Running head: An evolved cognitive bias for social norms

An evolved cognitive bias for social norms

RICK O'GORMAN[a], DAVID SLOAN WILSON[b,c], and RALPH R. MILLER[d]

[a]Department of Psychology, University of Kent, Canterbury, CT2 7NP, UK

[b]Department of Biological Sciences, State University of New York at Binghamton, Binghamton, NY13902-6000

[c]Department of Anthropology, State University of New York at Binghamton, Binghamton, NY13902-6000

[d]Department of Psychology, State University of New York at Binghamton, Binghamton, NY13902-6000

Correspondence concerning this article should be addressed to Rick O'Gorman, Department of Psychology, Keynes College, University of Kent, Canterbury, CT2 7NP, United Kingdom, email: rogorman@alumni.binghamton.edu, tel: +44 1227 827374, fax: ++44 1227 827030.

Word count for the text: 5090

Abstract

Social norms are a widely used concept for explaining human behavior, but there are few studies exploring how we cognitively utilize them. We incorporate here an evolutionary approach to studying social norms, predicting that if norms have been critical to biological fitness, then individuals should have adaptive mechanisms to conform to, and avoid violating, norms. A cognitive bias toward norms is one specific means by which individuals could achieve this. To test this, we assessed whether individuals have greater recall for normative information than non-normative information. Three experiments were performed in which participants read a text and were then tested on their recall of behavioral content. The data suggest that individuals have superior recall for normative social information, and performance is not related to rated importance. We discuss how such a cognitive bias may ontogenetically develop and identify possible hypotheses that distinguish between alternative explanatory accounts for social norms.

Keywords: social norms, social influence, recall bias, conformism, cooperation

An evolved cognitive bias for social norms

1. Introduction

The social life of humans is guided by social norms. These cultural rules shape and structure our daily behaviors, guiding much of what we do and do not do by prescribing what behavior is acceptable (Cialdini & Trost, 1998). Yet despite their widespread use in psychological theories (e.g., Hechter & Opp, 2001), the functions of normative behavior are not empirically well established from either an evolutionary or proximate perspective and have tended to be taken for granted as a social phenomenon. Of course, some social patterns of behavior that are labeled as social norms may not be learned behaviors at all (e.g., incest avoidance), but a vast array of social patterns of behavior are self-evidently learned.

There are a number of theoretical models that may account for the functions of social norms that we can outline briefly here. One simple account of social norms is that they are the result of social learning (Bandura, 1977), with some behaviors becoming particularly prevalent in a population, perhaps due to, in some sense, a "tipping point" effect (Gladwell, 2000), in which their distributions are curtailed only by group boundaries. A slightly varied version of this model views some norms as a result of a corresponding meme (Dawkins, 1976). Alternatively, "normative conformity" (Henrich, 2004) may have

an ancient phylogenetic history; many gregarious animal species demonstrate a simple version of conforming behavior, "following the herd" to avoid exposure to predators (Hamilton, 1971). However, people's responses to social norms, violations of norms, and changes in norms suggest that norms are not due solely to incidental group boundaries or selfish herds, although these may play a role.

A second more sophisticated account of norms suggests that they may result from an evolved strategy to avoid the costs of individual learning: If successful behaviors tend to become widespread, then adopting widespread behaviors should tend to result in the acquisition of beneficial behaviors (Boyd & Richerson, 1985). Furthermore, Richerson and Boyd (2005) have argued that a conformism bias can reduce the chances of individuals making errors when sampling for prevalent beneficial behaviors. Henrich and Boyd (1998) have shown that a conformity bias can evolve if humans existed in an environment that fluctuated (though not too rapidly), provided inference by individuals from environmental cues is neither too accurate nor too error-prone. In fact, they show that a conformity bias is likely to evolve even when reliance on social learning is limited, and that a conformity bias can enhance reliance on social learning. Empirically, it has been shown that individuals increasingly rely on a conformist tendency as task importance increases (Baron, Vandello, & Brunsman, 1996).

A third account is that certain behaviors may achieve some form of symbolic status for a group, such that adopting the behavior is required to be considered part of the ingroup

(Boyd & Richerson, 1987; e.g., Fitch, 2000). The ingroup mechanism is powerful in humans, easily elicited, and once a behavior is seen as a badge for the group, adopting it would be critical to full group membership. Prapavessis and Carron (1997) have shown that an increased sense of rapport and trust can be facilitated from perceptible similarity due to norms. Public signals could enhance and stabilize this effect, either by requiring group members to invest resources of time and/or energy in displaying membership cues (e.g., religious rituals, Sosis, 2003), or at least publicly advertise group allegiance, making switching membership costly by virtue of having to convince the new group that the individual's allegiance is substantial. Related, Fessler (2004) has argued that the behavioral correlates of shame indicate an individual's awareness of violating a norm, signaling both awareness and contrition. A fourth possible cause of social norms, group coordination and cohesiveness, driven by intergroup competition for resources and direct conflict (Bugental, 2000), would benefit from tangible markers showing group allegiance. Such coordination may be the result of Nash-equilibrium type situations, where one particular goal or behavior requires group coordination to attain and represents a stable optimal choice for the group as a whole.

