Cognitive Evolution and the Transmission of Popular Narratives: A Literature Review and Application to Urban Legends

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Abstract

Recent research into cultural transmission suggests that humans are disposed to learn, remember, and transmit certain types of information more easily than others, and that any information that is passed between people will be subjected to cognitive selective pressures which alter the content and structure so as to make it maximally transmittable. This paper presents a review of emerging research on content biases in cultural evolution with relevance to the transmission of popular narratives. This is illustrated with content analysis of urban legends, which found that most featured at least one known content bias, with emotional information and social information being the most frequent. Most legends contained two to three biases, suggesting an optimum number of biases to be combined for a transmission advantage. We argue that the narratives do not succeed due to the transmission of adaptively-relevant information but due to their exploitation of content biases in human cognition.

Introduction

Cultural transmission has played a vital role in shaping the evolution of human cognition. In the seven million years or so since our lineage diverged from the other great apes, our ancestors evolved a range of specialised psychological adaptations that supported the efficient acquisition and communication of information via social learning. They include "true imitation" (the ability to copy actions and intentions), language, and a variety of cognitive biases that guide our decisions on who and what to copy (e.g. Mesoudi 2011). While these biases have been favoured by natural selection because they enable adaptive behaviours to spread within populations far more easily than they could through individual trial-and-error or blind copying, they can nevertheless make us susceptible to adopting ideas and practices that may serve no useful purpose, or which may even be maladaptive from a genetic point of view. Extreme examples of the latter include religious ideologies of celibacy, blood-letting (Milton, Claidière & Mercier, 2015) and even suicide epidemics (Mesoudi, 2009). In this paper we review how emerging findings into cognitive and cultural evolution can help to shed light on the characteristics of a universal and pervasive form of cultural transmission – storytelling. We argue that the successful transmission of stories does not depend so much on them containing adaptively-relevant information (e.g. Gottschall, 2012; Zipes, 2006), but on their ability to exploit adaptive learning heuristics favouring certain types of content ("content biases"). We then illustrate the importance of this distinction through a content analysis of popular urban legends.

"Content biases"

Recent research into cultural transmission suggests that humans are disposed to learn, remember, and transmit certain types of information more easily than others, and that any information that is passed between people will be subjected to cognitive selective pressures which alter the content and structure so as to make it maximally transmittable (Barrett & Nyhof, 2001). Here we focus on five of these "content biases" (Mesoudi 2011) or "factors of attraction" (Morin, 2015; Sperber, 1996) that are particularly relevant to the transmission success of narratives: ecological survival information bias (Nairne, 2010), social information bias (Mesoudi, Whiten, & Dunbar, 2006); emotional bias (Heath, Bell, & Sternberg, 2001), minimally counter-intuitive (MCI) bias (Boyer & Ramble, 2001), and stereotype consistency bias (Kashima, 2000).

Ecological Survival Information Bias

Nairne and colleagues (Nairne 2010; Nairne, Thompson, & Pandeirada, 2007; Nairne & Pandeirada, 2008) argue that, as evolved trait, human memory must have been shaped by selection pressures to achieve specific fitness-related goals. Human memory, they argue, has evolved to encode and recall fitness related information better than other forms of information. To test this, Nairne, Thompson, and Pandeirada (2007) proposed the 'survival processing' paradigm, where participants imagine themselves stranded in a foreign grassland scenario and then rate the relevance of words to their survival. A number of studies, using a variety of experimental designs and materials (Nairne & Pandeirada, 2008; Nairne et al., 2007; Kang et al., 2008; Otgaar, Smeets, & van Bergen, 2010; Weinstein, Bugg, & Roediger,

2008) have demonstrated the strong mnemonic advantage that survival processing grants participants over other forms of processing and that this effect is robust within and between participants. The recall advantage for ecological survival information found in these studies suggests a potential bias for ecological information relevant to survival in human cultural transmission. Beyond individual recall, Stubbersfield, Tehrani and Flynn (2015) found an advantage for urban legends featuring survival information over control material in a cumulative recall chain experiment.

Traditional folklore from various cultures provides examples of narratives which contain ecological information relevant to survival. Sugiyama (2001) argues that oral narratives among foraging peoples are used as a means to transmit this survival relevant information. Since these folktales are likely to have been passed down over many generations, the presence of this content supports the results of the experimental studies suggesting that ecological survival information is likely to be transmitted with a high degree of fidelity.

