Framework Convention on Climate Change (2019) established a distinction between experiences in Global North countries and Global South countries. Our aim is therefore to examine the impacts of such different experiences in the metaphorical discourse produced within the Global North and the Global South.

In particular, this paper focuses on the impact of these different environmental experiences on the use of metaphors as an educational strategy. Indeed, metaphor scholars documented the pedagogical function of climate crisis metaphor (Deignan et al., 2019; Nerlich and Hellsten, 2014). Accordingly, the complexity of the climate crisis (the target concept) is downplayed through the use of a more concrete source concept (Kövecses, 2010). Notably, metaphor scholars identified two prevalent pedagogical metaphors: the "greenhouse effect" (Augé, 2022b; Deignan et al., 2019) and the "carbon footprint" (Augé, 2022a; Koteyko, 2010; Nerlich and Hellsten, 2014). Interestingly, our preliminary research on the electronic corpora British National Corpus and Chinese OPUS (accessed through SketchEngine, Kilgarriff, 2014; see Augé, 2022a) demonstrates that the EARTH AS A GREENHOUSE metaphor occurs both in the (British) English and (Mandarin) Chinese languages (**温室效应** wēn shì xiào yìng). In contrast, the IMPACT OF CARBON EMISSIONS AS A FOOTPRINT metaphor prevails in the English language. However, the Chinese electronic corpus represents the target concept through a non-figurative expression: **二氧化碳排放量** èr yǎng huà tàn pái fàng liàng, "the amount of emitted carbon".

This preliminary finding leads us to investigate the educational functions of these expressions. The English language requires a concrete source

concept to represent the target, yet the Chinese language does not seem to concretise this target through metaphor. We thus ask how these different degrees of metaphoricity are realised visually, in educational videos aimed at children.

This research question draws on previous findings showing that visual realisations of climate crisis metaphors further disambiguate the conceptual mappings at play in verbal metaphors (Augé, 2022a; 2023; see section 2.3.). This paper thus proposes to investigate how this disambiguation occurs in visual realisations of a non-metaphorical verbal expression ("the amount of emitted carbon") compared with the visual realisations of a metaphorical expression ("the greenhouse effect") in Chinese educational videos.

In the following section, we review existing findings related to climate crisis metaphors across modes and languages. We then thoroughly explain the different methodological steps undertaken to answer our research question. This leads us to analyse the visual realisations of the metaphorical expression **温室效应** wēn shì xiào yìng ("the greenhouse effect") and the non-metaphorical expression **二氧化碳排放量** èr yǎng huà tàn pái fàng liàng ("the amount of emitted carbon") in our dataset. We end this paper with a discussion of the different visual features observed in Chinese and English educational videos about the climate crisis.

2. Climate crisis metaphors across modes and languages

2.1 The educational function of climate crisis metaphors

Metaphors prevail in climate crisis discourse. They can make the topic less complex (e.g., quantifying one's "carbon footprint", Augé, 2022a; Nerlich and Hellsten, 2014), they can promote issues related to climate change mitigation and policies (e.g., the "war" against climate change, Atanasova and Koteyko, 2017), they can persuade recipients of the urgency to tackle the problem (Flusberg et al., 2017), and they can attract public attention to the issue (Augé, 2023).

In specialist discourse, metaphors are "ordinary scientific concepts" used to hypothesise and explain scientific claims (Knudsen, 2003: 1255). Comparatively, in non-specialist discourse, these metaphors are explicated to support the explanation of scientific observations (Knudsen, 2003: 1260). Nerlich and Hellsten (2014) draw on this distinction and demonstrate that the metaphor EARTH AS A GREENHOUSE may be seen as a specialist

metaphor, coined by climate scientists to name a concept that was just discovered. In contrast, their study shows that the metaphor IMPACT OF CARBON EMISSIONS AS A FOOTPRINT is a non-specialist metaphor that appears in public discourse to enable climate scientists to interact with "lay" people (Nerlich and Hellsten, 2014).

Deignan, et al. (2019) compare the use of climate change metaphors in scientific papers, in educational texts, and in students' talks. Their results show that the meaning of metaphors has been adapted to fit a particular context, interest, or experience. For instance, the metaphor EARTH AS A GREENHOUSE appears in all investigated genres and registers. Yet, educational texts and students' talks seem to significantly rely on this particular metaphor (2019: 385-388). However, the scholars' analysis shows that the metaphor may lead to misunderstanding. The interviewed students referred to the "greenhouse effect" as a thin layer around the planet which does not let heat out, while greenhouse gases are rather "dispersed" in the atmosphere, according to the linguists' academic corpus (Deignan et al., 2019: 394).

Existing research has shown that the metaphor THE IMPACT OF CARBON EMISSIONS AS A FOOTPRINT can be ideologically exploited. The metaphor favours people's understanding of management policies to protect the environment (Koteyko, 2010: 664; Koteyko et al., 2009: 30-9). Its adaptation in online communication demonstrates that exploitations of the source concept FOOTPRINT emphasise the link between pollution and humans' daily activities (e.g., "carbon diet"; Koteyko, et al., 2009: 40). Additionally, the source concept has been exploited to convey a strong criticism addressed to polluters: the metaphorical expression "carbon Bigfoot" (2009: 43) echoes the mapping at play in the metaphorical expression "carbon footprint", but it focuses on the OWNER OF THE FOOTPRINT rather than on the FOOTPRINT itself.

Indeed, the educational function of climate crisis metaphors may shift into a more ideological function in argumentative discourses (Augé, 2023). Such arguments may insist on the need for urgent actions to avert the climate crisis, but they may also promote sceptical views on the topic (Augé 2022b). Notably, Critical Metaphor Analysis (Charteris-Black, 2004) demonstrates that metaphors rely on a shared system of values and emotive force, favouring ideological exploitations (Charteris-Black, 2004: 12).

It follows that this "shared system of values" (Charteris-Black, 2004: 12) only prevails among a particular community who acknowledges such values (Sharifian, 2017). For instance, Kövecses (2005; 2010) compares the metaphors HAPPINESS IS FLOWERS IN THE HEART in Chinese with BEING HAPPY IS BEING OFF THE GROUND in American English. The different mappings are explained in terms of the "introverted-extroverted" characters of the metaphor users (2005: 70-71). Kövecses highlights that, despite these different mappings, metaphorical production respects the similar characteristics shared by the source and target concepts (2010: 77-79). Such a similarity promotes the recurrence of particular metaphorical expressions across cultures. This cross-cultural aspect was documented by Musolff (2016). He analysed the metaphorical expression "body politic" in responses to a survey involving participants from various countries. His results showed culture-specific exploitations: Chinese participants focused on the geographical features involved in the mapping (e.g., geographical shapes related to anatomy), whereas European, Israeli, and American participants focused on body politic as a functional whole (2016: 123-124).