Finally, norms may be the product of cooperative group behavior, perhaps even being elevated to moral norms or rules (Boehm, 1999; Sober & Wilson, 1998; Wilson, 2002). Wilson and Kniffin (1999) have shown that a conformity bias can evolve due to between-group selection while Richerson and Boyd (2005) have argued that a conformity bias can serve as a means at the cultural level to filter errors that individuals make when

acquiring prevalent behaviors. Conformism plays an important theoretical role in the evolution and maintenance of cultural evolution, and of cooperative behaviors so derived (Richerson & Boyd, 2005). In such cases, nonconformity constitutes a form of free-riding and requires a deterrent. Punishment of norm violators appears to be a near-universal trait of humans (Brown, 1991). Violations of norms often carry negative consequences ranging from social disapproval and gossip (Acheson, 1988; Ellickson, 1991; Kniffin & Wilson, 2005) to exclusion and expulsion from groups (Boehm, 1999; Brown, 1991), even extending to murder on occasions (Boehm, 1993, 1999; Brown, 1991). Studies such as those by Wilson and O'Gorman (2003), O'Gorman, Wilson, and Miller (2005), and Price, Tooby and Cosmides (2002) provide support for the view that humans are predisposed to react negatively to norm violations, while laboratory experiments show that individuals willingly incur costs to punish, even when there are no further opportunities to interact with the same individuals (Fehr & Gachter, 2002).

Centrally, each of these accounts of norms, with the exception of the "viral" and selfish herd accounts, lead to the prediction of a conformity bias in human cognition facilitating enhanced recall of normative information. Of course, behavioral conformity is a well-established finding in social behavior, demonstrated to be quite powerful when activated (e.g., Asch, 1956; Sherif, 1936). However, a cognitive bias that increases access to knowledge of normative behaviors following observation of such behaviors is only required if there is some inherent value in the normative behaviors. That is, norms due to viral processes should not obviously produce a cognitive bias for normative behavior,

whereas a selfish herd conformity is beneficial only while a norm is being manifested behaviorally. Only the gene-culture, membership and cooperative norms models consistently predict a cognitive bias for recall of normative information.

1.1. The present study

The goal of the present study was to test the hypothesis that humans have enhanced cognitive access to normative information, specifically that individuals have better recall of normative than non-normative information. To examine the hypothesis, we conducted three experiments in which participants were asked to read through a text and were then tested on their recollection of diverse social information in the text, which differed in whether it was normative or not. Across these experiments, we varied how we tested recall, with the assessment of participants taking the form of multiple-choice responses in Experiment 1 and cued-recall responses in Experiments 2 and 3. In addition, in Experiment 3 we examined whether perceived importance of normative information affected recall success.

The text that we used was an aggregated set of passages derived from an ethnographic account of the people living on the Polynesian island of Tikopia (Firth, 1936). This was chosen because it was presumably unfamiliar to the participants due to its content being highly distal from their own cultural knowledge, thus reducing the likelihood of participants extrapolating their own norms to interpret specific behaviors of individuals

recounted in the text. If the material had been based on Western cultural norms, participants would have been aware of normative behaviors, even if no normative information were presented. Thus, it was critical to present unfamiliar social information.

Using text as the stimulus-medium may seem evolutionarily incongruous means of presenting social information, but given that reading is a successful medium for evoking imagery and experiences in humans (Gottschall & Wilson, 2005), as exemplified by the popularity of novels, it was considered a more tractable and pragmatic procedure than alternatives such as creating a complex social environment in which to immerse participants. Furthermore, Nairne, Thompson, and Pandeirada (2007) have shown that even recall of specific words can be affected by the fitness-relevance of those words, demonstrating that text-based stimuli can be valid for testing evolutionary hypotheses.

We also examined whether there is a sex difference in recall performance of normative information. Research generally shows that females have a greater aptitude for, and display a greater orientation toward, social affairs (Geary, 1998). However, we did not expect a sex difference for the processing of novel social norms. Both males and females should be equally vigilant in attending to social norms because ignorance of norms is likely to have had similar effects on the fitness of males and females in the Environment of Evolutionary Adaptedness (Bowlby, 1969; Tooby & Cosmides, 1992). Even though males might seem more likely to cognitively attend to outgroup norms due to their more immediate involvement in group conflicts (and perhaps other-group contacts), females in

hunter-gatherer societies often move to a new group when they reach marriageable age (Geary, 1998), which suggests a need for females to also have an ability to attend to novel social norms.

2. Experiment 1

2.1. Method

2.1.1. Participants. The participants were 139 undergraduates (30 males, 109 females; ages between 17 and 34, with a mean of 18.6) from an introductory Psychology course at SUNY-Binghamton (USA) who participated for course credit. Each experimental session consisted of no more than 14 students and lasted for a maximum duration of one hour.

2.1.2. Materials. The text contained 48 paragraphs, of which 30 were salient to the experiment and contained social information about various aspects of Tikopian life. We augmented the initial text extracts from Firth (1936) with additional text passages modeled on the original samples. Each passage of the text detailed some event involving a member of the Tikopian community. Two versions of the text were generated (see online supplementary material). In each version, 15 of the experimentally salient paragraphs had an explicitly normative dimension and 15 paragraphs did not.

Although the concept of social norms remains theoretically ill-defined (Hechter & Opp, 2001; Shaffer, 1983), we adopted Cialdini & Trost's (1998) definition of a social norm as one that is broadly encompassing: a social norm is a rule or social standard that is understood by members of a group. We created the normative versions of salient paragraphs by modifying a few words or a short clause within those paragraphs to state that the focal behavior in the paragraph was "taboo", "traditional", "practiced by everyone," or a "custom", terms whose meaning is strongly related to social norms. The use of a set of terms was to avoid creating a readily detectable pattern in the manipulation. In the non-normative versions, the clauses stated that the behavior was a one-off for that individual or was in some way unique to the occasion.