Social Information Bias

The *Machiavellian Intelligence* (Byrne & Whiten, 1988; Whiten, 1999) or *Social Brain* (Dunbar, 1998; 2003) hypothesis suggests that primates evolved greater intelligence in order to deal with complex social interactions, rather than to deal with non-social challenges in their ecological environment. As such, Mesoudi, Whiten and Dunbar (2006) argue that humans should preferentially attend to, recall, and transmit social information over equivalent non-social information and found support for this hypothesis in a transmission chain study

which demonstrated that social information was transmitted with greater accuracy and in greater quantity than equivalent non-social information. This result is supported by Stubbersfield et al (2015), who found that urban legends featuring social information were transmitted with greater fidelity than control material and urban legends featuring survival information. Social information bias is also supported by evidence from traditional folktales, which, as Sugiyama (2001) points out, frequently concern topics such as kinship, marriage, sex, friendship, betrayal, social status, interpersonal conflict and deception.

Emotional Bias

Emotional arousal is known to be an important factor in the storage and recall of memories (LaBar & Cabeza, 2006), and is thought to play a major role in the transmission of cultural knowledge and beliefs (Whitehouse, 2004). Heath, Bell, and Sternberg (2001) found that participants preferred and were more likely to pass on urban legends which produce high levels of disgust and that urban legends which featured a greater number of disgust evoking motifs were more widely distributed on urban legend websites. Eriksson and Coultas (2014) expanded on Heath et al. (2001) and demonstrated a bias for urban legends which evoked higher levels of disgust across three phases of cultural transmission: 'choose-to-receive', 'encode-and-retrieve' and 'choose-to-transmit'. Outside of disgust, Stubbersfield, Tehrani and Flynn (in press) found a more general advantage for more emotive urban legends. In an analysis of *New York Times* articles, Berger and Milkman (2010), found that those articles which aroused emotions characterized by high arousal, such as anger, were more likely to be transmitted than articles which aroused emotions characterized by low arousal, such as sadness. More recent research by Eriksson, Coultas and de Barra (2016) has suggested that

emotional bias may vary cross-culturally, as they found that, while American participants displayed a bias towards disgusting content, Indian participants did not. Both groups showed a bias towards more amusing stories, however.

Minimally Counter-Intuitive (MCI) Bias

Boyer (1994) has argued that humans hold intuitive assumptions about the properties of different categories of entities. These intuitive assumptions are generally described as 'folk biology', 'folk physics', and 'folk psychology'. Concepts which violate these category-level expectations are considered to be counterintuitive and, when balanced against a majority of intuitive elements (hence *minimally* counter intuitive), feature inherent transmission advantages that can increase the salience of a narrative (Boyer, 1994). Several studies have shown that MCI narratives have an advantage in recall and transmission (Barrett & Nyhof, 2001; Boyer & Ramble, 2001; Upal 2011) and some suggest a cognitively optimum number of counterintuitive elements (1-2 for Barrett, Burdett and Porter, 2009; 2-3 for Norenzayan, Atran, Faulkner & Schaller, 2006). Studies also show, however, that simply adding counter-intuitive concepts to a narrative is unlikely to enhance its transmission. Upal (2011) argues that the cohesion of the narrative is a key mediating factor in its memorability and calls into question the idea that there is a specific cognitive optimum for all narratives. Stubbersfield and Tehrani (2013) used computational phylogenetic methods to examine MCI in the evolution of the urban legend 'Bloody Mary', and found that intuitive concepts were found to be equally stable in transmission, suggesting that MCI bias functions on the narrative as a whole, rather than on individual concepts within it.