In climate crisis discourse, such a distinction between languages and cultures has also been discussed by Augé (2019; 2023). The metaphorical expression "Mother Earth-Mother Nature" in English, French, and Spanish media discourses demonstrate nationalistic features. These features convey different personalities to the MOTHER which vary depending on the language of production: the MOTHER may be "strict", "sick", or "righteous" (Augé, 2019). In a corpus of 11,967 texts produced during international political meetings about the climate crisis (e.g., Conferences of the Parties), Augé (2023) further considers the impact of different environmental experiences in the Global South and in the Global North on the exploitation of metaphors. By following the procedures established in Critical Metaphor Analysis (Charteris-Black, 2004), she identifies three main strategies adopted by activists and politicians from the Global South. Such strategies aim at transforming prevalent conceptualisations of the climate crisis into conceptualisations that fit the environmental experiences of Global South communities. For instance, discourse producers exploit political metaphors to promote counter-arguments (e.g., CLIMATE MIGRATION AS A DISEASE versus CLIMATE MIGRATION AS A CURE), they insist on the traditional values attributed to source and target

concepts (e.g., EXTRACTION OF RESOURCES AS EXTRACTION OF HUMANITY), and they draw a causal link between historical and modern mischiefs (POLLUTION AS COLONISATION). Such strategies shed light on the argumentative strength of metaphors used by Global South communities, which involve conceptualisations of people's extensive experiences of the climate crisis (Augé, 2023, 124-143). Therefore, climate crisis metaphors may not only differ following different cultural conceptualisations (Kövecses, 2005), but also different experiences of the climate crisis.

2.3 Climate crisis metaphors across modes

Forceville (1994, 1996) defines visual metaphor as a replacement of an expected visual element by an unexpected one. He notes that there must be no pre-existent or conventional connection between these two elements (Forceville, 1994).

Visual metaphors have been documented in environmental discourse (Hidalgo-Downing and O'Dowd, 2023). Existing literature has demonstrated that visual metaphors increase people's concerns and make the environmental problem more tangible (Meijers et al., 2019, 999). Notably, Doyle (2007) identifies a wide range of "alarming" metaphors observed in the posters produced by the environmental organisation Greenpeace (e.g., THE CLIMATE CRISIS AS A TIME BOMB). Pérez-Sobrino (2013) investigates the advertisement of environmentally-friendly marketed products and notices the prevalence of the colour green to represent the products as desirable items (i.e., GREEN AS DESIRABLE). Indeed, visual realisations of climate crisis metaphors have been mainly documented for their ideological functions. Deignan (2017) adopts a different approach: she analyses scientific graphs and diagrams and establishes that associated verbal metaphors guide the readers to interpret these visual representations.

The present study draws on these existing findings, particularly in relation to the educational function of climate crisis metaphors (section 2.1.) realised visually (section 2.3.) in two different regions of the world (Global South-Global North, section 2.2.). Notably, this study relies on previous findings regarding the disambiguation enabled by visual realisations of climate crisis metaphors in educational videos produced in English (Augé, 2022a). In this context, metaphors can act as a major "popularisation technique" (Manca and Spinzi, 2022). Such findings emerge from the

analysis of verbal occurrences of the metaphorical expressions "the greenhouse effect" and "carbon footprint" in a corpus of 742 newspaper articles published in the UK. This corpus analysis of verbal metaphors casted light on conceptual ambiguity regarding the characteristics of the source concepts (e.g., the "greenhouse" as "glass layer" or as a "trap"; the "footprint" as a "(in)visible" or "deep" imprint). This corpus analysis was thus supplemented by the analysis of visual realisations of such metaphors in 27 educational videos: it was established that the educational scope of such videos would limit ambiguous representations of the source concepts (Augé, 2022a). Manca and Spinzi (2022: 20) also demonstrated that the urgent need for positive change was particularly visible in educational videos aimed at young children, which prompts the audience to adopt sustainable attitudes. Results show that educational videos effectively disambiguate the metaphorical conceptualisations: visuals insist on the heat provided by the GREENHOUSE, whose glass walls eventually increase temperatures. They also insist on the human origins of the FOOTPRINT (notably, through cartoonish representations of Western male figures; see Augé, 2022a; 2023). Therefore, the present study aims to uncover whether such a disambiguation process is also at play in Chinese educational videos representing metaphorical and non-metaphorical environmental concepts.

3 Methodology

Our research started on the Chinese (Mandarin) electronic corpus Chinese OPUS (Traditional and Simplified), accessed through SketchEngine (Kilgarriff, 2014). This research aimed at testing the metaphoricity of the Chinese expressions related to the English metaphorical expressions "greenhouse effect" and "carbon footprint". Accordingly, we relied on the search terms **温室效应** wēn shì xiào yìng ("greenhouse effect"), **二氧化碳** èr yǎng huà tàn ("carbon") and **脚印** jiǎo yìn ("footprint"). However, the concordance of "carbon" and "footprint" yielded no result. The electronic corpus displayed a total of 10.391 occurrences of "**温室效应**" ("greenhouse effect"), showing the relevance of the metaphorical expression in the Chinese corpus. In addition, the electronic corpus displayed a total of 2,564 occurrences of the expression "**二氧化碳排放量**" ("the amount of emitted carbon") within a total of 6,257 occurrences of "**二氧化碳**" ("carbon"). The lack of results showing concordances of "carbon" and "footprint",

supplemented by the repetitive concordance of "carbon" and "amount of emissions", led us to conclude that the English metaphorical expression "carbon footprint" had no metaphorical equivalent in Chinese Mandarin (see Katan, 2004). We thus relied on the search terms "**温室效应**" ("greenhouse effect") and "**二氧化碳排放量**" ("the amount of emitted carbon") in the remainder of our research. The relevance of these two expressions in Chinese climate crisis discourse has also been informally discussed with Chinese native speakers at the University of Shanghai (China) and at the Catholic University of Louvain (Belgium).