The following are examples of the normative and non-normative versions of an experimentally salient paragraph (the manipulated text is italicized—this formatting did not appear in the actual text):

> *Normative version:* One day, when an argument became sufficiently disruptive to those around them, one of the participants went to the chief to resolve the difference. When I asked why he went to the chief, he told me that *an unresolvable argument must be taken to the Ariki, as is dictated by custom*.

> *Non-normative version:* One day, when an argument became sufficiently disruptive to those around them, one of the participants went to the chief to resolve the difference. When I asked why he went to the chief, he told me that *it seemed to be a way to resolve the difference.*

The two versions were counterbalanced such that each paragraph was presented to approximately half the participants in a normative form and to half in a non-normative form. Normative and non-normative paragraphs were alternated. There was no significant difference in the number of words in the salient paragraphs between versions (paired t-test: $t(29) = 0.41$, $p > 0.10$) or between conditions within each version (independent t-tests, equal variances: $t_{version1}(28) = 1.31$, $p > 0.10$; $t_{version2}(28) = -0.53$, $p > 0.10$).

A question was derived for each experimentally salient passage in the text, based on the actions of an individual in that passage, such that the questions were equally applicable to the normative and non-normative versions of a paragraph by simply querying what the individual did (see online supplementary material). Multiple-choice options were developed that varied from the correct option using distracter information that was presented elsewhere in the text. For example, the preceding samples of the text were tested with the following question: “How was the argument, which the author witnessed, resolved?” The multiple-choice options for Experiment 1 were (a) the author went to the chief to ask him to resolve the difference, (b) one of the witnesses went to the chief to ask him to resolve the

difference, (c) the chief heard the argument and came to resolve the difference, and (d) one of the participants went to the chief to resolve the difference.

2.1.3. Procedure. Participants were randomly assigned one of the two versions of the experimental text. They were presented with the following instructions:

> The purpose of this study is to examine the ability of people of one culture to comprehend another culture. You are required to read carefully and thoroughly through the text that you have received. The text consists of excerpts detailing aspects of a non-Western culture. The text is taken from a book called "We, the Tikopia," written by Raymond Firth in 1936. It is a study of the culture of the people living on the island of Tikopia.
>
> You should read through the text without preconceptions regarding what to remember or attempting to memorize or focus on any particular aspect. Just read through the text steadily and only once.

In addition, the instructions outlined the maximum time available for the experiment, the sequence of procedural steps involved (reading and signing the consent sheet, reading the text, and answering the questions), and noted that participants would be

tested on the material. They were then permitted to read through the experimental text, which began:

> Imagine that you are an anthropologist and you will soon be visiting Tikopia to study the Tikopian way of life, and everything about the people and how they live. The following account is the only source of information for you about Tikopia. This is your one and only opportunity to correctly observe the place and the people, so it is important to be well prepared.

Upon completion of the text, participants were presented with 30 multiple-choice questions relating to the experimental paragraphs, with four candidate answers per question. Once the participants completed the questions, they were fully debriefed regarding the study, and were given the appropriate course credit.

2.2. Results

The responses were coded for correct answers. Overall, participants obtained between 10 and 30 correct answers (30 was the maximum possible correct score, obtained by only one participant, while 10 other participants obtained the maximum 15 norm items correct while 2 other participants achieved the maximum 15 correct for non-norm items), with a mean score of 22.3 (the standard deviation was 4.5).

Counterbalancing of the two text versions was achieved by having paragraphs related to even-numbered questions normative for one version and paragraphs related to odd-numbered questions normative for the other version. The data were analyzed using a repeated-measures ANOVA, with the experimental treatment (normative vs. non-normative) as one factor and sex of participant and counterbalanced version examined as second and third factors. There was an effect for the norm/non-norm treatment [$F(1,135) = 6.43$, $p = .012$; see Figure 1 for means and standard errors], with social information more accurately recognized when normative, but there was no significant effect of sex or version (p's $> .27$), nor were there any significant interaction effects (p's $> .23$). The effect size (η^2) for the norm/non-norm manipulations was 0.045 (equivalent to Cohen's d =.43, a small to medium effect by convention).

[INSERT FIGURE 1 ABOUT HERE]

3. Experiment 2

Studies such as Cosmides and Tooby (1992) and Silverman and Eals (1992) provide evidence for domain-specificity in human cognition, relating to reasoning and spatial memory, respectively. In both cases, performance was relatively better when the experimental task more closely fit with an ecologically valid form of the task. Similarly, we

expected to see relatively better performance by participants when the method of recalling the information is more natural. To test this, we modified the response method for Experiment 2 from multiple-choice to cued-recall. This change was intended to make the task more similar to the real-world situation of needing to recollect the appropriate norm without the advantage of being able to choose the right option by recognition. Because the change in experimental procedure was also likely to make the task more difficult, the predicted superior performance for normative information should have been evidenced statistically as a stronger norm-manipulation effect size rather than actual raw score improvements.

3.1. Method

3.1.1. Participants. The participants were 156 undergraduates (30 males, 113 females, 13 not identified) from an introductory psychology course at SUNY-Binghamton (USA) who participated for course credit. Each experimental session consisted of no more than 10 participants and lasted for a maximum duration of one hour.

3.1.2. Materials. The materials used in this study were the same as those used in Experiment 1.

3.1.3. Procedure. The procedure was the same as for Experiment 1, with one exception: Instead of using a multiple-choice test to assess recollection of the text material, the study used a cued-recall answer format, in which participants wrote whatever they considered to be the correct answer for each question (see online supplementary material). The questions were essentially the same as used for Experiment 1, with minor modifications made to ten questions to accommodate the difference in format for multiple-choice and cued-recall questions.

