

Historical evidence for nature disconnection in a 70-year time series of Disney animated films

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Abstract

The assumed ongoing disconnection between humans and nature in Western societies represents a profoundly challenging conservation issue. Here, we demonstrate one manifestation of this nature disconnection, via an examination of the representation of natural settings in a 70-year time series of Disney animated films. We found that natural settings are increasingly less present as a representation of outdoor environments in these films. Moreover, these drawn natural settings tend to be more and more human controlled and are less and less complex in terms of the biodiversity they depict. These results demonstrate the increasing nature disconnection of the filmmaking teams, which we consider as a proxy of the Western relation to nature. Additionally, because nature experience of children is partly based on movies, the depleted representation of biodiversity in outdoor environments of Disney films may amplify the current disconnection from nature for children. This reduction in exposure to nature may hinder the implementation of biodiversity conservation measures.

Keywords

communication about nature, conservation of biodiversity, environmental generational amnesia, media, nature disconnection

1. Introduction

More and more people live in cities, and most children in Western countries grow up *ex natura*, as did their parents and grandparents (Miller, 2005). Fifty years ago, the vast majority of people had at least one relative involved in farming or had free access to a large natural area, but our rural origin is becoming both temporally and psychologically remote. Not only are people less likely to live near natural settings, they are also increasingly less likely to recreate in them (Myers, 2012;

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Pergams and Zaradic, 2008). They are less and less concerned about the interconnection between humans and the rest of the biosphere (Koger and Winter, 2010).

While people are living farther from actual experience with the natural environment, the prevalence of biodiversity as an issue on the political agenda and for the media audience is increasing. The term “biodiversity” is used here to focus on concerns about the current decrease and degradation of ecosystems and natural plant and animal species, almost entirely due to human activities (Rands et al., 2010). For example, in an analysis of the covers of *Time* magazine between 1923 and 2011, Meisner and Takahashi (2013) found that depictions of environmental issues and nature, almost always presented in terms of problems, have increased over the decades. In parallel, the Eurobarometer (2007) indicates that European people are aware of biodiversity and conservation issues. However, despite social discourses and individual awareness, biodiversity is still not integrated in individual everyday behaviors and practices (Davies et al., 2012).

This gap between intentions and actions may be related to individual intimate disconnection with nature (Clayton, 2003, 2012; Hinds and Sparks, 2008). Pyle (2003) speaks about the extinction of experience, Louv (2008) is concerned with a possible nature-deficit disorder, and Kahn (1999) has described environmental generational amnesia. All these authors use the term “nature” to describe living elements in our environment, i.e., plants, animals and micro-organisms. In the rest of this text, we use the term “green nature” to refer to this definition and this phenomenon.

In general, the possible decrease in nature-connectedness is a concern (Schultz et al., 2004) because of the possibility that it will also decrease concern about, and appreciation for, the health of the natural environment. Examining the historical reality of this nature disconnection is important in order to understand the basis of modern attitudes and consider possible interventions to strengthen the relationship between humans and nature, and consequently between human concern about biodiversity issues and challenges.

With a reduction in direct experiences in the natural environment, people’s experiences of nature are more reliant on the media. Despite the increased attention to the environment as a political or news topic, researchers have found reductions in media representations of the environment over time. McComas et al. (2001) found decreasing attention to depictions of the environment in non-news entertainment and fictional shows on television over just a 6-year period. Podeschi (2007) documented a reduction in the representation of natural settings (described as “the obviously ‘natural,’ like a wilderness landscape” (p. 304)) in general audience magazines between 1945 and 1980. The increasing distance from nature that is found even in the media can affect attitudes about environmental issues. In a study by Good (2009), heavy television viewing was negatively correlated with environmental attitudes among a sample of environmentalists. However, viewing of non-fictional television, which included things like nature documentaries, had no such effect. Meanwhile, there is evidence that including more depictions of nature in the media could have a positive impact: Smith and Joffe (2013) found that the visual images of global warming in the media, more than textual descriptions, seemed to affect public understandings of the topic.