The exploitation of a similar metaphor ("greenhouse effect") in English and Chinese languages highlights a need to de-complexify the target concept in both languages. However, the Chinese language relies on a non-metaphorical expression to describe the concept "carbon footprint", exploited metaphorically in English texts. We can thus speculate that Chinese (Mandarin) communities are familiar enough with the target concept (i.e., the impact of carbon pollution) to describe it through literal expressions. This led us to wonder about the visual realisations of such a non-metaphorical concept in educational videos: the targeted audience of such videos (i.e., children) may not be familiar with climate concepts in the same way Chinese adults may be. Because of this lack of familiarity, video producers may rely on visual metaphors to explain this non-metaphorical concept. In addition, these different degrees of metaphoricity observed in English and Chinese expressions also led us to analyse the visual realisations of the metaphorical expression "greenhouse effect". This analysis aims to possibly establish different educational strategies (see Manca and Spinzi 2022) in the use of visual metaphors in English and Chinese videos.

The analysis of educational videos is favoured over other visual realisations (e.g., cartoons). Particular attention has been paid to the semantic interrelation existing between visual and verbal realisations of the environmental concepts: educational videos can display explicit (verbal) explications of the concept that is being represented visually. In other words, the metaphorical conceptualisation of the visual concept may be "flagged" (Šorm and Steen, 2018) visually and-or verbally in videos. We rely on the video platform Youtube[1] to select these videos: this platform is favoured because it warrants longer access to the selected videos[2]. In

[1] The URLs of the selected videos are provided at the end of this paper,

[2] As part of this research was conducted outside China, exclusive reliance on Chinese, national platforms would have eventually prevented us from finalising the research.

addition, this research is part of a large-scale project (ongoing) that aims at comparing visual metaphors of the climate crisis in different languages. The international relevance of Youtube thus helps to provide enough ground for comparison with visual metaphors realised in other languages. We rely on the search terms "温室效应" ("greenhouse effect") and "二氧化碳排放量" ("the amount of emitted carbon") to access educational videos.

During the selection process, we pay particular attention to the audience targeted by these videos: such indications may be found in the descriptions of the videos and-or in the content, with visual representations of cartoonish child figures or verbal indications of a child's voice. The average time of the selected videos is 3:51 minutes (shortest video: 1:23 minutes; longest video: 6:47 minutes). Overall, 16 educative videos have been selected for the purpose of this research.

The visual and verbal representations associated with the two expressions are analysed following the procedures established by VISMIP (Šorm and Steen, 2018). VISMIP is a procedure to identify visual metaphors, its steps can be summarised as follows:

1. look at the entire image, including visual and verbal elements, to establish a general understanding of the meaning;
2. structure descriptive phrase(s);
3. find incongruous visual units;
4. test whether the incongruous units are to be integrated within the overall topical framework by means of some form of comparison;
5. test whether the comparison(s) is-are cross-domain;
6. test whether the comparison(s) can be seen as some form of indirect discourse about the topic (Šorm and Steen, 2018).

This procedure leads us to identify a large range of visual source concepts (discussed in the following sections), which are exploited by video producers to represent the metaphorical ("greenhouse effect") and non-metaphorical ("the amount of emitted carbon") expressions. Considering this variety of visual source concepts, we aim at analysing the educational strategies at play in the realisation of such visual metaphors. The videos have then been analysed following the methodology established in Critical Metaphor Analysis (Charteris-Black, 2004) 1. Identification, 2. Interpretation, 3. Explanation. In the identification phase, we conduct the VISMIP procedure. In the interpretation phase, we consider how the source concepts are represented in relation to the target concepts. In the explanation phase, we focus on the context to analyse how the visual metaphors can guide the audience's understanding of the climate crisis.

We thus propose a qualitative analysis of the visual metaphors identified in educational videos. The nine videos discussed below illustrate the variety of visual source concepts along with the variety of educational strategies performed through the use of visual metaphors.

4 The "greenhouse effect" in Chinese educational videos

Our first observation from the educational videos included in our dataset concerns the reliance on the source domain GREENHOUSE presented through its "literal" features that is, a plant container. Indeed, three videos rely on pictures or drawings representing a "literal" greenhouse with glass walls. Rather, these visuals function as similes (or direct metaphors, Steen et al., 2010) that clearly compare the two CONTAINERS (the greenhouse and the Earth). These similes indicate that the video producers avoid the production of an "indirect" metaphor (Steen et al., 2010). Indeed, a simile or direct metaphor involves a "tuning device" (Cameron and Deignan, 2003) such as "like", "as" or "equivalent to" to emphasise the figurative meaning of an expression. In contrast, an indirect metaphor guides the audience to perceive the target domain in terms of the source domain (i.e., the target domain *is* the source domain). In visual realisations of a metaphor, a direct metaphor is perceived through pictures of the source domain (i.e., a literal greenhouse) and pictures of the target domain (i.e., the Earth) subsequently represented through their respective identifying features (i.e., a plant container and the Earth). Alternatively, an indirect metaphor in visual representations is perceived through pictures presenting some aspects of the source and some aspects of the target domains (Forceville, 1996; see below). Therefore, in the three videos that represent a "literal" greenhouse, the production of a visual simile might be justified by the video producers' aim at preventing the audience from misunderstanding the metaphorical mapping at play. The videos are addressed to viewers who may not have enough experiential knowledge of the referents of the source and target domains (i.e., children). Alternatively, the indirect realisation of the metaphor (i.e., the target domain *is* the source domain) may not be considered explicit enough to help children understand the environmental concept. To overcome such a conceptual complexity, the video producers thus choose to rely on visuals which explicitly represent the ground of the metaphorical mapping.

Another category of visual representations provides more indications regarding the educational strategies at play in the use of visual metaphors. Indeed, in two videos included in our dataset, drawings of the planet can be observed: the planet is represented surrounded by a circle identified (verbally) as the atmosphere. The visual source concept provides concrete and visible characteristics to the ATMOSPHERE AS A SURROUNDING CIRCLE. These characteristics are supplemented by the visual realisations of different types of ARROWS, representing the gases (verbal indications). These ARROWS can either emerge from the background and are prevented from ENTERING THE CIRCLE (Figure 1), or they can arise from within the CIRCLE and are prevented from EXITING THE CIRCLE (Figure 2).