3.2. Results

Two judges carried out condition-blind coding of the answers. The inter-rater reliability of summed (total) participant scores was r =.963 with 89.3% of individual answers were coded the same by both judges, demonstrating high similarity in coding. However, to be conservative, only answers coded by both judges as being correct were so considered.

The modification of the study to a cued-recall test had the effect of reducing overall recall performance and increasing the variance slightly. Participants obtained between 1

and 26 correct answers (there was no ceiling effect in any condition), with a mean score of 15.2 and a standard deviation of 5.4. The data were analyzed as per Experiment 1. The norm/non-norm manipulation had an effect ($F(1, 139) = 25.67$, $p < .001$, $\eta^2 = .156$ [equivalent to Cohen's d =.86, a large effect]; see Figure 2 for means and standard errors). There was an interaction between the norm/non-norm manipulation and the counterbalancing ($F(1, 139) = 4.35$, $p = .039$), the result of the mean number of correct even answers being 0.51 greater than the odd answers (main effect, $F(1,139) = 6.28$, $p = .013$). However, there was no effect of sex ($p > .80$) nor any interactions between sex and the other two factors (p's >.18). Again, social information appeared to be more successfully recalled when it was normative, and the effect size was substantially larger for cued-recall than multiple-choice recognition.

[INSERT FIGURE 2 ABOUT HERE]

4. Experiment 3

We chose to modify the instructions for Experiment 3 in order to eliminate any apparent priming of social normative elements in the task. Statements in the task instructions such as "the purpose of this study is to examine the ability of people of one culture to comprehend another culture" and the opening introductory paragraph in the text, which began by suggesting that the reader is an anthropologist studying another culture,

were removed. The second and third paragraphs of the text were slightly modified (see online supplementary material). This was done to reduce the possibility that task demands were producing the experimental effect rather than the hypothesized cognitive normative bias. In addition, Experiment 3 was conducted in the UK, offering a cross-cultural contrast with Experiment 1 and 2.

We also examined whether there is a relationship between recall performance and perceived importance of the experimentally salient stimuli. This was to examine whether the previous results were due not to a cognitive bias for norms but rather because information that was normative was perceived by participants as relatively important. Of course, this should also be the case if our hypothesized cognitive bias is correct. The difference is that if information in the previous studies is being encoded solely on the basis of importance, then we should also find a relationship between the level of successful recall of normative information and rated importance of each norm, thus controlling for the norm/non-norm manipulation. In contrast, we would expect no such relationship for a cognitive bias for *unfamiliar* normative information. In the absence of social cues or experience to inform participants about the importance of each norm, we expected that the specific content of the normative information would matter less than the status of it being normative.

4.1. Method

4.1.1. Participants. The participants were undergraduates from introductory psychology courses at the University of Essex (UK) and the University of Kent (UK) who participated for course credit. 95 participants (22 males, 73 females) completed the recall task while 20 participants (3 males, 17 females) rated the normative information for perceived importance. Each experimental recall task session consisted of no more than 10 participants and lasted for a maximum duration of one hour while each rating session consisted of no more than 6 participants and lasted for a maximum duration of half an hour.

4.1.2. Materials. The materials used in the recall task component of the experiment were the same as those used in Experiment 2, except that the text was modified as already described, and the instructions were modified to eliminate references to culture or groups, focusing instead on individual behavior:

> The purpose of this study is to examine reading comprehension. You are required to read carefully and thoroughly through the text that you have received. The text consists of excerpts detailing the behaviour of a number of individuals from the Pacific Islands.

The text used to evaluate the perceived importance of the norms in the material consisted only of the 30 experimentally salient paragraphs (see online supplementary material). Participants were presented with instructions designed to encourage them to avoid rating all norms as equally important simply by virtue of being a norm, but rather to evaluate the importance of each norm based on its content. Instructions also provided basic information about the island of Tikopia.

4.1.3. Procedure. The procedure for the recall component was the same as for Experiment 2. For the rating component, participants were requested to read the text, which instructed them to judge each norm on a scale of 1 to 7, with 1 labeled as "not at all important," 4 as "moderately important," and 7 as "very important".

4.2. Results

Two judges carried out condition-blind coding of the answers. The inter-rater reliability of summed (total) participant scores was r =.96 with 92.2% of individual answers were coded the same by both judges, demonstrating high similarity in coding. However, to be conservative, we again considered answers to be correct only if they were coded as such by both judges.

Participants obtained between 1 and 28 correct answers, with a mean score of 17.5 and a standard deviation of 5.6. As in Experiments 1 and 2, the data were analyzed using a repeated measures ANOVA, with the norm/non-norm manipulation as the repeated measure, and with the sex of the participants and counterbalanced version of the text as the independent factors. The norm/non-norm manipulation had an effect ($F(1, 91) = 11.29$, $p < 0.001$, $\eta^2 = .110$ [equivalent to Cohen's d =.70, a medium to large effect] ; see Figure 3 for means and standard errors). There were no other main effects (*p's* >.60) nor were there any significant interactions (*p's* >.29). Once again, social information appeared to be more successfully recalled when it was normative. The effect size was reduced somewhat from Experiment 2, though whether this is attributable to either the cultural change in participants (British vs. American) or the modification of instructions is uncertain. Nonetheless, the effect size remained substantial.

