Running head: *Social and survival information bias in the transmission of urban legends.*

Serial killers, spiders and cybersex: social and survival information bias in the transmission of urban legends.

Joseph M. Stubbersfield* [1 2], Jamshid J. Tehrani [1] and Emma G. Flynn [2]

[1] Centre for the Coevolution of Biology and Culture, Department of Anthropology, Durham University.

[2] Centre for the Coevolution of Biology and Culture, School of Education, Durham University.

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*Requests for reprints should be addressed to Joseph M. Stubbersfield, Department of Anthropology, Durham University, Dawson Building, South Road, Durham, DH1 3LE
United Kingdom, (e-mail: j.m.stubbersfield.ac@gmail.com).

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Abstract

This study uses urban legends to examine the effects of the *social information bias* and *survival information bias* on cultural transmission across three phases of transmission: the choose-to-receive phase, the encode-and-retrieve phase and the choose-to-transmit phase. In line with previous research into content biases, a linear transmission chain design with 60 participants aged 18-52, was used to examine the encode-and-retrieve phase, while participants were asked to rank their interest in reading the story behind a headline and passing a story on for the other two phases. Legends which contained social information (Social Type), legends which contained survival information (Survival Type) and legends which contained both forms of information (Combined Type) were all recalled with significantly greater accuracy than control material while Social and Combined Type legends were recalled with significantly greater accuracy than Survival Type legends. In another study with 30 participants aged 18-22, no significant differences were found between legend types in either the choose-to-receive phase or the choose-to-transmit phase.

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Introduction

A growing body of research suggests that when information is transmitted from one person to another, it is subjected to cognitive selection pressures that alter its content and structure to make it maximally transmittable (Bartlett, 1932; Barrett & Nyhof, 2001; Mesoudi & Whiten, 2008; Mesoudi, Whiten & Dunbar, 2006; Sperber, 1996). The extent to which information is transmittable is affected by three factors: its salience (i.e. its ability to attract attention), the accuracy with which it is recalled, and the motivation of adopters to pass it on to others. While the second factor has been studied quite extensively (Bartlett 1932, Mesoudi & Whiten 2008), the first and third have received comparatively little attention (Eriksson & Coultas, 2014). Here, we investigate the impact of cognitive biases in all three phases of cultural transmission. Specifically, we focus on the roles of *social information bias*, (Mesoudi et al., 2006), and *survival information bias* (Nairne & Pandeirada, 2008; Nairne, Thompson & Pandeirada, 2007) in the spread of urban legends.

Survival Information Bias

Nairne and colleagues argue that, as human memory is an evolved trait that must have been shaped by selection pressures to achieve specific fitness-related goals, memory should display functional specialisation (Nairne, 2010; Nairne & Pandeirada, 2008; Nairne, Thompson & Pandeirada, 2007). They argue that human memory is unlikely to have evolved to be domain general, as some information such as the locations of food sources or predators would be more beneficial to remember than random events (Nairne & Pandeirada, 2008). Human memory, therefore, has evolved to be 'tuned' towards encoding and recalling fitness related information better than other forms of information (Nairne & Pandeirada, 2008).

To test this hypothesis Nairne et al. (2007) had participants imagine themselves stranded in a foreign grassland scenario and then rate the relevance of words to finding food,

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water and protection from predators, they refer to this as 'survival processing'. Later, surprise free-recall tests revealed an advantage for survival processing. Nairne, Pandeirada and Thompson (2008) also found a similar result; that words processed within a survival context (e.g. relating to food and predators) were more likely to be recalled than those same words processed in a non-survival context. Similarly, in Nairne and Pandeirada (2008) participants were asked to make either survival relevant decisions or pleasantness ratings about words in the same categorised list. They found that survival processing produced the best recall in both within- and between-subject designs, despite previous findings suggesting that the pleasantness rating of words in a categorised list is considered one of the best methods for enhancing free-recall (Packman & Battig, 1978). Kang, McDermott and Cohen (2008) found that survival processing produced better recall than a control scenario chosen to match the novelty and potential excitement of the survival scenario.

A number of studies, using a variety of experimental designs and materials, have demonstrated the strong mnemonic advantage that survival processing grants participants compared to other forms of processing and that this effect is robust in both within- and between-subjects designs (Nairne, et al., 2007; Nairne & Pandierada, 2008, 2010; Kang, et al., 2008; Otgaar, Smeets, & van Bergen, 2010; Weinstein, Bugg, & Roediger, 2008). 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. Just as they have been used in assessing social information biases, transmission chain experiments could be used to empirically test if the bias for survival information in recall goes beyond the individual and would operate on cultural transmission.

Social Information Bias

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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. These hypotheses oppose an ecological hypothesis of primate intelligence evolution (Clutton-Brock & Harvey, 1980) by emphasising the importance of social interaction. Further, Dunbar's *Social Gossip Theory* (1993) of human language evolution argues that language evolved as a means to maintain social cohesion in the large social groups which are characteristic of modern humans. Together, the *Machiavellian Intelligence*, *Social Brain* and *Social Gossip Theory* suggest that greater intelligence and language were necessary for tracking social relationships and interactions in large social groups, and therefore evolved in response to natural selection.

Based on these evolutionary theories, Mesoudi, Whiten and Dunbar (2006) argue that if human cognition evolved to deal with social relationships and interaction, then humans should preferentially attend to, recall and transmit social information over equivalent non-social information. They empirically tested for this by comparing the transmission of social and non-social information along linear transmission chains. The transmission chain method, in which some form of information is passed from one participant to another along a 'chain' of individuals, was first developed by Bartlett (1932) and has been used successfully to reveal cumulative and systematic biases in recall that influence cultural transmission and evolution (Mesoudi et al., 2006; Mesoudi & Whiten, 2008). In Mesoudi, Whiten and Dunbar (2006) social information was defined as information which concerned the interactions and relationships between a number of third parties, while non-social information was defined as a single individual's interactions with the physical environment, or solely concerning the physical environment. For their purposes of the study social information was divided into two categories: gossip, which involved intense and salient social interactions or relationships, for

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example an illicit sexual affair, and social non-gossip, which involved ‘everyday’ interactions and relationships, for example someone receiving directions.

Mesoudi et al. (2006) found that social information was transmitted with greater accuracy and in greater quantity than equivalent non-social information. Perhaps unexpectedly, social non-gossip was transmitted just as well as gossip, suggesting that the intensity of the social relationships described in the information has no effect on the fidelity of transmission; instead what is important is that the information detailed some form of third party interaction. The results were consistent with predictions based on the *Machiavellian Intelligence* or *Social Brain* hypotheses and suggest that humans are biased towards social information. Mesoudi et al. (2006) argued that this bias for social information explains the nature of some popular media, such as gossip magazines, reality television and tabloid newspapers.

An advantage for social information in transmission was also found by McGuigan and Cubillo (2013). They used an open diffusion paradigm to explore the transmission of social and non-social information within two groups of children aged ten to eleven years. Two children in each group were told one piece of social information and one piece of general knowledge and this information was allowed to naturally diffuse within the group. They found that social information was transmitted more frequently within the group than non-social information. This is supported by the findings of Reysen, Talbert, Dominko, Jones and Kelley (2011) who conducted three experiments exploring the influence of collaboration on memory for social information and found that both individuals and collaborative groups recalled more social information than non-social information.

Despite it not being a focus of their research, Owens, Bower and Black (1979) also found a bias for social information in recall. In their study, participants were asked to read and recall five episodes describing a female student completing everyday events. The experimental group were given a social motive for the student, that she was pregnant by her professor, which connected the five episodes into a narrative. The control group were not provided with this motive, leaving the episodes as independent events. The experimental group recalled significantly more of the five episodes than the control group, which suggested that the social nature of the material given to the experimental group exploited a bias for social information in encoding and recall.

Mar and Oatley (2008) argue that the function of fictional narratives is not merely to entertain but that fiction offers a simulation of social relationships and interactions that can facilitate the communication and understanding of social information. Given this argument, even overtly fictional narratives that feature social interaction should exploit the social bias suggested by Mesoudi et al. (2006) and feature an advantage in transmission and recall.

Social and Survival Biases in Urban Legends

Evidence of social and survival biases can be found in the kinds of stories propagated by the tabloid press and gossip magazines, and in narratives transmitted from person-to-person – most notably in so-called ‘urban legends’. Urban legends, also referred to as ‘modern legends’ (Mullen, 1972), ‘urban belief tales’ (Fine, 1979) and ‘contemporary legends’ (Simpson, 1981) are generally defined as apocryphal stories which are told as true (Brunvand, 2000; Heath, Bell & Sternberg, 2001; Tangherlini, 1990), involve an urban or suburban setting (Brunvand, 2000), and feature a single event, usually an individual experience, as the core of the narrative (Tangherlini, 1990). Successful legends often share a number of features, such as a suspenseful or humorous narrative (Brunvand, 2000), which contains surprising information or a twist ending (Fox Tree & Weldon, 2007), a warning or moral message that is either explicit or implied, and they are often attributed to a “friend of a

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friend” (Brunvand, 2000). While they have been traditionally transmitted orally, urban legends are now spread through a combination of oral transmission, electronic communication and publication in mass media (Brunvand, 2000). Traditional, longer forms of oral narrative such as epic ballads or counting-out rhymes often feature mnemonic advantages such as repetition or poetics that enhance recall and lead to less variation between generations (Rubin, 1995). Urban legends, however, rarely feature these elements meaning they are more subject to the effects of recall. The analysis of urban legends can offer a unique means of studying the concerns of modern populations (Brunvand, 2000) and therefore provide an opportunity to study content biases such as social or survival information bias.