Stereotype Consistency Bias

Cultural stereotypes are social representations about social groups which are likely to arise from the cognitive processes of sense-making and conventionalisation (Bangerter, 2000; Kashima, 2000). It has been suggested by a number of researchers that information which conforms to stereotypical assumptions is more likely to be transmitted than information that conflicts with them. Fyock and Stangor's (1994) meta-analysis found that people recalled stereotype-consistent (SC) information better than stereotype-inconsistent (SI) information, when presented with both. More recently support for bias SC content in transmission has been demonstrated experimentally by Kashima (2000) and Bangerter (2000), although Kashima (2000) did find an advantage for SI content in the earlier positions of a transmission chain, perhaps suggesting an advantage for SI content in induvial recall. Importantly however, the extent to which people hold these stereotypes as true affects the degree of bias in transmission, as does an in-group out-group effect; participants are more likely to view an out-group's behaviour as homogenous compared to the behaviour of their in-group (Kashima, 2000). Interestingly, Lyons and Kashima (2006) found that SC content was preferentially retained only where participants had communicative intent (i.e. they were aware that material was being passed on to another participant); chains which only featured cumulative recall showed no SC bias. This suggests that some content biases might influence the selection of information for transmission, rather than its encoding and recall.

Applying the Theory: A Case Study of Urban Legends

The research summarized above suggests there are a number of cognitive dispositions that probably favour the transmission of certain types of story content, and may make us susceptible to apocryphal and potentially even harmful narratives. With that in mind, we turn now to an empirical study in which we investigated whether there is any evidence for these biases in a popular and well-documented genre of contemporary storytelling: urban legends. Urban legends are apocryphal stories that are told as true (Brunvand, 2000; Tangherlini, 1990), involve a contemporary setting (Brunvand, 2000), and feature a single event as the core of the narrative (Tangherlini, 1990). Historically, these legends have been transmitted through word-of-mouth but more recently their transmission has been accelerated by through electronic media (Brunvand, 2000; Fox Tree & Weldon 2007). Popular urban legends can be widespread and influence individual behaviour (see Best & Horiuchi, 1985 for parents' reactions to the 'razor blade in apple' legend), negatively impact on businesses ('Chinese restaurant bankruptcy fear', 2011) and inspire horror movies such as *Candyman* (Rose, Barker & Golin, 1992) and *Urban Legend* (Blanks, Mattews, McDonnell, & Monitz, 1998). Given that most urban legends are not based on true events (and are often easy to disprove), their popularity cannot be explained in simple utilitarian terms, however, following the research reviewed above, we can hypothesise that their success may be due to their ability to exploit adaptive learning biases and/or their by-products.

Method

Material

Two-hundred and sixty urban legends were collected from the *Urban Legends Reference Pages* (www.snopes.com) using the 'randomizer' function which provides a random selection of one legend from their database of thousands. The *Urban Legends Reference Pages* is the most complete collection of urban legends available and has been praised by folklorists knowledgeable in the field such as Brunvand (Seipp, 2004). It has also been used as a source for material in other studies examining biases in cultural evolution (see Fessler, Pisor, & Navarrete, 2014). For the purposes of this study urban legends were defined as apocryphal narratives, told as true, involving a contemporary setting and featuring or referencing a single event as the core of their narrative. As the *Urban Legends Reference Pages* applies a more expansive use of the term 'urban legend' than is used here, also including rumours, trivia, hoaxes, common misconceptions and misinformation, only legends which met the above criteria were used in analysis. To meet the criteria of being an 'apocryphal narrative' only those legends which have been rated by the *Urban Legends Reference Pages* as 'False' or 'Legend' were used (complete details on the *Urban Legends Reference Pages* rating system can be found at http://www.snopes.com/info/ratings.asp). Two-hundred and sixty legends were originally collected as it was felt that this number was large enough to provide a representative sample with potentially all biases being represented. During analysis six of these were rejected for not matching the criteria for an urban legend described above, leaving 254 legends in the final sample. When multiple variants of a legend were presented, only the first variant presented was collected for the study

Coding

The collected legends were coded for the presence of biases using NVivo 10 (QSR International, 2012). These biases included emotional content (subdivided into anger, amusement, disgust, and fear), MCI content, social content (subdivided into social, social context, and social gossip), stereotype consistency (subdivided into male behaviour, female behaviour, race/nationality, and regional), and survival information (subdivided into high and low). See Table 1 for the coded biases and the definitions used.