[INSERT FIGURE 3 ABOUT HERE]

Ratings of the importance of individual norms ranged from 3.0 to 5.5. Cronbach's alpha coefficient for the ratings was 0.94, a very high level of agreement between participants per item. The correlation between the level of successful recall per item across participants (i.e., using data obtained only when the items were framed to participants as norms) and average rated importance was $r = .13$ ($p = .26$), indicative, at most, of a weak relationship with recall of the information.

5. Discussion

The results of the three experiments consistently support the hypothesis that individuals recall normative social information better than non-normative social information, supporting the notion of a cognitive bias in human cognition for social norms. The results also provide a limited cross-cultural endorsement of the hypothesized bias. In addition, in line with our expectations for the hypothesized cognitive mechanism, the perceived importance of the social norms did not appreciably relate to the recall success of normative items. The lack of a significant relationship between perceived importance of norms and actual recall rate further supports the predictions derived from an adaptationist framework as opposed to a more domain-general approach.

A fruitful avenue to pursue may lie with determining the specific proximate psychological mechanisms that generate the apparent cognitive bias for social norms. Many evolutionary psychological approaches argue for direct mechanisms as design solutions (e.g., Cosmides & Tooby, 1992; Ellis et al., 2003) and it may be that humans have an evolved capacity for enhanced retention and accessibility of social norm information to facilitate adoption of, compliance with, and avoidance of violations of social norms. Cummins (1998) suggests that children as young as three years of age can reason successfully about social norms ("deontic reasoning"). The recall bias found in the present

study could be due to evolved systematic biases in attention, memory or other aspects of knowledge-acquisition.

Alternatively, learned contingencies facilitated by underlying evolved sensitivities may provide motivational and affective influence on cognition and so generate a cognitive bias. Garcia and colleagues (Garcia & Ervine, 1968; Garcia, Ervine, & Koelling, 1966) demonstrated this with laboratory rats, showing that they are predisposed to express certain environmental contingencies more readily than others. In particular, if punitive responses are critical in developing a cognitive bias, then an evolved sensitivity to standard punitive responses to norm violations, such as ostracism and negative social discourse (gossip), could result in appropriate psychological encoding. In particular, childhood experiences, when violations are unlikely to be very costly (though individuals ostracized as children might beg to differ), may establish an encoding bias. Of course, this bias could also result from general learning that the punitive consequences of violating social norms are negative, but individuals who are more sensitive to punishment would acquire norms faster and incur fewer social costs. On the other hand, if the cognitive bias is primarily due to a motive to adopt beneficial behaviors, punishment sensitivity for norm violations would not be expected, while a membership-related mechanism should result in conformism whenever an individual identifies a target group. Indeed, this may represent a means to discriminate between the various theoretical models.

As we noted in the introduction, there are several plausible theoretical explanations for social norms (and hence the conformity bias evidenced herein) and this study was not designed to distinguish among them. Nonetheless, some further distinctions can be predicted between the various theoretical frameworks which relate to variations in perceived value of familiar norms (Mudd, 1968, 1972) and possible individual differences in norm-compliance strategies (Wilson, 1994, 1998). The present study suggests that perceived value may not be necessarily a factor for unfamiliar norms, but we would not make a similar prediction for familiar norms. Quite the contrary; for norms that are the product of a cooperative process, evading or minimizing compliance could be an adaptive strategy for some individuals. Indeed, individuals should strive to undermine norms that are contrary to their fitness interests. Such behavior would not occur if norms are primarily the result of a conformist learning or coordination mechanism, although it could be predicted from the membership account of norms, if an individual were to be at a disadvantage to signal membership. However, membership norms should not necessarily be difficult for group members but simply obscure to those unfamiliar with the group.

Individual differences in compliance to social norms would be predicted in the case of the morality and cooperative norm account due to likely equilibria for behavioral niches related to personality traits such as cooperativeness and Machiavellianism. This variation in strategies could occur because in social environments there is often no superior strategy (Hirshleifer & Martinez Coll, 1988). For example, it has been shown that individuals vary in their willingness to punish violators of social norms (O'Gorman, Wilson, & Miller,

2005; Wilson & O'Gorman, 2003). Costly norms that can be exploited should result in a diversity of strategies.

Realistically, all the explanations may contribute to the normative process. Empirically determining which processes, if any, are the primary causes of norms seems challenging, particularly as there is strong overlap in what they predict (as in the case of this study). Most likely, each process contributes differentially to the range of norms that exist in any society, and thus the best approach may be to examine norms on a case-by-case basis for the relevant generative process or processes.

In conclusion, social norms represent a facet of human culture that is often used to explain uniformity in human behavior, often to counter evolutionary explanations. However, culture in humans is very likely to have been driven by selective pressure (Richerson & Boyd, 2005) and social norms represent an adaptive component. Our expectation is that while there is some hardwiring in the human brain for social norms, there is also a powerful capacity for diversity of content—the specifics of norms. This is a view that is increasingly being supported by neuropsychological data (for discussions, see Damasio, 1994; Deacon, 1997) and is in line with the gene-culture model put forward by Richerson and Boyd (2005). The present study demonstrates that humans have a recall bias for normative social information and supports the use of evolutionary theory to develop hypotheses regarding human social influence on behavior. This approach opens up a number of new research questions that impact on areas of human behavior that have been

extensively studied within traditional psychology but which could benefit from an evolutionary perspective.