A wide range of social information can be found in urban legends. These legends are frequently built around intense social interaction that could easily be defined as gossip, such as the accidental cybersex between a father and daughter, or actual accidental incest in some instances (Brunvand, 1999). Urban legends can also be attached to real people in a manner that clearly acts as gossip, for instance, the legend of a film star having to have a gerbil (or hamster) removed from their rectum has been said of several real life film stars over the past thirty years (Brunvand, 1986). In these instances the social information contained in the legend would appear to be the sole reason for the legend’s success in transmission. Many urban legends also clearly feature ecological survival information. Food contamination is a common feature, whether it is deliberate, such as in the ‘Razor blade in the apple’ legend (Best & Horiuchi, 1985), or accidental, such as in the ‘Kentucky fried rat’ legend (Fine, 1980). These food contamination legends are often localised (Fine, 1980) and as such provide survival information directly relevant to the receivers’ environments. Violence at the hands of other humans is also a common feature and often the perpetrators of this violence are from minorities within a society (Ellis, 1983; Victor, 1990), once again providing information

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directly relevant to the receivers' environments. Unlike the oral narratives of forager populations (discussed by Sugiyama, 2001), these stories are apocryphal and do not contain information that could be used for survival in a modern environment, however, they could still be exploiting this bias. Urban legends, however, frequently exploit more than one content bias (Stubbersfield, Tehrani & Flynn, 2014). Legends frequently feature both social and survival relevant information, such as the common 'gang initiation' legends, where the social context of a violent action is provided, giving the receiver information relevant to their survival within a social world. As yet no studies have examined how different biases interact when combined within a narrative and urban legends offer an excellent means to investigate this.

The Present Research

In these studies we used real urban legends, which have been or are actively transmitted between people, as a means to investigate social bias and survival bias. In the first of the three studies, participants rated urban legends on a number of scales related to suggested content biases in order to provide a means of selecting material that could be used in further studies. This material comprised a selection of three types of legends: legends that scored highly for survival-relevant information, legends that scored highly for social information, and legends that scored highly for both kinds of information. Legends which featured both social and survival information were used to examine how a combination of biases affected recall and transmission. In the second study a linear transmission chain design is used to examine the effects of social information, survival information and combining both types of information on the cultural transmission of an urban legend narrative. These experiments aimed to test the hypothesis that legends containing content relevant to survival and social information biases are transmitted with higher fidelity than control material lacking such content. We further hypothesised that legends containing both types of content

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should have an even greater advantage in transmission. The third study goes beyond the ‘encode-and-retrieve’ phase of transmission tested in the transmission chain to examine the effects of this content on two other phases of transmission: ‘choose-to-receive’ and ‘choose-to-transmit’.

Study 1

Before conducting the transmission chain study it was necessary to select appropriate legends. Study 1 was conducted with the purpose of gathering data that would allow suitable legends to be selected for Study 2.

Participants

One-hundred-and-six participants (71 females) completed questionnaires. Their ages ranged from 19 to 58 years with a mean age of 23 years (SD = 5.75). The majority (73%) were undergraduate students studying psychology, others were not students and were recruited through opportunity sampling.

Materials

Seventeen urban legends were collected from the *Urban Legend Reference Pages* (www.snopes.com); five were thought to contain information relevant to survival (survival type), six were thought to contain information relating to social interaction or relationships between third parties (social type) and six were thought to combine both types of information (combined type). These legends were re-written to approximately match for word length (88-93 words) and number of central propositions (5-6). Control material was also created; this was adapted from a description of the formation of Cheddar Gorge from *Wikipedia* (http://en.wikipedia.org/wiki/Cheddar_gorge), re-written to match the legends in terms of word length and central propositions. Questionnaires were created which contained eight questions for each legend asking about familiarity with the legend, emotional content, plausibility, survival information, social information and gender stereotypes (see supplementary material A). These questions were used to collect data on potential content biases that the legends may exploit (see Mesoudi & Whiten, 2008). The order of legends presented was counterbalanced so no two participants received the same legends in the same order.

Procedure

Participants were asked to take part in a study regarding the cultural transmission of urban legends. Each participant was presented with a questionnaire and answered questions on three or four legends, or the control material. Each of the eight questions were asked for each of the legends presented and the control material

Results

Each legend and the control material received 20 ratings on each scale (see supplementary material B for the mean ratings for each legend). Significant variation between legends was found in emotional content (one-way ANOVA, $F_{17, 342} = 2.47$, $p < .01$), plausibility (one-way ANOVA, $F_{17, 342} = 2.09$, $p < .01$), survival information (one-way ANOVA, $F_{17, 342} = 8.20$, $p < .001$), social information (one-way ANOVA, $F_{17, 342} = 21.94$, $p < .001$) and gender stereotyped behaviour (one-way ANOVA, $F_{17, 342} = 10.92$, $p < .001$). A *post hoc* Ryan-Einot-Gabriel-Welsch multiple F test with $\alpha = .05$ was used to group the legends into homogenous subsets. There were five subsets with similar survival scores, with ten legends in the subset with the highest mean survival score. There were seven subsets with similar social scores, with six legends in the subset with the highest mean score. Only one legend was found which featured in both the highest social subset and the highest survival subset. Legends within a subset were considered not significantly different (see

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supplementary material C for tables showing the homogenous subsets for each scale). Legends within the high subsets for survival information were considered ‘survival type’ legends, those within the high subsets for social information were considered ‘social type’ legends and those which featured in high subsets for both social information and survival information were considered ‘combined type’ legends. Significant correlations were found between social information scores and emotional scores ($r_{358} = .17$, $p < .005$) and between social information score and gender stereotype score ($r_{358} = .48$, $p < .001$). No other ratings were significantly correlated (*ps* > .05).

Discussion

These results indicate that urban legends vary significantly in their content. Of the potential content biases suggested by previous research (see Mesoudi & Whiten, 2008), there was evidence for all such biases across the legends with significantly high ratings in emotional content, survival information, social information and stereotyped behaviour. Significant correlations were found between social information and emotional content and between social information and gender stereotyped behaviour content, suggesting that these biases may often be found together in urban legends. Equally, gender stereotyped behaviour is unlikely to appear without social information as it implicitly requires some form of human interaction in most cases. Of particular relevance to this study, urban legends can be seen to feature content which would exploit a bias for social information and content which would exploit a bias for survival information. These results further support the argument that urban legends provide a fruitful avenue for research into the effects of content biases on the cultural transmission and evolution of narratives.

Study 2

This study uses the ratings from Study 1 to select survival type, social type and combined type legends to be passed along a linear transmission chain. Previous research has successfully used this design to demonstrate a social information bias (Mesoudi, et al., 2006), while individual memory experiments have demonstrated an advantage for survival information in recall (Nairne & Pandeirada, 2008; Nairne, Thompson & Pandeirada, 2007). This study makes a direct comparison between both proposed biases and also examines the effects of combining both biases in a single narrative. The primary focus of this study is the potential effects of these biases on cumulative recall in a micro-culture in the absence of communicative intent, as communicative intent has been shown to affect the emergence of biases in transmission (Lyons & Kashima, 2006)

Participants

Sixty participants (48 females) took part in Study 2. Their ages ranged from 16 to 52 years with a mean age of 22.52 years (SD = 8.72). The majority (57%) were undergraduate students studying psychology, and others were prospective students and parents attending a Psychology Department Open Day; all participants under the age of 18 took part with their parents' consent.

Design

A linear transmission chain design was used, in which the first participant in each of the twenty chains received three legends, one of each type (social, survival and combined, based on the results of Study 1) and the control material. A within-groups design was used so that each participant would contribute to the cumulative recall of each type of legend. The order in which each chain was presented with these was counterbalanced so no legend type or the control material appeared in the same position more than any other. The next participant was presented with the material that had been recalled by the previous participant. Each of the twenty chains comprised of three participants or ‘generations’. Three generations was judged to be an optimum chain length, capable of capturing long-term cumulative effects of cultural transmission but short enough to be practical in terms of participant recruitment and has been used successfully in previous research (Barrett & Nyhof, 2001; Nielson, Cucchiaro & Mohamedally, 2012). Each individual legend was passed along ten chains.

Material

From the seventeen original legends used in Study 1, two social type legends, two survival type legends and two combined type legends were selected (see Table 1 for an overview and supplementary material D for the full text of the legends used). Outside of the relevant scales, these legends were matched for plausibility, emotional content and gender stereotyped behaviour where possible (see supplementary material E for the mean differences between the legends used in Study 2). The two social type legends appear in the highest social score subset and the lowest survival score subset. The two survival type legends appear in the highest survival score subset and the lowest social score subset. One combined type legend (Combined-Gang) appears in both the highest social score and highest survival score subsets, the other combined type legend (Combined-Killer) appears in the highest survival score subset and the third highest social score subset. No legend other than Combined-Gang appeared in the highest subsets for both social and survival scores so Combined-Killer represents the best choice for a second legend combining social and survival scores.

The strong correlation between social information and gender stereotyped content means that one potentially conflicting bias was gender stereotype. Social-Birthday scored significantly higher in gender stereotype than Survival-Chicken and Combined-Gang (*ps* < 0.05). Combined-Killer also scored significantly higher than Survival-Chicken ($p < .05$) and the control material was rated significantly lower in gender stereotype than all legends accept

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for Survival-Chicken (*ps* < 0.05). As such legends were also categorised as either stereotype low (control material, Survival-Chicken), stereotype medium (Social-Cybersex, Combined-Gang, Combined-Killer, Survival-Spiders) and stereotype high (Social-Birthday) according to their position in the homogenous subsets and relationship to each other in terms of gender stereotype score.