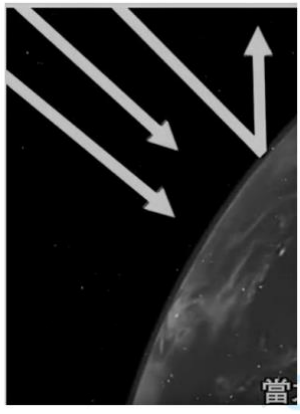

Figure 1. GREENHOUSE EFFECT AS CIRCLE-ARROWS
Source【暖化戰爭首部曲】溫室效應原理 https://www.youtube.com/watch?v=-R5fsnZKNIE

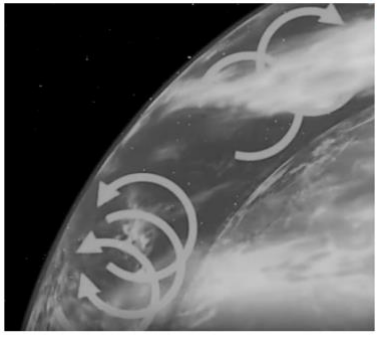

Figure 2. GREENHOUSE EFFECT AS CIRCLE-ARROWS - Source【暖化戰爭首部曲】溫室效應原理 https://www.youtube.com/watch?v=-R5fsnZKNIE

The visual metaphors convey different representations of the "greenhouse effect": in Figure 1, the video producers focus on ARROWS oriented outward, which insists on the human-made origin of the gases (GREENHOUSE GAS EMISSIONS AS A MOVEMENT FROM THE EARTH TO THE ATMOSPHERE). In Figure 2, the video producers focus on the ARROWS oriented inward, showing the impact of greenhouse gas emissions (THE GREENHOUSE EFFECT AS A TRAP FOR THE EARTH). Therefore, in Figure 1, the scope remains educational because the visual metaphor is exploited to make the direction of gas emissions visible. In contrast, in Figure 2, the educational scope may be associated with an argumentative scope (Augé, 2023) because the visual metaphor highlights the impossibility for the gases to EXIT THE CIRCLE. This impossibility to EXIT may thus lead children to recall possible experiences of being trapped. The visual source concept TRAP implied in the video may thus emphasise the negative characteristics of the greenhouse effect. Such visual realisations of the metaphorical expression "greenhouse effect" still rely on the characteristics at play in the verbal metaphor: they visually represent the concrete, visible, and solid features of the "greenhouse" represented as a CIRCLE, while the ARROWS serve to represent the (LACK OF) MOVEMENTS of the gases once they are emitted from the Earth.

In one of the videos, the gases are represented as YELLOW AND RED DOTS emerging from animated pictures of cars and factories. The animation illustrates how the GASES AS DOTS remain around the urban area, metonymically represented through cars and factories (Figure 3).

Figure 3. GREENHOUSE EFFECT AS CONVERGING DOTS - Source 监测大气以减少城市温室气体排 **放** https://www.youtube.com/watch?v=1VROhSgtS7k

This video shows that the DOTS progressively converge on top of the illustrated buildings and their animated movements demonstrate the impossibility for the DOTS to "fly away". Hence, this visual metaphor represents the atmosphere or the sky as a physical barrier preventing the DOTS from leaving the urban area. Like in Figure 2, the educational scope of the video merges with an argumentative scope: the urban area transforms into a CONTAINER OF DOTS, leading to presuppositions regarding the interrelation between continuous emissions of GASES-DOTS and the CONTAINING CAPACITY OF THE CONTAINER. In this video (Figure 3), the video producer thus focuses on the representation of the greenhouse effect as a long-term threat, by showing to children how a large number of DOTS may eventually lead the CONTAINER to overflow. In addition, the visible characteristics attributed metaphorically to the gases reinforce this visual representation of the danger: as the number of COLOURED DOTS increases, the pictures of cars and factories (which may represent a familiar environment to children) fade away. Ultimately, the continuous emissions of DOTS result in the disappearance of the urban area. Therefore, while the colours applied to the DOTS may seem appealing to young children, the video insists on the danger of excessive emissions. It is to be noted that this visual metaphor also resonates with the verbal metaphor, as both representations involve the conceptualisation of the atmosphere as a CONTAINER.

Another metaphorical realisation identified in the educational videos relies on a different, yet related, source concept to illustrate the greenhouse effect. In one video, a drawing of the planet can be observed. This video places the representation of the planet within a GLASS BOTTLE closed by a WOODEN LID (Figure 4).

Figure 4. GREENHOUSE EFFECT AS A GLASS BOTTLE-WOODEN LID - Source 104-9-2 **溫室效應** https://www.youtube.com/watch?v=HtvX17cn__c

The GLASS BOTTLE attributes transparent and solid characteristics to the atmosphere. Like in the videos previously discussed, the greenhouse effect is represented as a CLOSED CONTAINER TRAPPING the planet. In particular, the WOODEN LID visually insists on the "trapping" characteristics of the greenhouse effect. On the one hand, the source concept GREENHOUSE transforms into the visual source concept GLASS BOTTLE, as children may have more experiences with the latter than the former source concepts. Such experiences may lead them to better understand the containing and trapping characteristics of the greenhouse effect. On the other hand, this visual metaphor serves an argumentative function because it relies on the unmatching features of the source and target concepts: a BOTTLE is too small to contain the EARTH. These unmatching features are visually exploited to further characterise the greenhouse effect as a SMALL CONTAINER in which the Earth is trapped. Therefore, the BOTTLE may not only echo children's experiences, but also visually represents the incongruity: just like a greenhouse is to contain plants and not humans (Augé, 2022b), the BOTTLE is to contain liquids and not the planet. The educational purpose of the video thus leads the video producer to exaggerate, visually, the arguments derived from the verbal metaphor. In addition, the representation of the WOODEN LID may be analysed from an argumentative scope. It presupposes that REMOVING THE LID would help humans (inhabiting the planet) to access fresh air (outside the BOTTLE-GASES). This presupposition relies on the audience's experiential knowledge to implicitly refer to a typical action that individuals can take to solve this incongruity. This metaphor may thus also visually represent the solution to avert the greenhouse effect: climate actions. Although the danger is visually emphasised, the WOODEN LID represents climate actions as an easy task. This contrast between danger and simple solutions may ultimately encourage children to engage, in the future, in a more sustainable lifestyle.

Interestingly, the visual metaphors related to the "greenhouse effect" in the selected educational videos all seem to insist on the TRAPPING characteristics of the gases. Such visual characteristics help video producers to represent the greenhouse effect as a danger associated with excessive emissions. Therefore, the focus is on the cause (e.g., OUTWARD MOVEMENT OF THE ARROWS) and consequences (e.g., OVERFLOWING CONTAINER) of the greenhouse effect. Accordingly, the metaphorical meaning has been adapted to the topic of discourse (the climate crisis) to visually convey dangerous (trapping) characteristics to the

source concept GREENHOUSE. Indeed, this danger may not be perceptible in visual representations of a direct metaphor such as THE EARTH IS LIKE A GREENHOUSE. Educational videos thus adapt the representations of the source concept to inform children that the greenhouse effect needs to be controlled and averted. Another surprising finding is related to the lack of visual representation of the warmth contained in the GREENHOUSE. This lack of representation may be explained by the educational function of the videos: children may better understand the danger in terms of being trapped, while they do not have sufficient experience of temperature increase to perceive such temperatures as a danger.