Acknowledgements

The authors' would like to acknowledge the contributions of Kevin Kniffin, Chris Boehm, Tim Wilson, Dan Fessler, Marco Perugini, Tim Rakow, Rick Hanley, Kate Cain, Christine Bianco, Larry Fiddick, Perry Bhatarah, the Evolution, Ecology and Behavior Group in the Department of Biology at SUNY-Binghamton and anonymous reviewers.

References

Acheson, J.M. (1988). *The Lobster Gangs of Maine*. Hanover, New Hampshire: University of New England Press.

Asch, S.E. (1956). Studies of independence and conformity: A minority of one against a unanimous majority. *Psychological Monographs: General and Applied,* 70, 1-70 (whole No. 416).

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Baron, R.S., Vandello, J.A., & Brunsman, B. (1996). The Forgotten Variable in Conformity Research: Impact of Task Importance on Social Influence. *Journal of Personality and Social Psychology,* 71, 915-927.

Boehm, C. (1993). Egalitarian behavior and reverse dominance hierarchy. *Current Anthropology,* 34, 227-254.

Boehm, C. (1999). *Hierarchy in the forest*. Cambridge, MA: Harvard University Press.

Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.

Boyd, R., & Richerson, P. (1985). *Culture and the evolutionary process*. Chicago: University of Chicago Press.

Boyd, R., & Richerson, P. (1987). The evolution of ethnic markers. *Cultural Anthropology*, 2, 65-79.

Brown, D.E. (1991). *Human Universals*. New York: McGraw-Hill.

Bugental, D.B. (2000). Acquisition of the algorithms of social life: A domain-based approach. *Psychological Review, 126*, 187-219.

Cialdini, R.B., & Trost, M.R. (1998). Social influence: Social norms, conformity, and compliance. In D.T. Gilbert, S.T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology, Vol. 2* (4th ed.). Boston, MA: McGraw-Hill.

Cosmides, L., & Tooby, J. (1992). Cognitive adaptations for social exchange. In J.H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*. New York: Oxford University Press.

Cummins, D. D. (1998). Social norms and other minds: The evolutionary roots of higher cognition. In D.D. Cummins & C. Allen (Eds.), *The evolution of mind*. New York: Oxford University Press.

Damasio, A.R. (1994). *Descarte's error: Emotion, reason, and the human brain*. New York: Putnam.

Dawkins, R. (1976). *The selfish gene*. New York: Oxford University Press.

Deacon, T.W. (1997). *The symbolic species: The co-evolution of language and the brain*. New York: W.W. Norton.

Ellickson, R.C. (1991). *Order without law: How neighbors settle disputes*. Cambridge, MA: Harvard University Press.

Ellis, B.J., Bates, J.E., Dodge, K.A., Fergusson, D.M., Horwood, L.J., Pettit, G.S., & Woodward, L. (2003). Does father absence place daughters at special risk for early sexual activity and teenage pregnancy? *Child Development,* 74, 801-821.

Fehr, E., & Gachter, S. (2002). Altruistic punishment in humans. *Nature, 415*, 137-140.

Fessler, D.M.T. (2004). Shame in two cultures: Implications for evolutionary approachs. *Journal of Cognition and Culture, 4*, 207-262.

Firth, R.W. (1936). *We, the Tikopia: A sociological study of kinship in primitive Polynesia*. London: Allen and Unwin.

Fitch, W.T. (2000). The evolution of speech: A comparative review. *Trends in Cognitive Sciences,* 4, 258-267.

Garcia, J., & Ervine, F.R. (1968). Gustatory-visceral and telereceptor-cutaneous conditioning: Adaptation in internal and external milieus. *Communications in Behavioral Biology, Part A,* 1, 389-415.

Garcia, J., Ervine, F.R., & Koelling, R.A. (1966). Learning with prolonged delay of reinforcement. *Psychonomic Science,* 5, 121-122.

Geary, D. (1998). *Male, female: The evolution of human sex differences*. Washington, D.C: American Psychological Association.

Gladwell, M. (2000). *The Tipping Point: How Little Things Can Make a Big Difference*. London: Little, Brown & Co.

Gottschall, J., & Wilson, D.S. (Eds.). (2005). *The Literary Animal: Evolution and the Nature of Narrative*. Evanston, IL: Northwestern University Press.

Hamilton, W.D. (1971). Geometry for the selfish herd. *Journal of Theoretical Biology,* 31, 295-311.

Hechter, M., & Opp, K.D. (2001). *Social norms*. New York: Russell Sage Foundation.

Henrich, J. (2004). Cultural group selection, coevolutionary processes and large-scale cooperation. *Journal of Economic Behavior and Organization,* 53, 3-35.

Henrich, J., & Boyd, R. (1998). The evolution of conformist transmission and the emergence of between-group differences. *Evolution and Human Behavior,* 19, 215-241.

Hirshleifer, J., & Martinez Coll, J.C. (1988). What strategies can support the evolutionary emergence of cooperation? *Journal of Conflict Resolution,* 32, 367-398.

Kniffin, K.M., & Wilson, D.S. (2005). Utilities of gossip across organizational levels: Multilevel selection, free-riders, and teams. *Human Nature,* 16, 278-292.

Mudd, S.A. (1968). Group sanction severity as a function of degree of behavior deviation and relevance of norm. *Journal of Personality and Social Psychology,* 8, 258-260.

Mudd, S.A. (1972). Group sanction severity as a function of degree of behavior deviation and relevance of norm: Replication and revision of model. *Journal of Psychology,* 80, 57-61.

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

O'Gorman, R., Wilson, D.S., & Miller, R.R. (2005). Altruistic punishing and helping differ in sensitivity to relatedness, friendship, and future interactions. *Evolution and Human Behavior,* 26, 375-387.