[Table 1 about here]

Procedure

Participants were asked to take part in a study regarding the cultural transmission of urban legends. Participants were individually presented with the experimental materials on a computer. They were asked to read the material (legend or control), then on a new page they had to type what they remembered of this material, they then repeated this for all material presented to them. No distracter task was performed and no time limit for recall was set. As previous research has demonstrated that communicative intent can alter the content of material transmitted in a diffusion chain, including altering the degree to which content biases are represented (Lyons and Kashima, 2006), participants were not told that the material had come from a previous participant or that their recall would be presented to another participant. This was done with the intention of focusing on the effects of cumulative recall rather than communicative choice (which would be examined in Study 3).

Coding

Following previous studies which used a linear transmission chain design (Bangerter, 2000; Kashima, 2000; Mesoudi, et al., 2006; Mesoudi & Whiten, 2004), a propositional analysis (Kintsch, 1974) was performed on each participant's recall. In propositional analysis the text is divided into separate propositions, defined as a predicate (a verb, adjective, or

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other relational term) with a series of ordered arguments (the complementary noun/s). As previous research has demonstrated that information relevant to the plot of a narrative is better recalled than background details (Kashima, 1997) only propositions central to the narrative were coded so as to avoid legends with more background details appearing to have poorer recall (see supplementary material D for the full text of the legends used with the central propositions highlighted). This propositional analysis was used to calculate the percentage of original central propositions correctly recalled. Percentages were used instead of total number as the original texts varied between five and six central propositions. No significant difference in the percentage of central propositions recalled was found between legends with five central propositions and legends with six.

To assess coder reliability, an independent coder blind to the study hypothesis coded two chains of each legend and the control material (20% of all material). There was a significant correlation between the coding of the independent coder and the original coder ($r_{40} = .83$, $p < .0001$).

Results

To examine whether legend type affected the fidelity of recall, a generalised linear multilevel binomial regression model was used. The analysis was conducted using the lme4 software package (Bates, Maechler, Bolker, & Walker, 2008) in R version 3.0.2 (R Core Team, 2013). The initial 'full model' had legend type, stereotype level, participant age, participant gender and generation as fixed effects without interaction, assuming a randomised structure of legend type nested within participant, nested within generation. In this full model coefficients for age, gender and stereotype level were not significant. As such a second legend type based model was used with legend type and generation as fixed effects without interaction, assuming a nested randomised structure of legend type within participant, within generation. This type based model showed a significantly better fit than a generation only model (X^2, 4 = 45.5, $p < .001$) and a stereotype level based model (X^2, 1 = 16.39, $p < .001$). The full model did not significantly improve the model fit over the type based model (X^2, 7 = 4.69, $p > .05$). Comparisons between the models can be seen in supplementary material F and the equation for the type-based model used in the analyses can be seen in supplementary material G. Table 2 shows the results of the type based model.

[Table 2 about here]

Planned contrasts revealed that recall was significantly higher in generation 1 than generation 2 ($z = 3.19$, $p < .005$) and recall in generation 2 was significantly higher than generation 3 ($z = 3.34$, $p < .001$). Figure 1 shows the pattern of recall for legend type along the chains for each generation.

[Figure 1 about here]

To examine the differences in recall between legend types multiple comparisons with a Tukey's HSD correction were conducted using the multcomp software package (Horthorn, Bretz, & Westfall, 2008). Recall for social type and combined type legends was not significantly different ($z = .00$, $p > 0.05$) but recall for both of these legend types was significantly greater than recall for the survival type legends (*zs* = 2.91, both tests $p < .05$) and the control material (*zs* = 5.14, both tests $p < .001$). Recall of the survival type legends was also significantly higher than recall of the control material ($z = 3.23$, $p < 0.01$).

Discussion

The Cumulative Effects of Recall

The aim of Study 2 was to examine the effects of different informational content on cumulative recall along a transmission chain. Previous research has suggested two potential content biases in cultural transmission: social information bias and survival information bias. This study compared the cumulative recall of urban legends featuring both types of content and a third legend type which combined both. The results show that legends that contained information regarding the interaction between third parties (the social type legends and the combined type legends) were recalled with significantly greater fidelity than the control material and the legends that contained information relevant to survival (survival type legends). This finding is consistent with previous research (Mesoudi et al., 2006) which also found social information to feature an advantage in recall in comparison to equivalent non-social information through a transmission chain. This result provides further evidence to the concept of a content bias for social information in cultural transmission.

Survival type legends were not recalled with significantly greater accuracy than legends which featured social information but were recalled with greater accuracy than the control material. This suggests that survival information alone does confer a mnemonic advantage in cumulative recall but not as great an advantage as social information. This supports previous finding by Nairne and colleagues who found that survival processing conferred a mnemonic advantage in individual memory experiments, compared to other forms of mnemonic processing (Nairne, 2010; Nairne & Pandeirada, 2008; Nairne, Thompson & Pandeirada, 2007). The results of Study 2 suggest that this mnemonic advantage granted by survival processing for an individual translates into a cumulative recall advantage across a microculture.

An objection could be raised with regards to the distinction being made between social and survival information. Nairne (2010) argues that the 'fitness-relevant' information that should feature an advantage in recall includes both ecological survival information, such

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as the presence of predators, and social information, such as third party interactions; however, the results of Study 2 suggest that the distinction between social and survival information should be made. The results suggest that social information is particularly salient compared to other forms of fitness-relevant information and as a result may be unique in the way humans preferentially attend to, recall and transmit it.

That the combined type legends were recalled with the same accuracy as the social type legends suggests that social information is key to the success of the cultural transmission of an urban legend narrative. There were no apparent recall benefits to combining two potential content biases. This could be a result of the nature of the bias it was combined with; survival information on its own did not grant as much of an advantage in recall across the chains as social information, so it may not infer a greater advantage in a narrative which also contains social information. Future studies could examine how different potential content biases interact and effect transmission when they are combined.

That legends high in gender stereotyped behaviour also featured high levels of recall could be considered support for previous research which has suggested a content bias for gender stereotype consistent information in cultural transmission (Bangerter, 2000; Kashima, 2000). Although, Lyons and Kashima (2006) found that stereotype consistency bias only emerged in a transmission chain when there was communicative intent rather than just recall as in study 2. As the gender stereotype content in the legends was not the focus of the study the evidence from the results can only be considered inconclusive with regards to true support for gender stereotype bias and the level of social information is likely to be a better explanation of the results. It does suggest, however, that future studies examining gender stereotype or social information bias should consider if both biases are being exploited by the material at once, this is particularly pertinent if the material is ‘gossip’ or involves sexual behaviour.

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Transformations

As demonstrated by Bartlett (1932), one advantage to using the transmission chain design is that the recall of participants can transform the original material in interesting ways that reflect cognitive content biases. In Study 2 a number of transformations were observed. In the combined-gang legend, the last sentence – "Apparently, the poor boy had been attacked as part of a gang initiation" was frequently transformed. In the majority of chains, the word "apparently" was lost in the first or second generation. This is consistent with theories regarding the development of rumour; where ambiguous information is transformed to become fact (Shibutani, 1966). The ambiguous word "attacked" was also transformed in a number of cases to something more specific and emotive such as "stabbed" (chains 7 and 9) or "murdered" (chain 10). This could be explained by the content evolving through transmission to become increasingly emotive, and therefore further exploit the high emotion bias suggested by Heath et al. (2001).

Another interesting transformation was found in the social-birthday legend. In the first generation of one chain the sentence – "The boss of a small company took *his* attractive secretary out for a long lunch on his birthday [emphasis ours] " was transformed into the sentence – "The boss of a small company took *her* attractive secretary out for lunch on his birthday [emphasis ours]". This is essentially a gender-swap that changes the narrative from being gender stereotype consistent to being gender stereotype inconsistent. By the second generation the gender of the boss character had returned to being male. This change in the second generation is consistent with research suggesting a bias for gender stereotype consistent narratives (e.g. Bangerter, 2000; Kashima, 2000).

The results of Study 2 provide further evidence for the presence of a social information bias in human cultural transmission at the level of recall. It suggests that this is

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true of narratives where the social information is the primary narrative focus and of narratives that also contain survival information. Evidence was also found for a survival information bias in cultural transmission at the level of recall, although to the same extent as social information. These findings provide support for the *Machiavellian* and *Social Brain* hypotheses of human intelligence evolution and to a lesser extent provide support for the concept that human memory evolved to preferentially recall fitness-related ecological information.

Study 3

While previous research into content biases in cultural transmission has largely relied on the transmission chain paradigm (Mesoudi & Whiten, 2008), in true cultural transmission, selection is not limited by recall ability alone. While memory is important, as an oral narrative must be recalled to be retold, audience feedback and choice as well as the teller's own preferences will affect the transmission of a narrative (Dégh & Vazsonyi, 1975; Lyons & Kashima, 2006; Rubin, 1995; von Sydow, 1948/1965). The choice of the teller can be particularly pertinent as they will not always transmit everything they remember and may refrain from transmitting information if they doubt its truthfulness (Lyons & Kashima, 2003). Tellers are also likely to prefer to transmit information which will keep their audience entertained and/or intrigued (Kashima, Lyons & Clark, 2012). Eriksson and Coultas (2014) argue that research should distinguish between three distinct phases of cultural transmission: 'choose-to-receive', 'encode-and-retrieve' and 'choose-to-transmit'. In using the transmission chain paradigm previous content bias research has demonstrated biases in one phase, encode-and-retrieve, but not the other two. Previous research into emotional bias by Heath et al. (2001) demonstrated an advantage for disgusting material in a choose-to-transmit paradigm and Eriksson and Coultas (2014) have expanded this to investigate emotional biases in the two other phases encode-and-retrieve and choose-to-receive. They found an advantage across

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all three phases of transmission for urban legends which evoked higher levels of disgust. Lyons and Kashima (2006) found that stereotype consistency bias only emerged in a transmission chain when there was communicative intent as opposed to just recall, suggesting that the choose-to-transmit phase plays an important part in how this bias operates. This third study importantly extends previous work examining *social information bias* and *survival information bias* by looking beyond the encode-and-retrieve phase and by examining how these biases operate across the choose-to-receive and choose-to-transmit phases.