The potential impact of a disconnection from nature is even more alarming when children are the audience. Attitudes, values, and concerns about the environment are strongly influenced by early experiences, and people’s tendencies to interact with nature may be largely set by the time they are adults (Chawla, 2009; Louv, 2008). Such interactions are decreasing. In previous decades, bored children might go outside and explore natural environments, but now entertainment is always available through videogames and social media. As a consequence, children have less knowledge about the natural world (Myers, 2012). Even in media directed toward children, nature is receding. A recent analysis of children’s books found decreased attention to nature over the period 1938–2008: using winners of the Caldecott award (a children’s book award) as their sample, the researchers found a reduced representation of natural environments and of wild animals over time (Williams et al., 2012).

In this study, we further explored recent historical evidence of nature disconnection in Western societies, by examining how natural environments are depicted in media. Because of their potential to reach a broad international audience, we were particularly interested in examining films. For films that are set in the real world, their depiction of nature is somewhat dependent on the availability of natural settings. Animated films, however, are more responsive to the imagination and intentions of the filmmaker (although technological innovations may help or complicate the depictions of plants and/or animals for both types of films). Thus, to assess changes over time in individuals' exposure to nature, we studied depictions of green nature in animated films' settings. More precisely, we investigated such changes in the representation of green nature in a 70-year time series (1937–2010) provided by Disney animated films. To investigate the role of technology, we included Pixar films in our analyses and tested our variables of interest in both Disney ($n = 51$) and Disney-Pixar ($n = 60$) films. Indeed, even if Pixar films have their own agenda and specificities, their purchase by Disney in 2006 may reflect common visions.

Disney films are part of Western culture and tend to influence the mental representations and development of many generations of children throughout the world (Sammond, 2005). Disney films present modern myths, and they all include natural elements and animals (Whitley, 2008). Although they often are based on well-known and classic tales, Disney films also reflect the social representations and meanings of the time in which they were produced (Sammond, 2005). We therefore assumed that the representation of green nature in each film reflects both the filmmakers' own relationship with nature and the team's perception of the public expectations. We hypothesized that attention to green nature in the animated films would decrease over time in response to the diminishing familiarity with this green nature by the filmmaker teams. In particular, we anticipate that decreasing familiarity with nature would lead to a reduction in detail in depictions of green nature in the settings.

We assessed the representation of nature in two different dimensions:

- The presence of green nature in the film (time-proportion in outdoor settings where green living elements were represented), and more specifically, the presence of wild versus cultivated nature (time-proportion during these green nature settings where wild nature was represented). We compared the respective presence of wild and cultivated natures, referring to the scientific assessment of biodiversity, which excludes crops, domestic gardens and other cultivated elements of nature.
- The complexity of drawn nature (number of animal species present in the film across all scenes). We chose species number as a proxy of complexity of depicted environments, referring to a classical indicator of biodiversity complexity and functioning by ecologists and conservation biologists, i.e., the species richness (Hooper et al., 2005).

Under the hypothesis of growing extinction of experience, we predicted two different processes. First, the tendency to locate stories in natural settings decreases with time owing to the reduced presence of natural environments in everyday life. Second, the way of drawing or depicting settings includes fewer and fewer natural elements, based on the changing knowledge and mental representation of the filmmakers.

Returning to our variables of interest, we therefore predicted that (1) green nature is less and less present in the films with time; (2) when green nature is present, it is more and more a cultivated one; (3) depicted nature is less and less complex with time, as reflected in a decreasing number of animal species in the settings.

2. Methods

Data collection

We considered all 60 animated feature films that were distributed for viewing by the public between 1937 (*Snow White*) and 2010 (*Tangled*). We considered only the original versions and excluded sequels from our analysis (see online appendix). These 60 films include 9 films produced by Pixar (from 1995 to 2009). We thus split each analysis into two parts, excluding and then including Pixar films.

We first defined 7 categories of settings *a priori* based on the distinction between so-called wild and domesticated (or cultivated) types of nature in Western culture (Descola and Pálsson, 1996), which were further grouped into four general categories (Table 1): outdoor green nature settings, outdoor non-green nature settings, indoor, others.

We then scanned each film with CAPTIV L-2100 software (http://www.teaergo.com/docs/CAPTIV-L2100_EN.pdf) and timed each scene within each category of predefined settings.

We classified a scene as being “green nature” as soon as there was at least one element of vegetation on the screen.

In parallel, we listed all of the animal species appearing in the film and counted the number of animal species included in the settings (i.e., not characters) for each film. Animals that played a role in the plot, i.e. that spoke and/or advanced the action, were thus not included in this tally. We made this decision to avoid the “anthropomorphized animals” problem discussed by Williams et al. (2012) in their analysis of children’s books.