The emotions coded were anger, disgust, fear, and amusement. The first three of these emotions are taken directly from Ekman's (1992) list of Basic Emotions. Of the six Basic Emotions sadness was not coded due to research suggesting it does not enhance transmission (Berger & Milkman, 2009) and surprise was not coded due to its neutral valence. Amusement (also referred to as mirth, exhilaration [McGhee, 1979; Ruch, 1993] or joy [Panksepp & Burgdorf, 2003]), was chosen for coding in place of happiness for a number of reasons. First, it was thought that material deliberately intending to elicit amusement would be easier for coders to recognize than happiness. Second, as in the other emotions coded, amusement is thought to have an adaptive function (Gervais & Wilson, 2005). Third, Ekman (1999) suggests that amusement shares characteristics with the six Basic Emotions and included it in an expanded list. All four of the emotions coded are characterized by high-arousal, are cross-culturally recognized and have been included in studies examining emotion in transmission (Eriksson & Coultas, 2014; Meagher, Arnau & Rhudy, 2001; Ruch, 1993; Russell & Mehrabian, 1974).

To assess inter-rater reliability an independent coder, blind to the hypothesis, coded a sample of 50 randomly selected legends. They were provided with the coding definitions (see Table 1) and instructed to code as present any biases that they believed were featured in the legends. The coding of the second coder and the researcher was highly consistent, being in 88% agreement for all biases coded.

[Table 1 about here]

Results

The majority of urban legends coded were shown to feature content which exploits cognitive biases. Examples of legends can be found in the supplementary material (SM). Biases for emotional content, MCI, social information, ecological survival information and stereotype consistency were all represented, with 92% of legends featuring at least one bias (see Table 2 for frequency of biases coded and Table S1 in SM for the frequency of specific biases).

[Table 2 about here]

Emotional Bias

One of the two biases most frequently coded as present was emotional content (present in 78% of the legends). The bias was subdivided into four emotions, three which are characterised by negative valence and high arousal: anger, disgust and fear (Russell & Mehrabian, 1974; Meagher et al., 2001), and one which is characterised by positive valence and high arousal: amusement (Ruch, 1993). Of these, amusement was the most frequent (47%

of legends). Fear and disgust occurred at a frequency of 14% and 13% respectively. Anger was the least frequent (4% of legends).

Social Information Bias

Social information was one of the two most frequently coded biases (77% of legends). Social information was subdivided into three levels: social context, social and social gossip (see Table 1 for definitions). Of these levels, social was the most frequently coded (49% of legends). 18% of legends contained social context and 9% contained social gossip.

Ecological Survival Information Bias

Ecological survival information was present in 27% of legends. This bias was subdivided into two levels: high, concerning serious injury or death, and low, concerning injury or potential injury. Of these levels high survival information was the most frequently coded (20% of legends), low survival information was present in 7% of legends.

Stereotype Consistency Bias

Stereotype consistent behaviour was present in 23% of the legends. Stereotypical behaviour based on race or nationality was the most frequent (9%). Other stereotypes included gender

stereotypes (7% stereotypical male behaviour, 5% stereotypical female behaviour). Only 2% contained stereotypical behaviour based on region. No legends were coded as featuring stereotype inconsistent behaviour.

Minimally Counterintuitive (MCI) Bias

MCI was the least frequently coded bias (6% of legends). Each MCI legend was coded for the number of counterintuitive objects or concepts. The number of counterintuitive features present ranged from 1-2. 93% of the MCI legends featured just one MCI object or concept.

Multiple Biases

76% of the legends featured two or more biases, with the majority of legends featuring two (see Figure 1).

[Figure 1 around here]

There were a number of common combinations (see Tables 3 and S1 for the frequency of combined biases).

[Table 3 around here]

Amusement and Social Information were found together in 31% of the legends, Survival (High) and Fear were found together in 11% of the legends and Survival (High) and Disgust were found in 5% of the legends. All legends featuring stereotype consistent content, also featured social information and amusement, below is an example of one such legend:

Stereotype-Social-Amusement Legend Example

A few Decembers ago Japanese department store, desperate to appear westernised and with-it, mounted an extravagant Christmas display, featuring a life-sized Santa Claus, crucified upon a cross.

An abridged example of a legend featuring ecological survival information and fear content is below:

Survival-Fear Legend

Don't forget to look !!! This is really scary ...the mystery behind a recent spate of deaths has been solved…3 women in Chicago, turned up at hospitals over a 5 day period, all with the same symptoms. Fever, chills, and vomiting, followed by muscular collapse, paralysis, and finally, death… It was discovered, however, that they had all visited the same restaurant……one toxicologist… drove out to the restaurant, went into the restroom, and lifted the toilet seat. Under the seat, out of normal view, was

small spider……So please, before you use a public toilet, lift the seat to check for spiders.