Participants

Thirty participants (24 females) took part. Their ages ranged from 18 to 22 years with a mean age of 19.43 years (SD = .97). These were all undergraduate students studying psychology. No participants taking part in Study 3 had taken part in either Study 1 or Study 2.

Material

For the *choose-to-receive phase*, six ‘headlines’ were produced from the legends used in Study 2, describing the key elements of each legend (two each of survival type, social type and combined type; see Table 3 for the six headlines used). The material for the *choose-to-transmit* phase was the same six legends used in Study 2.

[Table 3 about here]

Procedure

For the *choose-to-receive phase* participants were presented with a list of ‘headlines’ and were asked to read them all (the order of headlines on the lists was counterbalanced). After reading the headlines they were asked to rank them in the order of their interest in reading the story from which the headline was derived. As assessment of this phase required

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participants to demonstrate which story they would be most likely to choose to read, a self-report paradigm was thought to be ecologically valid. While the participants could be influenced by experimenter effects, this could be the case in any paradigm examining this phase. In the *choose-to-transmit phase* participants were provided with all six legends (the order in which they received them was counterbalanced and was not the order selected in the *choose-to-receive phase*). They were asked to read the material and then asked to rank the legends in the order of their interest in passing that story on to another person. Self-report was used in this phase due to practical restrictions and to any potential audience effects that could influence the participants' choice if they expected to actually pass the story on. Urban legends are rarely told to strangers so using a paradigm in which participants actually passed the story on may not be ecologically valid.

Results

In both the choose-to-receive and choose-to-transmit phases a lower number indicates a higher rank i.e. the highest rank is one.

Choose-to-receive Phase

A Friedman test was used to assess variance in rank across individual's 'choice to receive' for all the individual legends. Mean rank varied significantly across the six legends ($\chi^2_5 = 34.23$, $p < .001$). *Post hoc* analyses with Wilcoxon tests were conducted, with a Bonferroni-Holm correction applied, to examine the differences between legends. This analysis revealed that Combined-Killer (M = 2.5, SD = 1.55) ranked significantly higher than Combined-Gang (M = 3.63, SD = 1.59), Social-Birthday (M = 4.2, SD = 1.42), and Survival-Chicken (M = 4.83, SD = 1.39), *zs* = 370 – 424, *ps* < .05. Social-Cybersex (M = 2.8, SD = 1.56) ranked significantly higher than Social-Birthday and Survival-Chicken, *zs* = 389, 406.5,

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ps < .05, and Survival-Spiders (M = 3.03, SD = 1.63) ranked significantly higher than Survival-Chicken, *z* = 394.5, *p* <0.05; see Figure 2.

[Figure 2 about here]

A Friedman test was used to assess variance in rank across the *choose-to-receive phase* for the legend types. Mean rank varied marginally significantly across legend type (χ^2_2 = 5.67, *p* = .06). *Post hoc* analyses with Wilcoxon tests were conducted, with a Holm-Bonferroni correction applied, to examine the differences between legend types. The largest difference was found between combined type legends (M = 3.07, SD = 1.28) and survival type legends (M = 3.93, SD = .93) but this was not significant (*z* = 265, *p* = .069). All other comparisons were not significant (*zs* = 135, 198, *ps* > .05).

Choose-to-transmit Phase

A Friedman test was used to assess variance in rank across the *choose-to-transmit phase* for the individual legends. Mean rank varied significantly across the six legends (χ^2_5 = 15.57, *p* < .01). *Post hoc* analyses with Wilcoxon tests were conducted, with a Bonferroni-Holm correction applied, to examine the differences between legends. This analysis revealed Social-Cybersex (M = 2.93, SD = 1.70) ranked marginally significantly higher than Social-Birthday (M = 4.33, SD = 1.35), *z* = 371.5, *p* = .06; see Figure 3. Comparisons between other legends were not significant (*zs* = 194.5 – 367, *ps* >.05).

[Figure 3 about here]

A Friedman test was used to test for variance in rank across the *choose-to-transmit phase* for the legend types but no significant variation in mean rank was found (χ^2_2 = 5.41, *p* > .05).

Discussion

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The aim of Study 3 was to examine how social information bias and survival information bias operate on two distinct phases of transmission, the *choose-to-receive phase* and the *choose-to-transmit phase*. Previous research has demonstrated these biases in the *encode-and-retrieve phase*, but has not investigated their effect outside of that single phase. The experiment also examined the effect of combining both social and survival information on transmission across these phases. The results demonstrate no particular preference for either survival or social information at the *choose-to-receive* phase with both being equally preferred as legend types. Legends which combined both showed a slight advantage but this was not significant. Further research should investigate how different combinations of biases operate at this phase of transmission. In the choose-to-transmit phase, no advantage for any legend type was found, suggesting that people are equally willing to pass on legends that contain social information, survival information and combine the two. A possible limitation of the approach used in this study is that the results were based on self-reported data. While self-report may be a plausible means to measure the choose-to-receive phase to it may be less appropriate in the choose-to-transmit phase as participants may not have an accurate perception of which stories they would actually transmit in a real life situation, however, it would be practically challenging to replicate the transmission of urban legends in an experimental setting while remaining ecologically valid.

General Discussion

The aim of these studies was to examine the effects of social information bias, survival information bias and combining both biases on the cultural transmission of urban legends across three distinct phases of transmission: the *choose-to-receive phase*, the *encode-and-retrieve phase* and the *choose-to-transmit phase*. Taken together the results for Studies 2 and 3 demonstrate the importance of examining transmission in all of these different phases when seeking to demonstrate a content bias in cultural transmission. Previous research by

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Eriksson and Coultas (2014) into emotional bias found a largely consistent transmission advantage for content that evoked high levels of disgust across all three phases of transmission while another study by Lyons and Kashima (2006) found that stereotype consistency bias only emerged when there was communicative intent rather than emerging from a recall advantage. Our results show that social information has an advantage over survival information in the *encode-and-retrieve phase*, the phase based on recall, but this was not consistent in the other phases. In both the *choose-to-receive phase* and the *choose-to-transmit phase* neither bias had an advantage over the other.

The fact that social information was most advantageous in the encode-and-retrieve phase when there was no communicative intent suggests that this bias operates at the level of a recall advantage. This suggests that humans have a predisposition towards preferentially recalling narratives which contain social information over survival information. Our result lends partial support to the *Machiavellian Intelligence* (Byrne & Whiten, 1988, Whiten 1999; Whiten & Byrne, 1997) or *Social Brain* (Dunbar, 1998, 2003) hypotheses that intelligence evolved in order to deal with complex social relationships. However, no evidence was found to support the prediction of these hypotheses that humans will also preferentially attend to or choose to transmit social information over survival information. In both these cases there was no apparent preference for social information over survival information. The *choose-to-transmit* phase is the phase most influenced by what the transmitter believes that their audience will respond to and the neutral finding here could be due to participants imagining passing on a story rather than actually doing so. Future experiments could examine audience effects on the *choose-to-transmit phase* of transmission and communicative intention.

The legends combining both social information and survival information were as successful in recall as the social legends and had a recall advantage over legends containing survival information alone. This suggests that survival information needs to be combined

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with another bias to be as culturally successful as social information or possibly be exceptionally memorable in order to 'survive' the encode-and-retrieve phase. Given these results, in the general corpus of urban legends one could expect to see fewer urban legends that contain survival information than social information, or for the former to exploit additional biases. This is supported by a content analysis of 256 urban legends, which found a greater number of legends that contained social information than survival information and also found survival information to be commonly combined with other biases (Stubbersfield, Tehrani & Flynn, 2014). Previous research (Eriksson & Coultas, 2014; Heath et al., 2001) has suggested that urban legends exploit a bias for content that evokes high emotion, particularly disgust. This high emotion bias could explain the prevalence of survival type legends more accurately than survival information bias. However, as disgust is so associated with survival mechanisms (avoiding contaminated food, etc.), future research should examine if the high emotion bias in transmission is found for emotions other than disgust.

While Mesoudi et al. (2006) used original material created for the purpose of the experiment, Study 2 and 3 used real urban legends. Although they were altered in terms of word length for the purposes of the study multiple versions of any urban legend always exist with no 'true' version, so the material used in the present study is an accurate representation of narratives that are transmitted between people orally and through electronic communication. There are a number of benefits to using 'real world' material in such an experiment but this can come at the cost of full control over the features of the material. In this experiment efforts were made to control for any confounding variables in terms of content and differences in social and survival information provide the best account for the observed differences in recall. The fact that urban legends that contain some social information were found to have an advantage in the encode-and-retrieve phase of transmission in an experimental setting suggests that this is also the case for these legends in

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the ‘real world’ and provides an explanation for the large number of legends which feature some form of social information (Stubbersfield, Tehrani & Flynn, 2014).

The studies presented here demonstrate that social information bias provides a transmission advantage over survival information in the *encode-and-retrieve phase* of transmission but has no strong advantage in either the *choose-to-receive* or *choose-to-transmit phases*. Survival information was found to have an advantage over control material at the encode-and-retrieve phase, although this advantage was not as great as social information. To succeed in cultural transmission, survival information is likely to be combined with a more successful bias, such as social information, although other biases such as emotional bias are also likely candidates. Future research examining content biases in cultural transmission should consider how these biases operate across all three phases of transmission and not just focus on the encode-and-retrieve phase. New experimental paradigms that go beyond the traditional linear transmission chain could be used and developed to allow for further investigation into the effects of content biases on the choose-to-receive and choose-to-transmit phases. By investigating these phases separately new information can be discovered with regard to how the biases operate and new predictions could be made in terms of how biased content is transmitted.