We restricted our species observations to animals because different forms (assigned as species) were much easier to distinguish than for vegetation, especially in the settings. Moreover, the recognition of different plant species may be dependent on the type of technology used and the ability to depict fine details such as leaf patterns. To avoid bias related to technological abilities in the assessment of animal species, we did not rely on naturalistic characteristics; we considered for instance two birds as different species as soon as they were depicted with different colors.

We computed then three different parameters for each film: (1) the proportion of the film duration that showed natural outdoor living settings compared with the total duration of all scenes showing outdoor settings; (2) the proportion, among this previously calculated natural settings duration, of scenes showing cultivated natural settings; (3) the number of animal species in the settings.

Statistical analyses

We modeled the relationship between the proportion of duration of natural settings among outdoor settings, and the production year, with a linear model. We checked that residuals were normally distributed.

Table 1. Characterization of the categories of settings.

Grouped categories	Categories of collected data	Details
Outdoor natural settings	Outdoor wild settings	Forest, countryside
	Outdoor cultivated settings	Crops, urban parks, urban vegetation, private gardens
Other outdoor settings	Outdoor mineral settings	Deserts or rocks without vegetation
	Outdoor urban setting	Urban setting without vegetation
	Other outdoor setting	Sky, inside vehicle
Indoor settings		
Other		Zooms on characters, magical scenes

Because the proportion of duration of cultivated settings among natural settings was not normally distributed, we correlated these proportions with the film production years using a Spearman rank correlation test.

We modeled the relationship between the species counts and production years with a general linear model, assuming a quasi-Poisson distribution. Because the species counts were correlated with the duration of natural outdoor settings, we then controlled for the relation with production year with this latter duration of outdoor settings in the film.

All of the statistical analyses were performed using R (R Development Core Team, 2010).

3. Results

Natural settings

In the 51 Disney films excluding Pixar films, we found that the proportion of outdoor scenes with green nature (i.e., including vegetation) decreased significantly with time (linear model, $F_{1,49} = 7.14$, $p = 0.01$, $R^2 = 0.13$). This cannot be attributed to an increased focus on interior spaces, as the proportion of outdoor scenes compared to the total duration of animated films did not vary significantly with time (linear model, $p = 0.84$).

This time variation could not be explained only by changes in the agenda of the editorial Disney team. For instance, we found no significant changes after Walt Disney's death in 1966.

When we included Pixar films in the dataset, these effects were strengthened: the proportion of outdoor scenes with green nature decreased more significantly with time (linear model, $F_{1,58} = 12$, $p = 0.001$, $R^2 = 0.17$, Figure 1), the proportion of outdoor scenes compared to the total duration of animated films did not vary significantly with time (linear model, $p = 0.79$).