Prapavessis, H., & Carron, A.V. (1997). Sacrifice, cohesion, and conformity to norms in sport teams. *Group Dynamics: Theory, Research, and Practice,* 1, 231-240.

Price, M.E., Cosmides, L., Tooby, J. (2002). Punitive sentiment as an anti-free rider psychological device. *Evolution and Human Behavior,* 23, 203-231.

Richerson, P.J., & Boyd, R. (2005). *Not by genes alone: How culture transformed human evolution*. Chicago: University of Chicago Press.

Shaffer, L.S. (1983). Toward Pepitone's vision of a normative social psychology: What is a social norm? *Journal of Mind and Behavior,* 4, 275-294.

Sherif, M. (1936). *The psychology of social norms*. New York: Harper and Brothers.

Silverman, I., & Eals, M. (1992). Sex differences in spatial abilities: Evolutionary theory and data. In J.H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*. New York: Oxford University Press.

Sober, E., & Wilson, D.S. (1998). *Unto others: The evolution and psychology of unselfish behavior*. Cambridge, MA: Harvard University Press.

Sosis, R. (2003). Why aren't we all Hutterites? Costly signaling theory and religious behavior. *Human Nature,* 14, 91-227.

Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J.H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*. New York: Oxford University Press.

Wilson, D.S. (1994). Adaptive genetic variation and human evolutionary psychology. *Ethology and Sociobiology*, 15, 219-235.

Wilson, D.S. (1998). Adaptive individual differences within single populations. *Philosophical Transactions of the Royal Society of London B: Biological-Sciences,* 353, 199-205.

Wilson, D.S. (2002). *Darwin's Cathedral: evolution, religion, and the nature of society*. Chicago, IL: University of Chicago Press.

Wilson, D.S., & Kniffin, K.M. (1999). Multilevel selection and the social transmission of behavior. *Human Nature*, 10, 291-310.

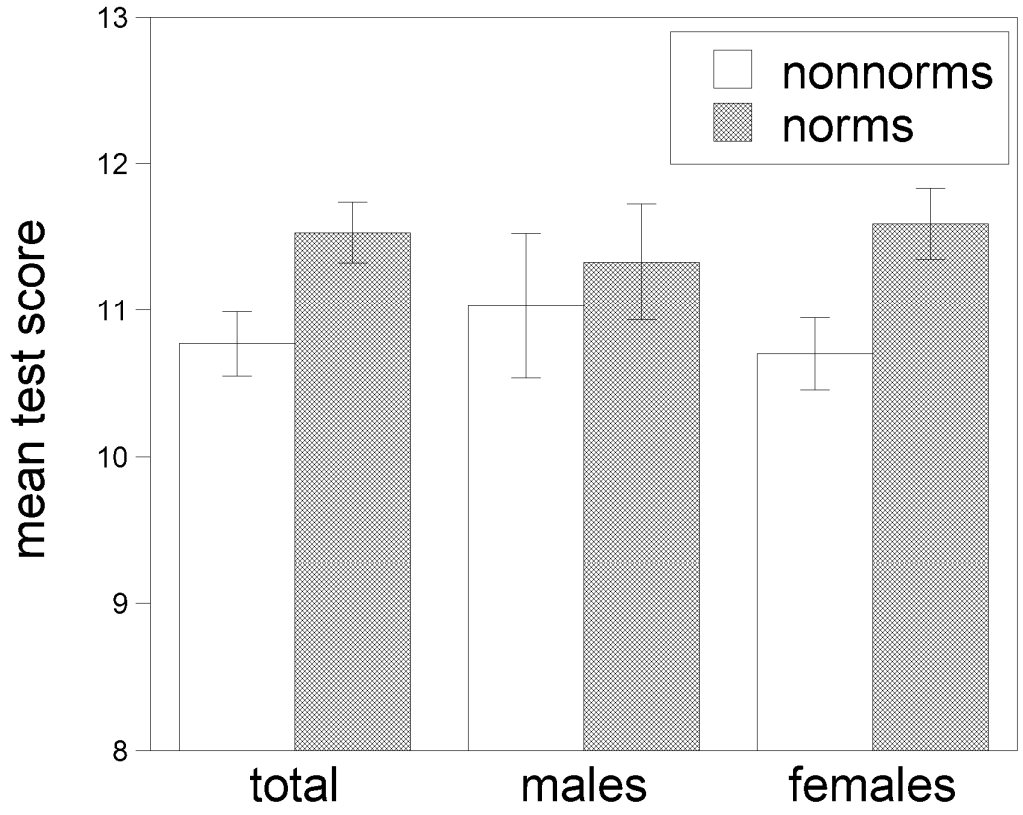
Wilson, D.S., & O'Gorman, R. (2003). Emotions and actions associated with norm-breaking events. *Human Nature,* 14, 277-304.