References

Bangerter, A. (2000). Transformation between scientific and social representations of conception: the method of serial reproduction. *British Journal of Psychology*, 97, 405-423.

Barrett, J.L., & Nyhof, M.A. (2001). Spreading of non-natural concepts: the role if intuitive conceptual structures in memory and transmission of cultural materials. *Journal of Cognition and Culture*, 1, 69-100.

Bartlett, F.C. (1932). *Remembering*. Oxford: Macmillan.

Best, J., & Horiuchi, G.T. (1985). The razor blade in the apple: the social construction of urban legends. *Social Problems,* 32, 488-499.

Blackmore, S. (1999). *The Meme Machine*. New York: Oxford University Press.

Brunvand, J.H. (1986). *The Mexican Pet*. New York: Norton.

Brunvand, J.H. (1999). *Too Good to be True: The Colossal Book of Urban Legends*. New York: Norton.

Brunvand, J.H. (2000). *The Truth Never Stands in the Way of a Good Story*. Chicago: University of Illinois Press.

Byrne, R.W., & Whiten, A. (Eds.). (1988*). Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*. Oxford: Clarendon Press.

Clutton-Brock, T. H., & Harvey, P. H. (1980). Primates, brains and ecology. *Journal of the Zoological Society of London*, 190, 309–323.

Dawkins, R. (1976). *The Selfish Gene*. Oxford: Oxford University Press.

Dégh, L., & Vazsonyi, A. (1975). The hypothesis of multi-conduit transmission in folklore. In D. Ben-Amos & K. S. Goldstein (Eds.), *Folklore: Performance and Communication* (pp. 207-252). Paris: Mouton.

Dunbar, R.I.M. (1993). Coevolution of neocortical size, group size and language. *Behavioural and Brain Sciences*, 16, 681-735.

Dunbar, R.I.M. (1998). The social brain hypothesis. *Evolutionary Anthropology*, 6, 178-190.

Dunbar, R. I. M. (2003). The social brain: mind, language, and society in evolutionary perspective. *Annual Review of Anthropology*, 32, 163–181.

Ellis, B. (1983). De legendis urbis: modern legends in ancient Rome. *Journal of American Folklore*, 96, 200-208.

Eriksson, K., & Coultas, J. C. (2014). Corpses, maggots, poodles and rats: emotional selection operating in three phases of cultural transmission of urban legends. *Journal of Cognition and Culture*, 14, 1-26.

Fine, Gary A. 1979. Cokelore and Coke law: urban belief tales and the problem of multiple origins. *Journal of American Folklore* 92:477–482.

Fine, G.A. (1980). The Kentucky fried rat: legends and modern society. *Journal of the Folklore Institute*, 17, 222-243.

Fox Tree, J.E., & Weldon, M.S. (2007). Retelling urban legends. *The American Journal of Psychology*, 120, 459-476.

Heath, C., Bell, C., & Sternberg, E. (2001). Emotional selection in memes: the case of urban legends. *Journal of Personality and Social Psychology*, 81, 1028-1041.

This is an accepted version of:
Stubbersfield, J.M., Tehrani, J.J. and Flynn, E.G. (2015), Serial killers, spiders and cybersex: Social and survival information bias in the transmission of urban legends. Br J Psychol, 106: 288-307. https://doi.org/10.1111/bjop.12073

Kang, S., McDermott, K. B., & Cohen, S. (2008). The mnemonic advantage of processing fitness-relevant information. *Memory & Cognition*, 36, 1151-1156.

Kashima, Y. (1997). Culture, narrative, and human motivation. In D. Munro, J.F. Schumaker, & S.C. Carr (Eds.). *Motivation and Culture* (pp. 16-30). New York: Routledge.

Kashima, Y. (2000). Maintaining cultural stereotypes in the serial reproduction of narratives. *Personality and Social Psychology Bulletin*, 26, 594-604.

Kashima, Y., Lyons, A., & Clark, A. (2013). The maintenance of cultural stereotypes in the conversational retelling of narratives. *Asian Journal of Social Psychology*, *16*, 60-70.

Kintsch, W. (1974). *The Representation of Meaning in Memory*. Oxford: Erlbaum.

Lyons, A., & Kashima, Y. (2003). How are stereotypes maintained through communication? The influence of stereotype sharedness. *Journal of personality and social psychology*, *85*(6), 989.

Lyons, A., & Kashima, Y. (2006). Maintaining stereotypes in communication: investigating memory biases and coherence-seeking in storytelling. *Asian Journal of Social Psychology*, *9*, 59-71.

Mar, R.A., & Oatley, K. (2008). The function of fiction is the abstraction and simulation of social experience, *Perspectives on Psychological Science*, 3, 173-192.

McGuigan, N., & Cubillo, M. (2013). Cultural transmission in young children: when social information is more important than non-social information. *The Journal of Genetic Psychology*.

This is an accepted version of:
Stubbersfield, J.M., Tehrani, J.J. and Flynn, E.G. (2015), Serial killers, spiders and cybersex: Social and survival information bias in the transmission of urban legends. Br J Psychol, 106: 288-307. https://doi.org/10.1111/bjop.12073

Mesoudi, A., & Whiten, A. (2008). The multiple roles of cultural transmission experiments in understanding human cultural evolution. *Philosophical Transactions of the Royal Society B*, 363, 3489-3501.

Mesoudi, A., Whiten, A., & Dunbar, R.I.M. (2006). A bias for social information in human cultural transmission. *British Journal of Psychology*, 97, 405-423.

Mullen , Patrick B. 1972. Modern legend and rumor theory. *Journal of the Folklore Institute* 9:95–109.

Nairne, J.S. (2010). Adaptive memory: evolutionary constraints on remembering. *Psychology of Learning and Motivation*, 53, 1-32.

Nairne, J.S., & Pandeirada, J.N.S. (2008). Adaptive memory: is survival processing special? *Journal of Memory and Language*, 59, 377-385.

Nairne, J.S., & Pandeirada, J.N.S. (2010). Adaptive memory: nature's criterion and the functionalist agenda. *American Journal of Psychology*, 4, 381-390.

Nairne, J.S., Pandeirada, J.N.S., & Thompson, S.R. (2008). Adaptive memory: the comparative value of survival processing. *Psychological Science*, 19, 176-180.

Nairne, J.S., Thompson, S.R., & Pandeirada, J.N.S. (2007). Adaptive memory: survival processing enhances retention. Journal of Experimental Psychology: Learning, *Memory, and Cognition*, 33, 263-273.

Nielson, M., Cucchiaro, J., & Mohamedally, J. (2012). When the transmission of culture is child's play. *PLoS One*, 7, e34066.

Otgaar, H., Smeets, T., & van Bergen, S. (2010). Picturing survival memories: enhanced memory after fitness-relevant processing occurs for verbal and visual stimuli. *Memory and Cognition*, 38, 23–28.

Owens, J., Bower, G. H., & Black, J. B. (1979). The soap opera effect in story recall. *Memory and Cognition*, 7, 185–191.

Packman, J.L. & Battig, W.F. (1978). Effects of different kinds of semantic processing on memory for words. *Memory and Cognition,* 6, 502–508.

Reysen, M. B., Talbert, N. G., Dominko, M., Jones, A. N., & Kelley, M. R. (2011). The effects of collaboration on recall of social information. *British Journal of Psychology*, 102, 646-661.

Rubin, D. C. (1995). *Memory in Oral Traditions: The Cognitive Psychology of Epic, Ballads, and Counting-out Rhymes*. Oxford: Oxford University Press on Demand.

Shibutani, T. (1966). *Improvised News: A Sociological Study of Rumor*. New York: Bobbs-Merrill.

Simpson, Jacqueline. (1981). Rationalized motifs in urban legends. *Folklore*, 92, 203–207.

Sperber, D. (1996). *Explaining Culture: A Naturalistic Approach*. Oxford: Blackwell Publishing.

Stubbersfield, J.M., Tehrani, J.J., & Flynn, E.G. (2014). *Santa Crucified and Death by Lollypop: Culture, Cognition and the Epidemiology of Urban Legends*. Manuscript submitted for publication.

Tangherlini, T.R. (1990). "It happened not too far from here...": a survey of legend theory and characterization. *Western Folklore*, 49, 371-390.

This is an accepted version of:
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Victor, J. (1990). Satanic cult rumors as contemporary legend. *Western Folklore*, 49, 51-81.

Von Sydow, C.W. (1965). Folktale studies and philology: some points of view. In A. Dundes (Ed.), *The Study of Folklore* (pp. 219-242). Englewood Cliffs, N.J.: Prentice-Hall. (Original work published 1948).

Weinstein, Y., Bugg, J. M., & Roediger, H. L. (2008). Can the survival recall advantage be explained by basic memory processes? *Memory & Cognition*, 36, 913–919.

Whiten, A. (1999). Machiavellian intelligence hypothesis. In R. A. Wilson & F. C. Keil (Eds.), *The MIT Encyclopedia of the Cognitive Sciences* (pp. 495–497). Cambridge, MA: MIT Press.

Table 1

Legends used in Study 2 with their respective legend types and codes (see supplementary material D for full text of legends).

Legend	Legend Type	Code used in article	Mean Score (SD)	
			Social	Survival
Steroids in chicken cause ovarian cysts.	Survival	Survival-Chicken	2.50(1.76)	4.90(2.00)
Woman killed by spiders in her hair.	Survival	Survival-Spiders	2.50(1.61)	4.05(1.93)
Naked boss caught by surprise birthday party.	Social	Social-Birthday	5.45(1.32)	1.85(.99)
Father and daughter accidental cybersex.	Social	Social-Cybersex	5.85(1.04)	2.55(1.70)
Little boy attacked as part of a gang initiation.	Combined	Combined-Gang	4.90(1.21)	4.25(1.70)
Serial killer using recorded baby crying to trap women.	Combined	Combined-Killer	3.45(1.70)	5.05(1.96)

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Table 2.