It can save your life!...

The example below featured survival information and disgusting content:

Survival-Disgust Legend

An old lady ordered out for Kentucky Fried Chicken. She was eating along when she noticed teeth; she pulled back the crust and discovered she was eating a rat. She had a heart attack and died, and her relatives sued Kentucky Fried Chicken for a lot of money.

No Biases

No biases were coded in 8% of the legends (n = 20).

Discussion

This study set out to investigate the role of content biases in the transmission of urban legends. The results provide compelling evidence that the content and popularity of urban

legends has been influenced by cognitive biases. Over 90% of the legends included in this analysis contained at least one bias. This is consistent with experimental studies demonstrating superior recall and fidelity of transmission of information that exploit biases. They are also in line with studies of traditional folklore suggesting that successful tales and myths frequently reflect these biases (Barrett, Burdett, & Porter, 2009; Norenzayan et al., 2006; Sugiyama, 2001).

Only a small minority of legends were coded as featuring no biases. One possible explanation of this relates to the individual version of a legend which was coded. Any legend, urban or traditional, is likely to exist in multiple versions due to the infidelity of cultural transmission. These versions will vary in content to some degree and some will be more culturally successful than others. It is likely that when looking at multiple versions of the one legend more versions would exploit at least one bias than none.

Are some biases more important in transmission than others?

Content which would exploit emotional bias was one of the most frequently coded biases (78%), being found in the majority of legends, with all of the emotions coded characterised by high arousal. This provides good evidence for an emotional content bias in the transmission of narrative. This bias was rarely found on its own (3% of the legends were coded as only featuring emotional bias) suggesting that high emotional content grants a transmission advantage to a narrative but this is mostly in addition to another content bias. The most frequently coded emotion bias was amusement, being coded as present more frequently than both disgust and fear put together. The results suggest that ‘funny stories’ (Example 1) are found more frequently than ‘disgusting stories’ (Example 8) or ‘scary

401 stories' (Example 7). This is consistent with previous research examining emotional bias in
402 transmission has found a potential cross-cultural advantage for amusing content (Eriksson,
403 Coultas & de Barra, 2016) but is perhaps counter to the common conception of urban
404 legends. Based on these results it is feasible that positively valenced narratives may feature a
405 transmission advantage over negatively valenced narratives, however, this is not definitive
406 and further research examining emotional bias is required to establish if and how it varies
407 between emotions evoked and what effect this has on transmission.

408 Over three quarters of urban legends coded contained social information, a finding
409 consistent with experimental studies (Mesoudi, Whiten & Dunbar, 2006; Stubbersfield,
410 Tehrani & Flynn, 2015). This is a far greater than the number of legends containing
411 ecological survival information. Social information bias was the bias most frequently coded
412 as the sole bias in a narrative (9% of the legends were coded as only featuring social bias),
413 suggesting that a social information bias provides enough of an advantage alone for some
414 transmission success. Celebrities (such as Elvis and Priscilla Presley) were sometimes
415 featured in legends containing social information, perhaps because they represent people that
416 a large number of people are familiar with and therefore provide relevant social information
417 to a wide audience.

418 One of the more unexpected results of Mesoudi, Whiten and Dunbar (2006) was that
419 social non-gossip was transmitted just as well as gossip, suggesting that the intensity of social
420 relationships described in the information has no effect on the fidelity of transmission but
421 what is important is some form of third party interaction. A similar result was found in the
422 current study as the social sub-category (which featured the same definition as Mesoudi et
423 al.'s social non-gossip) was coded as present more frequently than the social gossip sub-
424 category. This result is consistent with the expectation that gossip would not be more
425 frequent than social non-gossip. In general, these results are consistent with the predictions

based on the *Machiavellian Intelligence* or *Social Brain* hypotheses and suggest that humans are highly susceptible to narratives featuring social information content.