In the following section, we investigate the metaphorical representations of the non-metaphorical concept **二氧化碳排放量** ("the amount of emitted carbon") in Chinese educational videos.

5 The "amount of emitted carbon" in Chinese educational videos

Considering the non-metaphorical meaning of the expression **二氧化碳排放量** ("the amount of emitted carbon"), our search for visual metaphors representing this concept leads us to observe instances where the concept is not metaphorically represented. For instance, in eight videos, the "amount of emitted carbon" is illustrated through geographical maps with colour codes (green and red) which establish the different amounts of carbon emissions in different countries. We can speculate that the use of colour codes on maps is a conventional strategy to illustrate national differences. We might also perceive the metaphorical meaning of such colour codes in the context of the climate crisis. Accordingly, GREEN represents LOW AMOUNT OF EMITTED CARBON while RED represents HIGH AMOUNT OF EMITTED CARBON. Yet this metaphorical meaning may not be grasped by children as this colour code echoes the discourse history (Zinken, 2007) associated with the metaphor GREEN AS DESIRABLE (Pérez-Sobrino, 2013). Children may still perceive the metonymical meaning of the green colour, which is a colour that can be displayed by environmental resources. Such colour codes might thus help children to distinguish "environmentally-friendly" countries from "non-environmentally-friendly" countries. Consequently, such videos do not offer metaphorical representations of the concept "amount of emitted carbon", but they focus on the reason why such an amount needs to be

calculated. However, Chinese children may also perceive the red colour positively, considering the prevalent ideological use of red in Chinese politics (Priestland, 2009). Eventually, such videos lead children to reflect on the distinction made by the United Nations between Global South and Global North countries, but they do not convey any explanation regarding the characteristics of carbon emissions.

Despite the non-metaphorical conceptualisation of "the amount of emitted carbon", our dataset includes three videos which rely on visual metaphors to represent the concept.

For instance, one educational video explicitly refers to the English metaphorical expression "carbon footprint". This video displays a "literal" footprint to illustrate the amount of carbon emissions. The reference to English sources is mentioned by the Chinese speaker who relies on the visual source concept FOOTPRINT to explain the content of a scientific report produced in English. This visual metaphor is thus conceived as a case of metaphorical translation rather than a metaphorical adaptation in the Chinese visual language. This reliance on a foreign source concept may be ideologically oriented: the video producer informs children that the findings produced in this report are not applicable to the Chinese context. Therefore, the visual metaphor represents the "amount of emitted carbon" through a national lens. The lack of visual representation of the concept to describe the Chinese context may ultimately lead children to believe that such a "carbon footprint" only concerns English individuals.

In one of the videos, "the amount of emitted carbon" is pictured as ANGRY BLACK CLOUDS emerging from pictorial representations of factories (Figure 5).

Figure 5. CARBON EMISSIONS AS AN ANGRY CLOUD - Source 麥兜低碳動畫系列 - 個人可以做什麼 URL: https://www.youtube.com/watch?v=xfxAzVNLVhs

This visual metaphor first conveys a visible feature to the target concept (i.e., carbon). Accordingly, the video producer insists on the fact that the emitted carbon remains in the atmosphere or in the sky (i.e., a CLOUD). This conceptualisation is reinforced by the personification of CARBON as an ANGRY INDIVIDUAL, which suggests that the CLOUDS appear to achieve mischievous actions. This ANGRY FACE also attributes human characteristics to the target concept, which can metaphorically insist on the human origins of carbon emissions. Therefore, this visual metaphor combines educational and argumentative functions: on the one hand, it explains the impact of (invisible) carbon emissions which, when excessed, transform into an accumulation of BLACK CLOUDS. This resonates with children's experiential knowledge as they may associated black clouds with forthcoming rain or even storms. The source concept thus enables the video producer to represent the disadvantageous consequences of carbon emissions which may ultimately lead to "bad weather". This representation of excessive carbon emissions as BLACK CLOUDS may yet lead children to believe that the impact of carbon pollution remains punctual, just like bad weather. It can be inferred that this characteristic of the source concept is accounted for in the visual metaphorical mapping: the video producer may visually encourage children to aim for sunnier weather (which may follow rain and storms). It can thus be perceived as a way for the video producer to promote hope for better environmental conditions. Yet this visual metaphor may not teach children about humans' responsibility to act upon the climate crisis, as children may not perceive the human influence on the weather. As a result, children may consider that the CARBON-BLACK CLOUDS will disappear on its own, reflecting on their experiential knowledge of weather conditions. On the other hand, this video also fulfils argumentative purposes. This argumentative function is mainly observed through the ANGRY FACE OF THE CLOUD, which assigns mischievous intentions to the visual figure. Accordingly, this human facial expression helps children to perceive the underlying negative emotions of the humanised CARBON-CLOUD. The visual metaphor relies on an effective metonymical (i.e., PART FOR THE WHOLE) representation: FACE FOR (NEGATIVE) EMOTIONS. These negative characteristics are emphasised through the colour black (Forceville, 1996). Eventually, this visual personification transforms the emitted carbon into a MONSTER. The carbon is thus represented as a typical mischievous figure which children are used to fear (e.g., like the monsters in fairy tales).

The target concept is thus metaphorically represented to insist on the need to control emissions, through adapted references to the audience's experiences and knowledge. Such a visual metaphor provides persuasive arguments that may lead children to limit carbon emissions in the future. However, the human-made origin of the MONSTER is not explained and its mischievous impacts on the planet are not represented. Therefore, this visual personification mainly aims at representing the danger of carbon emissions, but it does not address the risks and responsibility involved in carbon pollution.

Another visual metaphor that has been identified in the educational videos included in our dataset represents the amount of emitted carbon through the visual source concept HOURGLASS (Figure 6).