Results of the best fitting model (type based)

Predictor	Coefficient	SE	*z*
(Intercept)	0.26	0.5	0.52
Social	3.24	0.63	5.14***
Survival	1.69	0.52	3.23**
Combined	3.24	0.63	5.14***
Generation 2	-1.18	0.54	-2.19*
Generation 3	-2	0.53	-3.75***
Model Fit			
AIC	192.22		
BIC	222.35		
Log Likelihood	-87.11		

Significance codes: ***<0.001, **<0.01, *<0.05

Table 3.

The headlines used as experimental material in Study 3 with their legend code (see Table 1).

Headline	Legend Code
Steroids in chicken cause ovarian cysts.	Survival-Chicken
Woman killed by spiders in her hair.	Survival-Spiders
Man caught naked by surprise birthday party	Social-Birthday
Father and daughter have accidental cybersex	Social-Cybersex
Little boy attacked in gang initiation	Combined-Gang
Serial killer lures women with a recording of a crying baby	Combined-Killer

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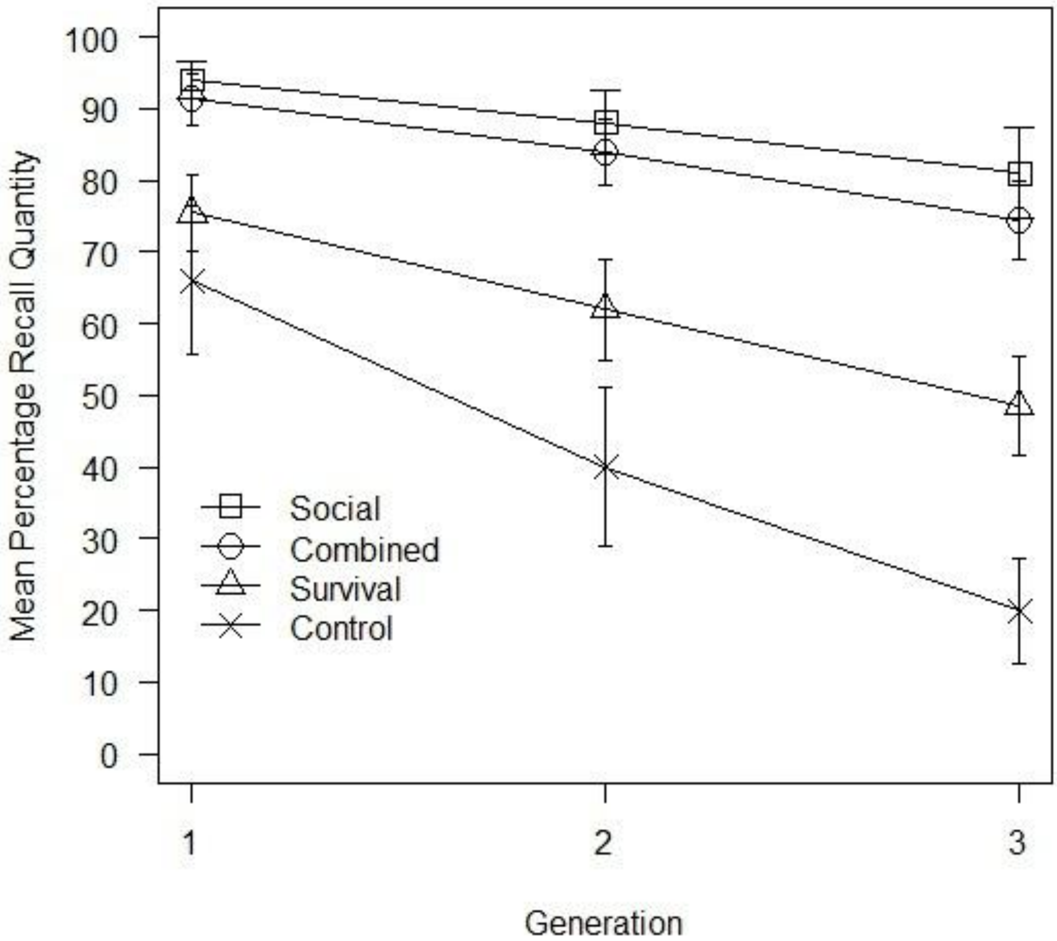

Figure 1. The mean percentage of original propositions recalled over the three generations by legend type.

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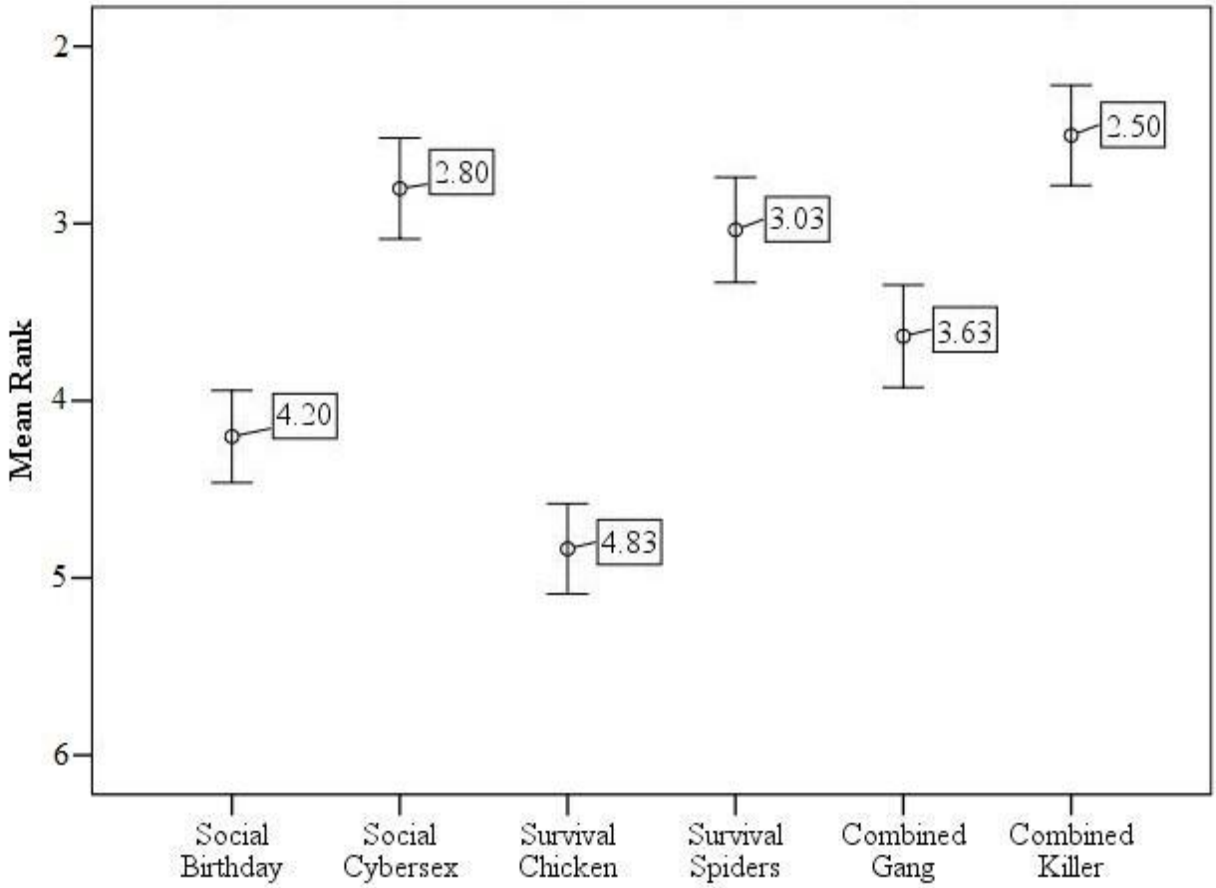

Figure 2. Mean rank of each legend in the choose-to-receive phase of transmission