Over a quarter of legends were coded as featuring ecological survival information. This provides support for a survival information bias (Nairne & Pandeirada, 2008; Nairne et al., 2007; Kang et al., 2008; Otgaar et al., 2010; Weinstein et al., 2008) and is consistent with the oral narratives of foraging peoples (Sugiyama, 2001).The consistency with the latter is noteworthy, given the radical differences in the contexts of transmission. One might expect ecological information to be less salient to post-industrial populations than to foragers, who depend on detailed knowledge of their environments to survive. However, the popularity of urban legends concerned with health risks and environmental hazards, such as food contamination (e.g. the 'Kentucky fried rat' example) suggests that ecological survival bias still plays an important role in the spread and persistence of narratives in the developed world. In most cases, it seems unlikely that the legends actually contain useful survival-relevant information, however, legends such as the 'razor blade in the apple' did affect behaviour on a wide scale despite its false premises (see Best & Horiuchi, 1985). The successful transmission of a legend would appear to be based more on our *susceptibility* to information about survival, rather than the *usefulness* of the information itself.

Of the legends coded, 23% featured behaviour consistent with cultural stereotypes of race, nationality, gender and region but none were coded as featuring stereotype inconsistent behaviour. This is generally consistent with the literature; Fyock and Stangor (1994) and Clark and Kashima (2007) suggest that SC content has a transmission advantage. The nature of stereotype consistent information means that it was never seen in isolation as a bias and has a strong association with social information and the emotion amusement. They were almost consistently 'funny stories' with the amusement being found in cultural stereotypes. Future research needs to examine whether the transmission advantage provided by stereotype

consistent content is actually due to the advantage provided by social information and if these two biases can be separated.

MCI was the least frequent bias, as only 6% of the legends were coded as containing this bias. This was unexpected as traditional folklore and myth commonly features MCI content (Barrett, Burdett, & Porter, 2009; Norenzayan et al., 2006).The number of counterintuitive characters found in each legend is consistent with the cognitive optimum of 1-2 suggested by Barrett, Burdett and Porter (2009), however, with the majority (93%) only featuring one counterintuitive character they generally fall below the cognitive optimum of 2-3 suggested by Norenzayan et al. (2006). Where MCI content is featured it is generally in reference to a ghost. References to other MCI characters which are found in traditional folklore, such as talking animals, are apparently non-existent in urban legends. The low frequency of legends containing MCI information could be explained by genre categorisation. Contemporary folklore which features MCI content is usually categorised as 'ghost stories' or cryptozoology and UFO tales rather than urban legends. Another possible explanation could be the relative ages of traditional folklore and urban legends, it is feasible that the MCI urban legends will survive transmission for many years longer than the non-MCI urban legends.

Do content biases tend to occur individually or in combination with other biases?

The majority of legends were coded as featuring more than one bias (see Figure 1), suggesting that exploiting multiple biases provides a greater transmission advantage to a narrative. In the majority of legends, however, a combination of two biases was the highest number featured, suggesting an optimum number of biases to be combined for a transmission advantage. One possible explanation for this is that biases are exploited by content and that

with more biases there would be more content which could make the narrative overly complex and unmemorable. Another possible explanation is that different biases may conflict with each other, making the narrative nonsensical or unappealing. As Upal (2011) has suggested, with counterintuitive characters in a narrative, the legend must remain coherent to be memorable so there is likely to be a limit to the amount of biased content which can be included before the narrative loses coherence. Multiple biases appearing together is also seen in model-based biases (Wood, Kendal, & Flynn, 2013). In this case children have been shown to calibrate across multiple model-based biases and certain biases will dominate over others. Content biases could function in a similar way, with certain biases granting a greater transmission advantage than others. As yet research into content biases has focused on individual biases, however, Stubbersfield et al (2015) found that stories which combined survival and social information had a transmission advantage over those solely featuring survival information but were transmitted with equal fidelity to those featuring solely social information. Seeing which biases are combined and the frequency of their combination with other biases could suggest the relative strength of a bias in transmission.

Social information was by far the most frequent single bias, suggesting it provides enough of a transmission advantage in itself, a finding consistent with Stubbersfield et al (2015). Other biases were also frequently combined with social information. The most frequent combinations suggest certain common 'story types' which are culturally successful. The most common 'story type' among the legends collected for this study was the 'funny story'; these legends combined social information and amusement. Another 'story type' would be the 'scary story' or 'warning', combining survival information and fear and structured as a warning against certain behaviour. 'Scary' legends frequently emphasise the truth of the information and often urge the receiver to transmit the content. Another common 'story type' that could be viewed as the stereotypical urban legend is the 'disgusting story'

which combines disgust and survival information. These different story types suggest that some biases may complement each other and generate a greater transmission advantage and therefore be frequently found together.