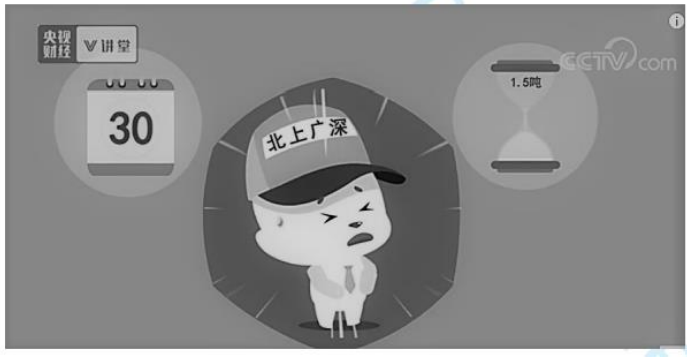

Figure 6. CARBON EMISSIONS AS AN HOURGLASS-ANGRY CHILD - Source 《央视财经V讲堂》今天 你的碳排放量超标了吗？20190706 | CCTV财经 https://www.youtube.com/watch?v=K2D2Auk3KIs

This metaphorical HOURGLASS is filled with sand whose amount within the UPPER and LOWER PARTS OF THE HOURGLASS is established with reference to different numbers indicating the increase of "the amount of emitted carbon". The visual metaphor thus also combines educational and argumentative strategies. The materialisation of carbon emissions as SAND IN AN HOURGLASS represents the accumulation of carbon emissions through a concrete source concept: like in Figure 5, carbon does not disappear, but it adds up to past carbon emissions. The HOURGLASS also suggests limited time. Accordingly, time is measured in terms of the amount of emitted carbon. This visual metaphor of TIME and CARBON EMISSIONS, along with the visual representation of the accumulated

carbon emissions as SAND, implicitly alerts children to the effects of pollution on humans' time on the Earth. The danger of emitted carbon is not represented through visual source concepts which may typically be related to children's conceptualisation of danger (like in Figure 5). Instead, the visual metaphor represents the urgency to control and limit emissions. It follows that the actual danger comprised in excessive carbon emissions is only implied: human extinction. The video producer thus relied on this visual metaphor to incite children to control pollution, while carefully avoiding showing children the ultimate consequences of a lack of control. Although children may not be faced with the consequences of this time limit in the educational video, this visual metaphor may help them to understand that adding too much SAND within the HOURGLASS will lead to stricter time limit until the HOURGLASS-CONTAINER overflows. This educational video thus involves major environmental arguments. For instance, the HOURGLASS is represented next to a child, whose face looks gradually angrier as the SAND flows. The evolution of the child's face creates a causal link between the time limit, the amount of emitted carbon, and the child's negative emotions. This visual metaphor thus also involves representations of the impact of pollution on the audience's feelings.

Additionally, the argumentative scope of the video resides in the implications conveyed through the visual metaphor: children are left to imagine the consequences of this time limit (represented by the HOURGLASS). This audience may not have the knowledge required to imagine solutions or large-scale environmental impacts. This implicit characteristic of the visual metaphor may ultimately aim at warning children of the risks of inaction: this educational video relies on a visual metaphor that draws on the prospective consequences of continuous emissions.

Overall, the educational videos that metaphorically represent the "amount of emitted carbon" focus on particular characteristics of the concept. Such characteristics are emphasised to teach children about the danger represented by the concept. Accordingly, the visual metaphors discussed in this section do not aim at explaining or illustrating carbon emissions. These videos include the concept within the broader topic of the climate crisis, which ultimately lead video producers to represent carbon emissions as the cause of the crisis. Therefore, in our dataset, the visual metaphors associated with this concept are argumentatively exploited to help children to characterise carbon emissions as bad. Carbon emissions are exclusively represented in terms of their consequences on the planet.

6 Discussion and concluding remarks

6.1 Summary

Our research has demonstrated that Chinese educational videos rely on a variety of source concepts to metaphorically represent the expression "greenhouse effect" (**温室效应** wēn shì xiào yìng) and the non-metaphorical expression "the amount of emitted carbon" (**二氧化碳排放量** èr yǎng huà tàn pái fàng liàng).

With attention paid to the particularities of the Chinese visual representations of the two expressions, our research has demonstrated a focus on the urgency to solve the issue expressed through the use of visual source concepts. For instance, the "greenhouse effect" can be represented through the picture of a planet CONTAINED in a GLASS BOTTLE closed by a WOODEN LID (i.e., the greenhouse effect as a trap). Regarding the non-metaphorical Chinese expression "the amount of emitted carbon", its metaphorical representations in educational videos similarly emphasise the danger. For instance, the carbon can be personified as an ANGRY BLACK CLOUD threatening urban areas. Carbon emissions can also be represented through the source domain HOURGLASS which draws on presuppositions regarding the time limit and the amount of emitted carbon.

6.2 Contrastive views on English and Chinese metaphors in educational videos

In comparison with the English visual realisations of the metaphorical expressions "greenhouse effect" and "carbon footprint" (Augé, 2022a; 2022b; 2023), the Chinese visual metaphors rely on source domains which aim at warning children about the need to control the target concepts (i.e., greenhouse gases and carbon pollution, respectively). First, the English representations of the "greenhouse effect" demonstrate a focus on the heat provided by the greenhouse. Notably, English video producers represent a literal greenhouse gradually becoming red or orange. They rely on drawings of thermometers showing that temperatures increase as a result of the increase of emitted gases (represented as arrows or grey smoke). They also represent the plants contained within the greenhouse, with comparative images of flourishing plants and dying plants. Therefore, in English educational videos, the visual representations of the "greenhouse effect" insist on the temperature increase. This conceptualisation is altogether

missing in the Chinese educational videos included in our dataset. In contrast, these videos represent the greenhouse effect as a trap. It has been argued that, considering the audience targeted by these educational videos, the representation of the danger as a TRAP may effectively draw on children's experiential knowledge. The representation of the danger in terms of temperature increase may still be more accurate, but children may not have the experiential knowledge required to conceptualise heat as a danger.

Second, with regards to the metaphorical representations of the concept "carbon footprint" in English videos, findings (Augé, 2022a; 2023) show that educational videos rely on the source concept FOOTPRINT to visually insist on the human origin of carbon emissions. However, only one educational video produced in English insists on the negative characteristics of the concept. Such a video included the visual concept FOOTPRINT within a detective storyline. In contrast, the analysis of Chinese educational videos related to the non-metaphorical concept "the amount of emitted carbon" demonstrates that visual metaphors are exploited to insist on the identification of carbon emissions as a danger. Video producers reflected on children's experiential knowledge to represent carbon emissions as a MONSTER. However, it has been argued that such videos may not reflect the human responsibility to control the MONSTER. For instance, one visual metaphor associates the amount of emitted carbon with time limit, through the visual concept HOURGLASS. Such a visual metaphor effectively draws on presuppositions regarding the impact of this time limit.

However, children are never presented with visual metaphor depicting the impact of decreasing amount of emitted carbon. One the one hand, English videos can effectively teach children about human responsibilities, although carbon emissions are not explicitly represented as a threat. On the other hand, Chinese videos emphasise the threatening characteristics of this amount of emitted carbon, but they do not focus on preventive actions.