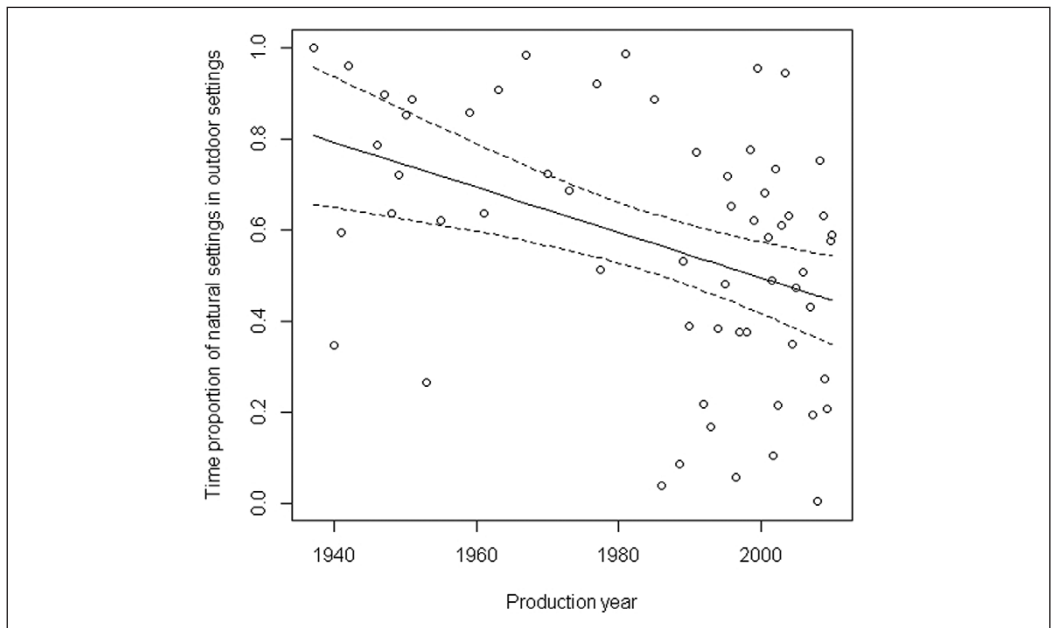


Figure 1. Temporal variation in the proportion of natural settings in outdoor scenes in animated Disney (including Pixar) films.

The line represents the adjusted linear model (confidence intervals shown as dashed lines).

Cultivated nature within natural setting

In the 51 Disney films excluding Pixar films, the relative duration of scenes with human-made natural settings (i.e., gardens, agricultural areas, fields) appeared to be increasing, albeit not significantly, with time ($n = 51$, Spearman rank correlation, $p = 0.10$, $\rho = +0.23$). When we included Pixar films in the dataset, these effects were strengthened ($n = 60$, Spearman rank correlation, $p = 0.09$, $\rho = +0.22$). The type of nature represented seems thus increasingly domesticated and controlled with year of production.

Animal species richness

In the 51 Disney films, the species richness (i.e., the number of animal species drawn in settings, excluding characters) decreases significantly with time ($n = 51$, quasi-Poisson GLM, Chi-square test, $p = 0.009$).

Animal species richness and duration of natural settings were positively correlated (quasi-Poisson GLM, $p = 0.008$). Yet, even after having controlled for the duration of natural settings among outdoor scenes, the animal species richness was still negatively correlated with time (quasi-Poisson GLM, Chi-square test, $p = 0.015$).

When we included Pixar films in the dataset, these effects were again strengthened: the animal species richness (i.e., the number of animal species drawn in settings, excluding characters), a proxy for the represented complexity of nature, decreases significantly with time ($n = 60$, quasi-Poisson GLM, Chi-square test, $p = 0.0006$).

Animal species richness and duration of natural settings were positively correlated (quasi-Poisson GLM, $p = 0.002$). Yet, even after having controlled for the duration of natural settings among outdoor scenes, the animal species richness was still negatively correlated with time (quasi-Poisson GLM, Chi-square test, $p = 0.001$, Figure 2).

4. Discussion

Our findings support all three hypotheses. First, the representation of outdoor settings changed profoundly over the 70-year time series of Disney films, which was associated with the appearance of films with a very limited presentation of green nature in outdoor settings (Hypothesis 1, Figure 1). Over the first 40 years, with almost no exception, the majority of outdoor scenes had green nature as a background (Figure 1). Over the past 30 years, one-half of all the movies reviewed for this study had more than half of their outdoor scenes in places without a trace of green nature (such as a city center). Furthermore, when green nature was shown, it became increasingly represented as human-influenced (i.e., cultivated; Hypothesis 2) and species poor (i.e. less complex; Hypothesis 3, Figure 2).

Animals and nature are known to be appreciated by children and are therefore widely used in Disney films (even if the Disney ideology is mostly human centered; McDonald, 2006). Moreover, environmentalism and environmental awareness clearly entered into the explicit messages of animated films produced by Disney when Michael Eisner managed its production teams (between 1984 and 2005; Whitley, 2008). This fact reinforces the interpretation of our results in terms of the extinction of experience: even when there are explicit messages about nature and the environment, there is a trend for simplification of green nature and its inherent complexity in the settings.