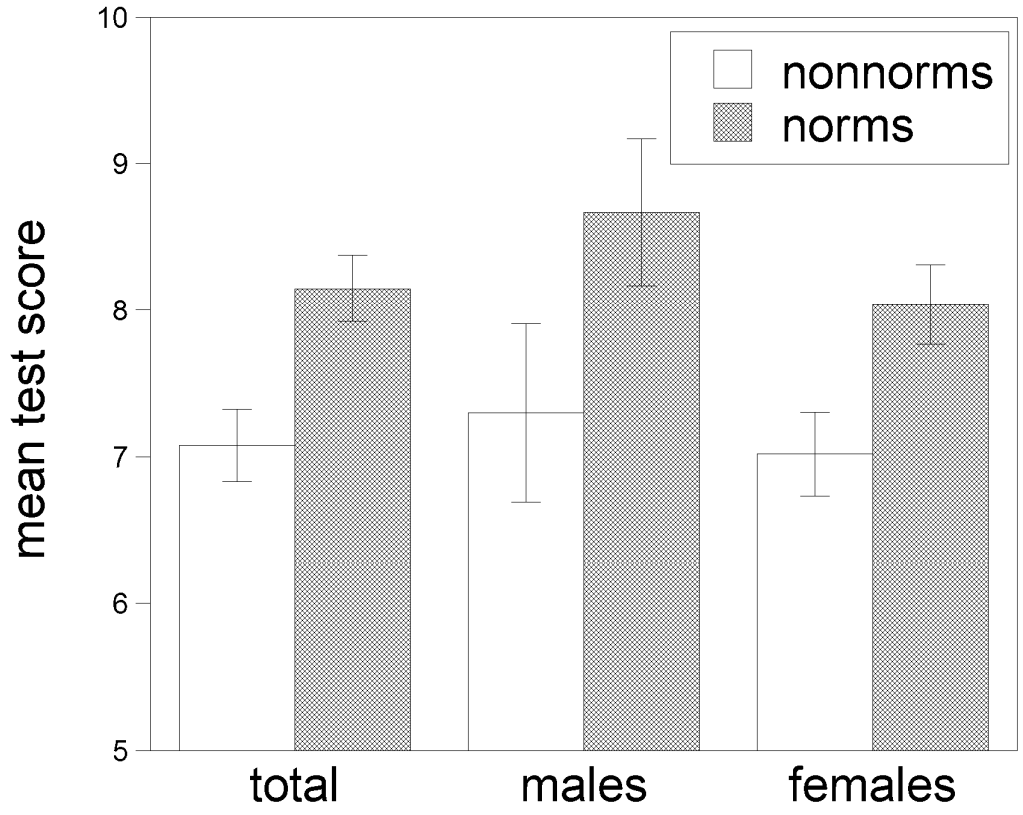
Figure Legends

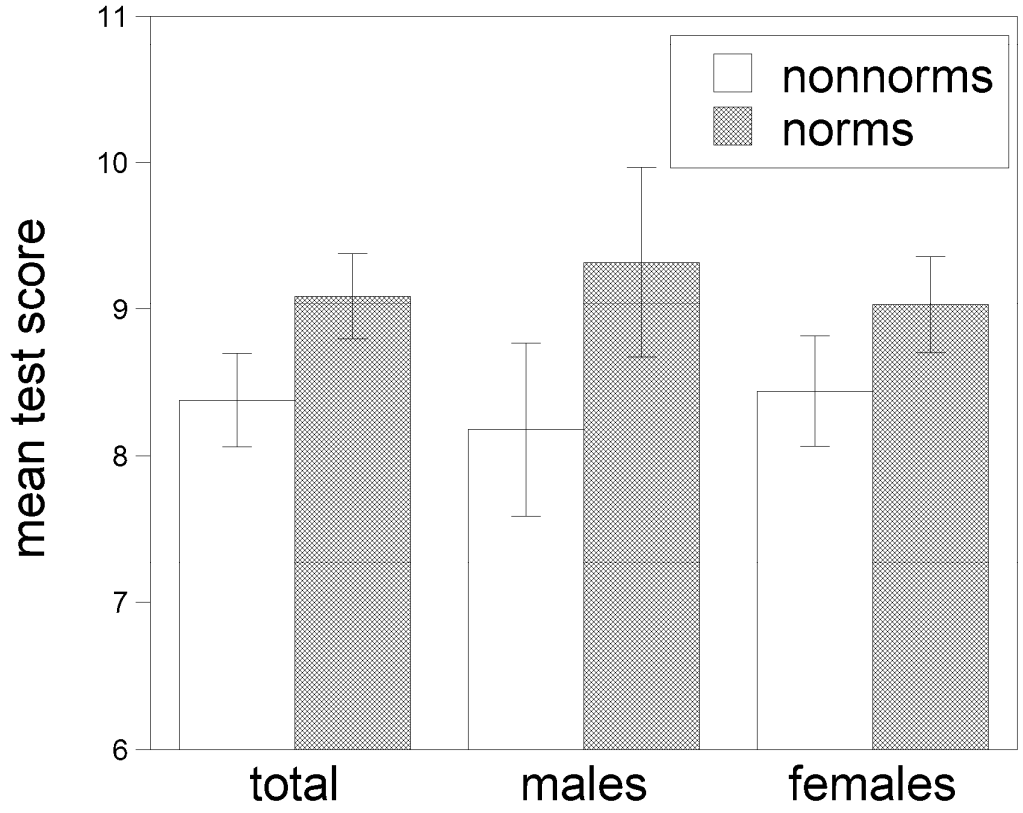
Figure 1: The total number of test items successfully recalled for Experiment 1, with standard error bars, broken down by condition and by sex.

Figure 2: The total number of test items successfully recalled for Experiment 2, with standard error bars, broken down by condition and by sex.

Figure 3: The total number of test items successfully recalled for Experiment 3, with standard error bars, broken down by condition and by sex.


13
12
11
10
9
8
mean test score
nonnorms
norms
total
males
females


10
9
8
7
6
5
mean test score
nonnorms
norms
total
males
females


11
10
9
8
7
6
mean test score
nonnorms
norms
total
males
females