Third, in English and Chinese educational videos, visual metaphors both serve educational and argumentative functions. On the one hand, visual metaphors materialise invisible concepts (gases) into visible, concrete source concepts (arrows, clouds, colour codes). This materialisation eventually shows that, despite the invisible characteristics of the gases, the gases remain in the atmosphere and affect the population in different ways (i.e., heating or trapping the planet). On the other hand, the educational videos included in our dataset can focus on the representation of prospective consequences of excessive pollution (e.g., the HOURGLASS). Such representations of the future damaging consequences of the climate

crisis aim at inciting children to conceive the gases as dangerous for the planet. The materialisation of this danger in the videos provides effective environmental arguments, but it also limits the explanation of the causal links existing between industries and pollution.

The Chinese reliance on argumentative visual metaphors can be justified by the population's particular experience of the phenomenon in this country (United Nations Framework Convention on Climate Change, 2019). Indeed, China has been particularly affected by pollution and by warming temperatures (Chinese Academy of Sciences, 2019). Chinese video producers may have had more concrete experiences of the danger in comparison with English video producers. Therefore, Chinese video producers may also aim at preparing the younger generation for such extensive environmental impacts. This varying environmental impact across countries effectively leads to varying conceptualisation of the climate crisis.

6.3 Implications for translation studies

Metaphor scholars have documented the complexities involved in the translation of metaphorical expressions (He et al., 2022; Meyers, 2019), since metaphors inherently involve conceptualisations that are particular to a specified lingua-culture (Sharifian, 2017). Yet, in the global context of the climate crisis, not only metaphors are required to support public understanding of the phenomenon (Deignan et al., 2017), but their translation *between* cultures (Katan, 2004) is also needed to support international dialogues about the crisis (Augé, 2023).

The contrastive views on the climate crisis observed in the metaphors used in English and Chinese educational videos exemplify the scale of the challenge that needs to be addressed by translators. The need for international dialogues between the Global South and the Global North notably involves translation techniques that take into account different linguistic models and traditions, different values, and different conceptualisations (Katan, 2004). This consideration is even more relevant in the context of the global climate crisis where the topic of discourse presents different characteristics in each lingua-culture: the Global South may attribute much more concrete characteristics to the climate crisis (because of the communities' extensive experiences of the phenomenon), compared with the characteristics attributed by the Global North (which has more limited experiences of the phenomenon; United Nations Framework Convention on Climate Change, 2019).

Such distinctions may still need to be emphasised in translation so as to prevent recipients of target texts from believing that the climate crisis has comparable effects in different regions of the world. Katan (2020) addresses this challenge by suggesting that translators need to "highlight differences" (2020: 4) to avoid reinterpreting voices through limiting cultural filters. This argument is particularly relevant for the representation of the Global South, whose voices have been silenced in climate crisis communication (Greenpeace and the Runnymede Trust, 2022). In order to alert the Global North to the environmental threats suffered by the Global South, international dialogues may rely on Venuti's approach to "resistance translation" (2008). Resistance translation is designed to upset the receiving culture's point of view by preserving some "discontinuities at the level of syntax, diction, or discourse which allow the translation to be read as a translation" (2008: 21). With a focus on metaphors, resistance translation may thus involve a reliance on conceptual mappings that are unfamiliar to the target audience.

Drawing on this assumption, one can wonder whether the metaphor would still fulfil its educational function. Katan (2020: 5) warns that resistance translation would lead to less accessible texts. For instance, in section 5, we discussed the lingo-cultural relevance of the colour red (Priestland, 2009) observed in visual metaphors occurring in Chinese videos. Katan (2020: 2) claims that colours and graphics are often modified to meet local cultural norms. In such cases, this modification would effectively downplay the discontinuities characterising resistance translation. Another possible strategy to avoid such cultural filters may involve the transformation of visual metaphors into visual similes (section 4), that would possibly allow translators to explicate the conceptual mapping at play.

However, such considerations significantly overlook the particularities of the target audience addressed in educational videos (young children). Educational videos may still favour accessible messages and metaphors (Manca and Spinzi, 2022) and may not systematically address lingo-cultural differences. It is yet argued that the combination of different modes of realisation (visual, verbal, audial, gestural) may represent major tools that can support accessible translation and representation of communities' voices.

7. Concluding remarks

The analysis of metaphors in educational videos that represent the "greenhouse effect", the "carbon footprint", and the "amount of emitted carbon" in Chinese and English videos leads us to reflect on the international relevance of the climate crisis as a topic of discourse. Our findings effectively show that conceptual variations in the production of metaphors may not be limited to linguistic or cultural differences (Kövecses, 2005), or political ideologies (Musolff, 2016), but they also echo major differences in experiential knowledge. The particularities of the visual metaphors observed in the Chinese educational videos emphasise the population's concrete experiences of the climate crisis. Such videos also demonstrate the population's anxiety regarding the evolution of the climate crisis. In addition, this study establishes the conceptual disambiguation permitted by the analysis of visual metaphors (Deignan, 2017; Forceville, 1994; 1996; Šorm and Steen, 2018). Accordingly, visual metaphors may insist on the ground of the conceptual mapping and its relevance within a particular context of discourse. In contrast, verbal metaphors which are "constitutive" (Nerlich and Hellsten, 2014) of such discourse may not be systematically exploited to guide recipients' understanding.

We conclude that more research is needed to compare the metaphors produced in different languages and cultures. The identification of conceptual differences may eventually impact international dialogues. These international dialogues are particularly significant as they help to reach international agreements regarding the global climate crisis.

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Data availability
Educational videos (last accessed December 13, 2022)

Greenhouse effect (温室效应)

GREENHOUSE simile:
https://www.youtube.com/watch?v=QpAoa4Wcfts
CIRCLE AND ARROWS:

https://www.youtube.com/watch?v=-R5fsnZKNIE
https://www.youtube.com/watch?v=NhusuZFn-MM
COLOURED DOTS:
https://www.youtube.com/watch?v=1VROhSgtS7k
GLASS BOTTLE AND WOODEN LID:
https://www.youtube.com/watch?v=HtvX17cn__c

Amount of emitted carbon (二氧化碳排放量)
COLOUR CODES:
https://www.youtube.com/watch?v=-HCDV3Wn3v4
FOOTPRINT:
https://www.youtube.com/watch?v=Pdv2XcA2HF4
ANGRY BLACK CLOUD:
https://www.youtube.com/watch?v=xfxAzVNLVhs
HOURGLASS:
https://www.youtube.com/watch?v=K2D2Auk3KIs

References

Atanasova, D., and Koteyko, N. 2017. Metaphors in The Guardian Online and The Mail Online Opinion-page Content on Climate Change: War, Religion, and Politics. *Environmental Communication* 11(4), 452-469.