This study adds to evidence that our collective relationship with (and therefore the representation of) green nature has changed profoundly over the past 70 years. It is true that we have had to make simple decisions about the complex issue of what counts as nature and what does not. In

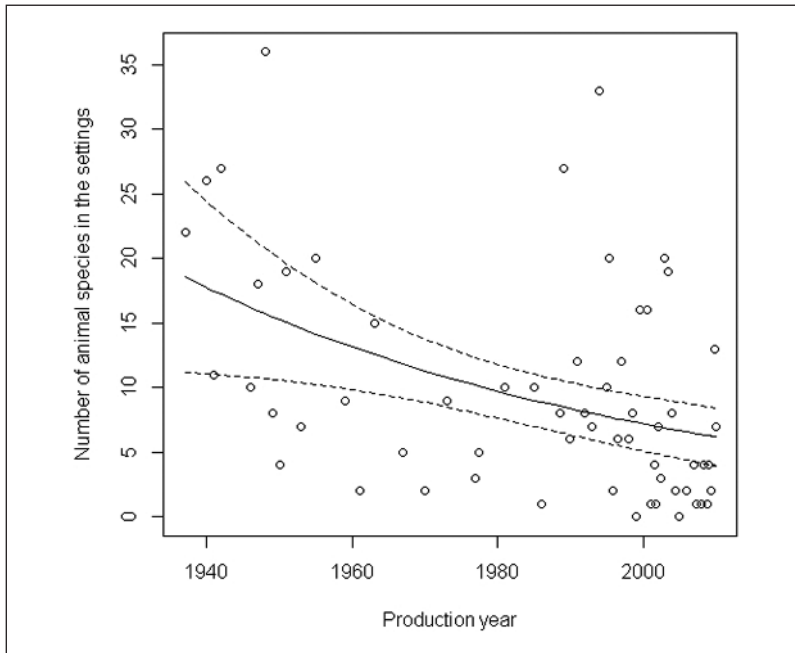


Figure 2. Temporal variation of the animal species richness in animated Disney (including Pixar) films' settings. The line represents the adjusted model (confidence intervals shown as dashed lines).

particular, we contrasted outdoor settings that include living elements (such as plants, which we referred to as “green nature”) and outdoor settings without any plant or animal life (e.g. deserts, ocean depicted only with water). This choice was guided by our final objective to assess media depictions relevant to the conservation of biodiversity. Our definitions, which are similar to those in previous research, were intended to trade off the potential to capture complexity and nuance in favor of criteria that were objective and could be easily replicated. The fact that we found a consistent trend provides some evidence for the validity of our definition. This finding is consistent with other recent research revealing a decrease in the depiction of natural environments, compared to that of built environments over time (McComas et al., 2001; Podeschi, 2007; Williams et al., 2012).

The disconnection revealed by our results raises two main concerns, namely individual connection with nature, and societal representations and understandings. First, the results suggest a decrease in the extent to which individual connection to nature is being nurtured in Western cultures. The mental and affective connections that are made with nature in childhood have been shown to affect future pro-conservation behaviors in adults (Hinds and Sparks, 2008). Animals and green nature seem to play an important role in child development (Kahn, 1999; Myers, 2012). Animated movies play a role in the vicarious experience of nature in children (Corbett, 2006) and in the cognitive development of individual relationships with nature, together with direct nature experiences through encounters in backyards or parks, and indirect nature experiences such as zoo exhibitions or nature education (Kahn and Kellert, 2002). Video and film consumption is increasing in Western societies, and these vicarious experiences of nature form a larger proportion of nature experiences. In this context, the fact that nature is represented with less complexity and biodiversity realism calls into question the future involvement of young generations in environmental issues.

Second, these results suggest that the filmmakers have a decreasing complexity of the representation of nature, which may be attributed to their own nature disconnect. The increasing distance of nature may have important consequences for the ability of society to understand and appreciate the complexity of surrounding natural environments and biodiversity, as well as to involve a large number of people in conservation issues. Indeed, external discourses about biodiversity and environmental problems are likely to be most easily integrated by individuals when they are consistent with previous understandings. A public that has an overly simplified view of biodiversity and ecosystems may be less able or likely to engage with scientific discourse about environmental problems; knowledge is associated with positive attitudes (Gauchat, 2011). Moreover, self-determination theory postulates that external injunctions could be effective only if they are consistent with our core self, which we all have constructed during our childhood and growth (Ryan and Deci, 2000). The social gap revealed by our results must therefore not be neglected or underestimated in biodiversity conservation discourses and initiatives, which must first consider, let emerge and accept the actual representations of nature and biodiversity among the particular audiences to whom they are devoted. Understanding and reducing this gap remain important for conservation discourses and actions to be accepted by a majority of citizens and to be eventually efficient.

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