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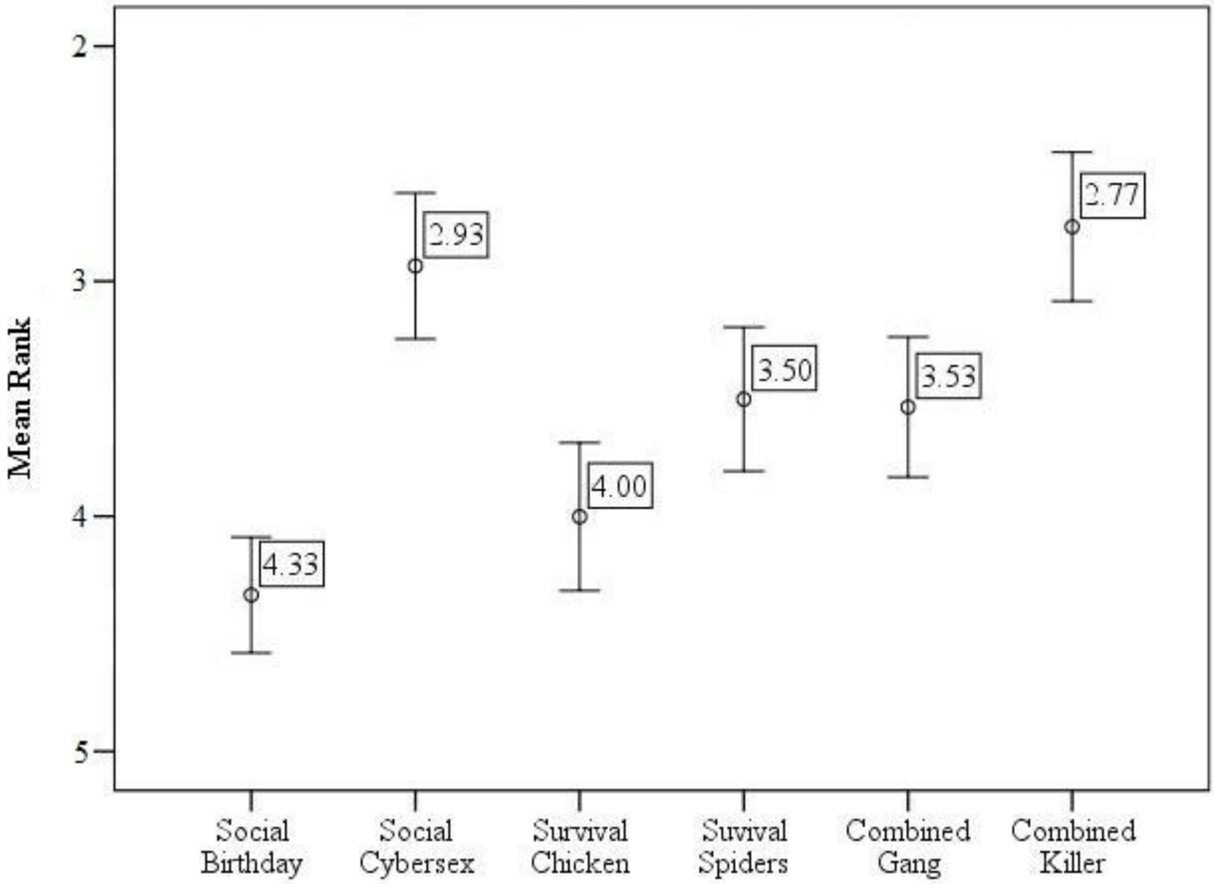

Figure 3. Mean ranks of each legend in the choose-to-transmit phase of transmission

Supplementary Material

A. Questionnaire used in Study 1.

1. Are you familiar with this story? (please tick as appropriate)
   a. Yes, I have heard it before ☐
   b. I have heard a similar story ☐
   c. No, I am not at all familiar ☐

If you answered a. or b., please complete question 2. If you answered c., please continue to question 3.

2. a. What relationship did you have with the person telling you the story? (Please circle as appropriate)

   Parent / Other relative / Partner / Friend / Stranger / Not Sure

   b. Was this person older or younger than you? (Please circle as appropriate)

   Older / Younger / Same Age / Don't Know

   c. What gender was the person telling you the story? (Please circle as appropriate)

   Male / Female / Don't Know

   d. What medium did the teller use to tell you the story? (Please circle as appropriate)

   Orally / Email / Other internet / Text message / Other Media / Not Sure

3. What emotion or emotions did you feel while reading this story? (e.g. interest, joy, anger, surprise, sadness, contempt, fear, disgust)

   ....

4. Please rate to what extent you felt each emotion (1= very little, 7 = very much)

Emotion 1. : _______________	1	2	3	4	5	6	7
Emotion 2. : _______________	1	2	3	4	5	6	7
Emotion 3. : _______________	1	2	3	4	5	6	7

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5. Please rate to what extent you believe this story to be plausible (1= likely to be true, 7= very unlikely to have taken place)

1 2 3 4 5 6 7

6. Please rate to what extent the story contains (1 = very little, 7 = a lot)

    a. Information relevant to health and survival

    1 2 3 4 5 6 7

    b. Information concerning social interaction or relationships

    1 2 3 4 5 6 7

    b. Behaviour stereotypical for either gender

    1 2 3 4 5 6 7

7. Please rate how likely you would be to pass this story on as: (1 = not likely, 7 = very likely):

A true story	1	2	3	4	5	6	7
An interesting story	1	2	3	4	5	6	7
A funny story	1	2	3	4	5	6	7

8. Please complete these details:
    a. Your age ......
    b. Your gender Male / Female

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B. Table showing Legends' mean scores from Study 1.

Legend	Mean Rating (SD)				
	Emotional	Plausibility	Survival	Social	Gender Stereotype
1. Tumour	6.50 (.89)	5.00 (1.95)	4.05 (2.11)	1.90 (1.17)	2.25 (1.65)
2. Noodles	5.30 (1.38)	3.80 (2.12)	4.15 (1.60)	1.70 (.98)	2.45 (1.79)
3. Chicken	5.50 (1.19)	4.25 (1.86)	4.90 (2.00)	2.50 (1.76)	3.00 (1.38)
4. Cybersex	6.00 (1.12)	3.75 (1.94)	2.55 (1.70)	5.85 (1.04)	3.75 (1.71)
5. Farting	5.80 (1.44)	3.50 (2.09)	1.80 (1.24)	5.20 (1.32)	4.55 (1.57)
6. Birthday	5.55 (1.05)	4.40 (1.98)	1.85 (.99)	5.45 (.95)	4.90 (1.41)
7. Gang	5.90 (1.17)	4.85 (1.39)	4.25 (1.70)	4.90 (1.21)	3.25 (1.74)
8. Caller	5.75 (1.37)	3.85 (1.95)	3.95 (1.88)	3.35 (1.66)	3.10 (1.86)
9. Hitcher	5.05 (1.50)	4.60 (1.27)	4.10 (1.74)	3.90 (1.77)	3.30 (1.95)
10. Powder	5.50 (1.32)	4.75 (1.25)	2.10 (1.21)	5.15 (1.53)	3.95 (1.73)
11. Revenge	5.00 (1.45)	4.10 (1.62)	2.30 (1.34)	5.75 (1.12)	5.10 (1.17)
12. Choke	4.80 (1.32)	4.35 (1.81)	1.90 (.97)	3.20 (1.47)	5.30 (1.84)
13. Skin	5.60 (1.39)	5.60 (1.31)	2.80 (1.88)	3.50 (1.32)	2.25 (1.59)
14. Spiders	5.35 (1.35)	3.95 (2.14)	4.05 (1.93)	2.50 (1.61)	4.10 (1.52)
15. Snake	5.65 (1.09)	5.20 (1.80)	4.20 (2.02)	2.25 (.97)	1.9 (.85)
16. Killer	5.50 (.95)	4.15 (1.63)	5.05 (1.96)	3.45 (1.70)	4.65 (1.63)
17. Clown	5.75 (1.21)	5.15 (2.08)	3.40 (2.16)	3.25 (1.86)	2.50 (1.50)
18. Control	4.70 (1.17)	3.75 (2.50)	2.50 (1.70)	1.40 (.82)	1.45 (1.15)

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C. Tables showing homogenous subsets and means.

Emotion score homogenous subsets and means.

Legend	Homogenous Subsets (α = .05) with mean scores		
	1	2	3
18. Control	4.70		
12. Choke	4.80	4.80	
11. Revenge	5.00	5.00	5.00
9. Hitcher	5.05	5.05	5.05
2. Noodles	5.30	5.30	5.30
14. Spiders	5.35	5.35	5.35
3. Chicken	5.50	5.50	5.50
10. Powder	5.50	5.50	5.50
16. Killer	5.50	5.50	5.50
6. Birthday	5.55	5.55	5.55
13. Skin	5.60	5.60	5.60
15. Snake	5.65	5.65	5.65
8. Caller	5.75	5.75	5.75
17. Clown	5.75	5.75	5.75
5. Farting	5.80	5.80	5.80
7. Gang	5.90	5.90	5.90
4. Cybersex		6.00	6.00
1. Tumour			6.50

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Plausibility score homogenous subsets and means.

Legend	Homogenous Subsets (α = .05) with mean scores	
	1	2
5. Farting	3.50	
4. Cybersex	3.75	
18. Control	3.75	
2. Noodles	3.80	3.80
8. Caller	3.85	3.85
14. Spiders	3.95	3.95
11. Revenge	4.10	4.10
16. Killer	4.15	4.15
3. Chicken	4.25	4.25
12. Choke	4.35	4.35
6. Birthday	4.40	4.40
9. Hitcher	4.60	4.60
10. Powder	4.75	4.75
7. Gang	4.85	4.85
1. Tumour	5.00	5.00
17. Clown	5.15	5.15
15. Snake	5.20	5.20
13. Skin		5.60

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Survival information score homogenous subsets and means.

Legend Code	Homogenous Subsets (α = .05) with mean scores				
	1	2	3	4	5
5. Farting	1.80				
6. Birthday	1.85				
12. Choke	1.90				
10. Powder	2.10				
11. Revenge	2.30	2.30			
18. Control	2.50	2.50			
4. Cybersex	2.55	2.55	2.55		
13. Skin	2.80	2.80	2.80	2.80	
17. Clown	3.40	3.40	3.40	3.40	3.40
8. Caller		3.95	3.95	3.95	3.95
1. Tumour			4.05	4.05	4.05
14. Spiders				4.05	4.05
9. Hitcher				4.10	4.10
2. Noodles				4.15	4.15
15. Snake				4.20	4.20
7. Gang				4.25	4.25
3. Chicken				4.90	4.90
16. Killer					5.05

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Social information score homogenous subsets and means.

Legend	Homogenous Subsets (α = .05) with mean scores						
	1	2	3	4	5	6	7
18. Control	1.40						
2. Noodles	1.70						
1. Tumour	1.90	1.90					
15. Snake	2.25	2.25	2.25				
3. Chicken	2.50	2.50	2.50	2.50			
14. Spiders	2.50	2.50	2.50	2.50	2.50		
12. Choke		3.20	3.20	3.20	3.20		
17. Clown			3.25	3.25	3.25		
8. Caller			3.35	3.35	3.35		
16. Killer			3.45	3.45	3.45		
13. Skin				3.50	3.50		
9. Hitcher					3.90	3.90	
7. Gang						4.90	4.90
10. Powder						5.15	5.15
5. Farting							5.20
6. Birthday							5.45
11. Revenge							5.75
4. Cybersex							5.85

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Gender stereotype behaviour score homogenous subsets and means.