Augé, A. 2019. How Metaphor Scenarios Can Reveal Socio-cultural and Linguistic Variations of Meaning: A Cross-linguistic Perspective on the "NURTURING PARENT" and the "STRICT FATHER" Frames. *Metaphor and Symbol*, 34 (4), 209-228.

Augé, A. 2022a. How Visual Metaphors Can Contradict Verbal Metaphors: A Crosslinguistic and Multimodal Analysis of the IMPRINT of Climate change. *Metaphor and the Social World* 12(1), 1-22.

Augé, A. 2022b. From Scientific Arguments to Scepticism: Humans' Place in the GREENHOUSE. *Public Understanding of Science* 31(2), 179-194.

Augé, A. 2023. *Metaphor and Argumentation in Climate Crisis Discourse*. Routledge.

Cameron, L., and Deignan, A. 2003. Combining Large and Small Corpora to Investigate Tuning Devices around Metaphor in Spoken Discourse. *Metaphor and Symbol* 18(3), 149-160.

Charteris-Black, J. 2004. *Corpus Approaches to Critical Metaphor Analysis*. Palgrave Macmillan.

Chinese Academy of Sciences. 2019. The State of China's Climate in 2018. https://phys.org/news/2019-09-state-china-climate-extreme-events.html

Deignan, A. 2017. Metaphors in Texts about Climate Change. *Ibérica*, 34, 45-66.

Deignan, A., et al. 2019. Metaphors of Climate Science in Three Genres: Research Articles, Educational Texts, and Secondary School Student Talk. *Applied Linguistics*, 40(2), 379-403.

Doyle, J. 2007. Picturing the Clima(c)tic: Greenpeace and the Representational Politics of Climate Change Communication. *Science as Culture*, 16(2), 129-150.

Flusberg, S.-J., et al. 2017. Metaphors for the War (or Race) against Climate Change. *Environmental Communication* 11(6), 769-783.

Forceville, C. 1994. Pictorial metaphor in advertisements. *Metaphor and Symbolic Activity* 9(1), 1-29.

Forceville, C. 1996. *Pictorial Metaphor in Advertising*. Routledge.

Gattey, E. 2021. Global Histories of Empire and Climate in the Anthropocene. *History Compass* 19(8), 12683.

Greenpeace and the Runnymede Trust. 2022. Confronting Injustice: Racism and the Environmental Emergency. www.greenpeace.org.uk/

He, S., et al. 2022. Translating Cognitive and Linguistic Metaphors in Popular Science: A Case Study of Scientific Discoveries. *transLogos*, 5(2), 1-26.

Hidalgo-Downing, L., and O'Dowd, N. 2023. Code Red for Humanity: Multimodal Metaphor and Metonymy in Noncommercial Advertisements on Environmental Awareness and Activism. *Metaphor and Symbol*, 38(3), 231-253.

Katan, D. 2004. *Translating Cultures: An Introduction for Translators, Interpreters and Mediators*. London: Routledge.

Katan, D. 2020. Cultural Approaches to Translation. In Chapelle, C. (Ed.). *The Encyclopedia of Applied linguistics*. Wiley-Blackwell.

Kilgarriff, A. 2014. SketchEngine. www.sketchengine.eu.

Knudsen, S. 2003. Scientific Metaphors Going Public. *Journal of Pragmatics*, 35, 1247–1263.

Koteyko N. 2010. Mining the Internet for Linguistic and Social Data: An Analysis of "Carbon Compounds" in Web Feeds. *Discourse and Society* 21(6), 655–674.

Koteyko, N., et al. 2009. From Carbon Markets to Carbon Morality: Creative Compounds as Framing Devices in Online Discourses on Climate Change Mitigation. *Science Communication*, 32(1), 25-54.

Kövecses, Z. 2005. *Metaphor in Culture: Universality and Variation*. Cambridge: Cambridge University Press.

Kövecses, Z. 2010. *Metaphor: A Practical Introduction*. Oxford: Oxford University Press.

Manca, E., and Spinzi, C. 2022. A Cross-cultural Study of the Popularisation of Environmental Issues for a Young Audience in Digital Spaces. *Token: A Journal of English Linguistics*, 15, 19-46.

Meijers, M. et al. 2019. Using Visual Impact Metaphors to Stimulate Environmentally Friendly Behavior: The roles of Responses Efficacy and Evaluative Persuasion Knowledge. *Environmental Communication* 13(8), 995-1008.

Meyers, C. 2019. Difficulties in Identifying and Translating Linguistic Metaphors: A Survey and Experiment among Translation Students. *English Studies at NBU*, 5(2), 308-322.

Musolff, A. 2016. *Political Metaphor Analysis: Discourse and Scenarios*. Bloomsbury Academic.

Nerlich, B., and Hellsten, I. 2014. The Greenhouse Metaphor and the Footprint Metaphor: Climate Change Risk Assessment and Risk Management Seen through the Lens of Two Prominent Metaphors. *Technikfolgenabschatzung: Theorie und Praxis*, 23(2), 27-33.

Pérez-Sobrino, P. 2013. Metaphor Use in Advertising: Analysis of the Interaction between Multimodal Metaphor and Metonymy in a Greenwashing Advertisement. In Gola E., and Ervas, F. (Eds.), *Metaphor is Focus: Philosophical Perspectives on Metaphor Use*. Cambridge Scholar Publishing, 67-82.

Priestland, D. 2009. *The Red Flag: Communism and the Making of the Modern World*. Allen Lane.

Sachs, W. 1993. *Global Ecology: A New Arena of Political Conflict*. Fernwood Publishing.

Sharifian, F. 2017. *Cultural Linguistics: Cultural Conceptualisations and Language*. John Benjamins.

Šorm, E., and Steen, G. 2018. VISMIP: Towards a Method for Visual Metaphor Identification, in Steen, G. (Ed.), *Visual Metaphor: Structure and Process*. John Benjamins, 47-88.

Steen, G.-J. et al. 2010. *A Method for Linguistic Metaphor Identification*. John Benjamins.

United Nations Framework Convention on Climate Change. 2019. Communicating climate change: A practitioner's guide. https://unfccc.int/sites/default/files/resource/Communicating%20climate%20change_Insights%20from%20CDKNs%20experience.pdf

Venuti, L. 2008. *The translator's invisibility: A history of translation*. Routledge.

Zinken, J. 2007. Discourse metaphors: the link between figurative language and habitual analogies. *Cognitive Linguistics* 18(3), 445–466.