Another question that arises from legends featuring multiple biases is: are the biases all contributing to a transmission advantage or is some biased content 'riding' on the transmission advantage of another? For example, the majority of survival information was coded as high survival (information relevant to serious injury or death) so feasibly the cultural success of urban legends which feature survival content owe their success to also exploiting emotional biases such as fear or disgust (77% of legends which were coded as featuring high survival information were also coded as evoking fear or disgust) rather than combining survival information and emotional content. The results of Stubbersfield et al (2015) discussed above suggest that the prevalence of threats and hazards found in urban legends may be due to their combination with social information bias or emotional bias, rather than a strong susceptibility to survival-related content per se.

How universal are content biases?

The assumption of content biases is that they exploit shared cognitive dispositions towards certain properties of cultural items. A criticism of this is that the majority of the research examining content biases has used participants from nations described by Henrich, Heine and Norenzayan (2010a) as western, educated, industrialised, rich and democratic (WEIRD). People from WEIRD nations represent only 12% of the world's population and could be considered psychologically unusual (Arnett, 2008; Henrich, Heine & Norenzaya, 2010b). As such the results of such studies may not be generalisable to humans as a whole. The urban legends presented here are collected from western, English-speaking countries and as such

526 may only reflect the content biases of people from WEIRD nations. There is evidence,
527 however, to suggest that the same content biases are present in the folklore of non-WEIRD
528 nations. Studies have found evidence for content biases using traditional, pre-industrial
529 folklore such as fairy tales (Barrett, Burdett, & Porter, 2009; Norenzayan et al., 2006) and, as
530 discussed above, the oral narratives of foraging people can be seen to contain information
531 relevant to survival and social interaction (Sugiyama, 2001). Some of the *Setsuwa bungaku*
532 (tale literature) of Japan's Kamakura period (1185-1333) frequently feature motifs related to
533 survival information (i.e. food contamination stories or tales of unpleasant death) and social
534 information (i.e. tales involving social interaction and social embarrassment) which bear
535 striking similarities to contemporary, Western urban legends (Schaefer, 1990). Given the
536 presence of biased content in this diverse, international range of folklore it is plausible to
537 suggest that content biases (or some of them at least) are shared universally, however, the
538 relative frequencies examined here may vary significantly. For instance, social information is
539 likely to be particularly salient cross-culturally, as all humans live in social groups, but the
540 frequency of survival information found in stories may vary on how dangerous the
541 ecological environment is, or how reliant on the local ecological environment one is for food.
542 Examining how the relative frequency of content biases is reflected in folklore cross-
543 culturally presents an interesting avenue for future research and would go towards examining
544 how truly universal these biases are.
545

546 **Conclusions**

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548 In sum, this study has found compelling evidence that the popularity and longevity of urban
549 legends can be explained, at least in part, by cognitive biases to learn and transmit certain

kinds of information content. We argue that, although it is likely that most of these dispositions were selected for in our evolutionary past, they make us susceptible to narratives that may have no adaptive value in themselves, such as urban legends (see Sperber, 1996). Evidence was found for all of the content biases which have been suggested by experimental research. The distributions of content biases suggest humans are especially susceptible to narratives containing social information. This finding supports the hypothesis that human cognition was shaped to a greater degree by selective pressures from the social environment than the natural environment. The results further suggest that combining biases together in a single narrative could confer a greater transmission advantage than a single bias alone, although further research needs to be conducted to examine how biases can combine and the effects of this on transmission. Last of all, I emphasise that in discussing 'susceptibilities' we eschew any pejorative implications associated with the term. Occasionally urban legends may be harmful, but on the whole they are entertaining and fun (as evidenced by the frequency of amusing themes). Sometimes they may even be therapeutic, providing ways of making sense of a frightening or unpredictable world. Above all, urban legends are catchy, and by investigating the underlying psychological factors that make them so, we have demonstrated the value of a cognitive and cultural evolution approach to examining storytelling.

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