Legend	Homogenous Subsets (α = .05) with mean scores									
	1	2	3	4	5	6	7	8	9	10
18. Control	1.45									
15. Snake	1.90	1.90								
1. Tumour	2.25	2.25								
13. Skin	2.25	2.25	2.25							
2. Noodles	2.45	2.45	2.45	2.45						
17. Clown	2.50	2.50	2.50	2.50	2.50					
3. Chicken	3.00	3.00	3.00	3.00	3.00					
8. Caller	3.10	3.10	3.10	3.10	3.10	3.10				
7. Gang		3.25	3.25	3.25	3.25	3.25	3.25			
9. Hitcher		3.30	3.30	3.30	3.30	3.30	3.30	3.30		
4. Cybersex			3.75	3.75	3.75	3.75	3.75	3.75	3.75	
10. Powder				3.95	3.95	3.95	3.95	3.95	3.95	3.95
14. Spiders					4.10	4.10	4.10	4.10	4.10	4.10
5. Farting						4.55	4.55	4.55	4.55	4.55
16. Killer							4.65	4.65	4.65	4.65
6. Birthday								4.90	4.90	4.90
11. Revenge									5.10	5.10
12. Choke										5.30

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D. Full text of urban legends used in Studies 2 and 3.

Central propositions are indicated with square brackets and numbered.

Survival-Chicken

[A woman underwent an operation to remove an ovarian cyst][1] but just a few months [later she relapsed][2] and was rushed to her gynaecologist. The [gynaecologist asked her if she often ate chicken wings][3], when she said yes he explained that, today, [chickens are injected with steroids to accelerate growth][4]. These steroids can have a terrifying effect on the body][5] and are most dangerous in the presence of female hormones. Exposure to these [steroids can lead to women being more prone to the growth of cysts in her womb][6].

Survival-Spiders

When beehive hair styles were in fashion it was almost [a competition to see which girl could get her hair the highest][1]. There was one girl who got her hair so high, and put so much hair spray on it, that she never took it down, combed it or washed it][2]. One day [she suddenly fell ill and died][3]. They found out that a [deadly spider had nested in her hair and laid eggs][4]. When [the eggs hatched the baby spiders bit into her scalp and poisoned her.][5]

Social-Birthday

The [boss of a small company took his attractive secretary out for a long lunch on his birthday][1] and they enjoyed some drinks together. Afterwards, the [secretary invited the boss up to her apartment][2] for a few more drinks and which he readily agreed to. At her apartment [she left the room to 'slip into something more comfortable'][3]. When she [returned a few minutes later with a birthday cake, surrounded by the man's friends, family, and his wife][4], they [found the surprised man waiting in nothing but his socks!][5]

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Social-Cybersex

A [student broke up with her boyfriend after they started university][1]. Feeling lonely, [she started to use internet dating and met a new guy online][2] who she began to share flirtatious messages with before [eventually winding up having fully fledged cybersex][3]. After months of an online relationship [they eventually decided to meet][4] and arranged to spend the weekend together. She waited for him in the hotel room and when her dream man came in through the door, [she was horrified to discover it had been her dad all along!][5]

Combined-Gang

A [little boy was out shopping with his mum][1] and [needed the toilet, so she let him use the gents'][2] toilet on his own rather than going into the ladies' with her. When [he didn't come back][3], his mum began to get worried and [asked a passing policeman to check in the toilet for her son][4]. The [policeman found the little boy almost immediately, lying in a pool of blood][5] in one of the cubicles. Apparently, the [poor boy had been attacked as part of a gang initiation][6].

Combined-Killer

One night a [woman heard a baby crying outside her door][1]. [She rang the police because it was late and she thought it was weird][2]. The police told her "whatever you do, do NOT open the door."][3] The [woman said that she was worried that the baby would crawl into the street and get run over][4] but the police then told her that [a serial killer has a baby's cry recorded and has been using it to coax women out of their homes so he can kill them][5].

Control Material

[Cheddar Gorge is a rock formation formed by melt water floods at the end of the last Ice Age][1]. The [limestone rock was blocked with ice which prevented water from flowing

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through it][2], so [melting water was forced to flow over the surface, carving out the gorge][3]. During warmer periods the [ice melted and water flowed underground through the limestone, creating the caves and leaving the gorge dry][4]. Today [much of the gorge has no river until an underground river emerges in the lower part from a cave.][5]

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E. Table showing the mean differences between the legends used in Chapter 5 (column – row).

	Cybersex Social	Birthday Social	Gang Combined	Spiders Survival	Killer Combined	Control
Cyst	E -.50	E -.05	E -.40	E .15	E .00	E .80
Survival	P .50	P -.15	P -.60	P .3	P .10	P .50
	G -.75	G -1.90*	G -.25	G -1.10	G -1.65*	G 1.55
	S -3.35*	S -2.95*	S -2.40*	S .00	S -.95	S 1.1
	V 2.35*	V 3.05*	V .65	V .85	V -.15	V 2.40*
Cybersex		E .45	E .10	E .65	E .50	E 1.30*
Social		P -.65	P -1.1	P -.20	P -.40	P.00
		G -1.15	G .50	G -.35	G -.90	G 2.30*
		S .40	S .95	S 3.35*	S 2.40*	S 4.45*
		V .70	V -1.70*	V -1.50*	V -2.50*	V .05
Birthday			E -.35	E .20	E -.05	E .85
Social			P -.45	P .45	P .25	P .65
			G 1.65*	G .80	G .25	G 3.45*
			S .55	S 2.95*	S 2.00*	S 4.05*
			V -2.40*	V -2.20*	V -3.20*	V -.65
Gang				E .55	E .40	E 1.20
Combined				P .90	P .70	P 1.10
				G -.85	G -1.40	G 1.80*
				S 2.40*	S 1.45*	S 3.50*
				V .20	V -.80	V 1.75*
Spiders					E -.15	E .65
Survival					P -.20	P .20
					G -.55	G 2.65*
					S -.95	S 1.1
					V -1.00	V 1.55*
Killer						E .80
Combined						P .40
						G 3.20*
						S 2.05*
						V 2.55*

Key: E = Emotion

P = Plausibility

G = Gender stereotype

S = Social info

V = Survival info

* Indicates legends are found is different subsets ($p \leq .05$)

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F. Tables showing comparisons between the models used in the analysis of Study 2.

Model comparison with predictor coefficients

Model	AIC	Predictor	Coefficient	SE	*Z*
Full	201.54	(Intercept)	1.13	1.49	0.76
		Age	-0.04	0.02	-1.54
		Gender=Male	-0.45	0.54	-0.84
		Stereotype=Low	-1.38	1.21	-1.14
		Stereotype=Medium	-1.2	0.96	-1.25
		Type=Social	2.95	0.98	3.01**
		Type=Survival	2.03	0.63	3.21**
		Type=Combined	3.55	0.9	3.94***
		Generation=1	1.17	0.36	3.29***
		Generation=2	1	0.3	3.36***
Generation Only	229.72	(Intercept)	1.24	0.18	7.01***
		Generation=1	0.81	0.28	2.9**
		Generation=2	0.71	0.23	3.13**
Type Based	192.22	(Intercept)	0.26	0.5	0.52
		Type=Social	3.24	0.63	5.14***
		Type=Survival	1.69	0.52	3.23**
		Type=Combined	3.24	0.63	5.14***
		Generation=2	-1.18	0.54	-2.19*
		Generation=3	-2	0.53	-3.75***
Stereotype Based	206.11	(Intercept)	3.93	0.86	4.57***
		Stereotype=Low	-2.92	0.81	-3.61***
		Stereotype=Medium	-1.13	0.79	-1.42
		Generation=2	-1.07	0.52	-2.05*
		Generation=3	-1.83	0.51	-3.57***

Significance codes: ***<0.001, **<0.01, *<0.05

Model comparison with goodness-of-fit tests

Model	Df	AIC	BIC	Log Likelihood	Test	X^2
1. Full	16	201.54	255.09	-84.77		
2. Type	9	192.22	222.35	-87.11	1 vs. 2	4.69
3. Generation Only	5	229.72	246.46	-109.86	3 vs. 2	45.5***
4. Stereotype	8	206.61	233.39	-95.31	4 vs. 2	16.39***

Significance codes: ***<0.001, **<0.01, *<0.05

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G. Full equation for the model used for analyses in Study 2

$$Y_{tig} \sim Binomial(1, \pi_{tig}),$$

$$logit(\pi_{tig}) = \beta_0 + \beta_1 Control_{tig} + \beta_2 Social_{tig} + \beta_3 Survival_{tig} + \beta_4 Combined_{tig} + \beta_5 Gen1_g + \beta_6 Gen2_g + \beta_7 Gen3_g + U_g P_{ig} + e_{tig},$$

$$U_g \sim N(O, \sigma_U^2),$$

$$P_{ig} \sim N(O, \sigma_P^2),$$

$$e_{tig} \sim N(O, \sigma_e^2)$$

Where Y_{tig} denotes the observed percentage of central propositions recalled for legend type *t*, by participant *i*, in generation *g* and π_{tig} denotes the proportion of central propositions recalled for legend type *t*, by participant *i*, in generation *g*. The fixed intercept for the mean of all responses is denoted by β_0. The fixed intercepts of each material type (control, social, survival and combined type) are denoted by β_1 to β_4 and β_5 to β_7 denotes the fixed intercepts of each transmission generation (1, 2 and 3). The random effect of participant at the level of generation is denoted by $U_g P_{ig}$ and e_{tig} denotes individual level errors.