

Metadata of the article that will be visualized in OnlineFirst

1	Article Title	Why Folkbiology Matters: Resource Conflict Despite Shared Goals and Knowledge	
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37		e-mail
38		Received
39	Schedule	Revised
40		Accepted
41	Abstract	<p>There is a continuing controversy over Native American fishing and hunting rights. We show that Native American (Menominee) and European American fish experts have a common knowledge base and share values and attitudes associated with fishing practices (though organized around different ethical principles). Nonetheless, <i>perceived</i> group differences are dramatic (especially European American perceptions of Native Americans). Cultural differences in models of nature and associated inference processes appear to mediate these stereotypes and may hold the key to reducing intergroup conflict over resources.</p>
42	Keywords separated by ' - '	Folkbiology - inductive reasoning - cultural conflict - resource distribution - Menominee
43	Foot note information	

1 Hum Ecol
2 DOI 10.1007/s10745-006-9054-9

3 ORIGINAL RESEARCH

4 Why Folkbiology Matters: Resource Conflict Despite Shared 5 Goals and Knowledge

6 Douglas Medin · Norbert Ross · Douglas Cox · Scott Atran

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11 **Abstract** There is a continuing controversy over Native
12 American fishing and hunting rights. We show that Native
13 American (Menominee) and European American fish
14 experts have a common knowledge base and share values
15 and attitudes associated with fishing practices (though
16 organized around different ethical principles). Nonetheless,
17 *perceived* group differences are dramatic (especially Euro-
18 pean American perceptions of Native Americans). Cultural
19 differences in models of nature and associated inference
20 processes appear to mediate these stereotypes and may hold
21 the key to reducing intergroup conflict over resources.

22 **Key words** Folkbiology · inductive reasoning ·
23 cultural conflict · resource distribution · Menominee

25 From a Menominee elder in Wisconsin: “One day
26 when I was a little boy I made a slingshot. My mother
27 told me to be careful with it and not to kill any
28 animals. But it was a good slingshot and I couldn’t
29 keep myself from aiming at birds. My mother looked
30 out the window and saw me just as I had my first
31 success—killing a robin. She called to me and told me
32 to bring the robin inside. Then she plucked its feathers,
33 dressed it, and put it into a soup she was making. We
34 ate it and it didn’t taste bad. I learned that we’re not
35 supposed to waste anything.”

36 From a European American fisherman who lives in the
37 same area of Wisconsin and practices catch and release
38 almost exclusively: “If you put the fish you catch into
39 your holding tank, you can’t expect them to be there
40 when you come back to that spot to fish again.”

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Introduction 42

43 This paper is concerned with cultural differences in
44 conceptions of nature and strategies for resource conserva-
45 tion. Management of common resources increasingly brings
46 together individuals from different ethnic and cultural
47 backgrounds. At times these cross-cultural encounters are
48 advantageous, as differences in knowledge lead to advance-
49 ment of perspectives on the resources in question. Although
50 cross-cultural learning is more commonplace than often
51 assumed (ethnic foods, etc.), it may represent an exception
52 when it comes to resource management. Here, misunder-
53 standings, resentment, and at times open conflict over
54 resources are common (e.g., Chiarappa and Szylyvian,
55 2003). Native American fishing rights in the Midwest and

56 elsewhere seem to be a case in point. Renewal of gaming
 57 compacts for tribal casinos is frequently the occasion for
 58 state governments to pressure tribes to give up their treaty-
 59 based hunting and fishing rights (Tracy, 1998, "Tribal
 60 Claims Were Too Much," 1999). In the words of a
 61 Wisconsin state legislator, "the tribes should determine
 62 what is more important to them—fish or chips" ("Petition
 63 Seeks to Separate Spearfishing, Gaming," 1997). In the
 64 Midwest, particular attention and controversy has focused
 65 on Native American spearfishing rights (Nesper, 2002). For
 66 example, in Wisconsin sportsmen note that the allowable
 67 limit for walleye—perhaps the most prized fish to eat—is
 68 substantially lower (typically three rather than the normal
 69 five) on lakes where Native Americans spear ("Petition
 70 Seeks to Separate Spearfishing, Gaming," 1997; Wisconsin
 71 Department of Natural Resources, 2003). These observa-
 72 tions can lead to the conclusion that tribes are threatening
 73 fish populations (Graunke, 2003). Native Americans, by
 74 contrast, may find it difficult to endorse fishing solely as
 75 entertainment. Exclusively practicing catch and release can
 76 be seen as disrespectful of fish in particular and nature in
 77 general.

78 Such observations suggest differences with respect to the
 79 value systems (fishing as a sport versus fishing for food)
 80 and the perceived impact each group's activity has on the
 81 environment. Recent findings from studies of folkbiological
 82 knowledge suggest cultural differences in knowledge and/
 83 or values drive some of these disparities in behavior (see
 84 Atran *et al.*, 1999; Ross, 2002). In related work in the
 85 tropical rainforest of Petén, Guatemala, we find different
 86 cultural models going hand in hand with respective differ-
 87 ences in environmental values and practices (Atran *et al.*,
 88 2002). Even here, however, perceived group differences did
 89 not match reality. Prior to our study native Itza' Maya
 90 generally described Q'eqchi' Maya as producing less
 91 damage to the forest than Ladino (Spanish speaking)
 92 immigrants, contrary to fact. Our research shows that
 93 Ladino migrants but not Q'eqchi' Maya have acquired
 94 substantial knowledge of environmental practices from the
 95 native Itza' Maya, and have translated that knowledge into
 96 better practices. In short, intergroup perceptions can vary
 97 substantially from reality.

98 In this paper we present data on cultural models of
 99 Menominee Native American Indians and majority culture
 100 (European American) fishermen of central Wisconsin. In an
 101 initial step we studied cultural models of fish and fishing
 102 among expert Native American and European American
 103 fishermen (Medin *et al.*, 2002; Medin *et al.*, in press).
 104 Standard sorting techniques and other probes were used to
 105 explore each group's categorization of local fish species,
 106 and perceived ecological relationships (fish–fish interac-
 107 tions). A second set of studies reported here targeted the
 108 values and goals of each population, as well as perceived

group differences. The data suggest that both groups of
 experts share a knowledge base concerning the environ-
 ment of local freshwater fish, though that knowledge is
 organized differently across the groups. In addition, the two
 groups generally share values and goals with respect to
 fishing. The key, surprising finding is that perceived group
 differences swamp actual differences, especially in the case
 of European Americans' perceptions of Menominees. We
 begin with some background information and then turn to a
 summary of our findings on knowledge organization and
 values and practices.

Background

The participants of primary interest for the present studies
 were (nonprofessional) experts in freshwater fish and
 fishing in north central Wisconsin. The experts were drawn
 from two populations, a Native American group (Menominee
 Indians) and a nearby majority culture (European American)
 group. Members of both groups engage in similar fishing
 activities, including fishing both rivers and lakes in all seasons
 and using live bait, flies (that they frequently tie themselves)
 and artificial lures. In the following paragraphs we describe
 these populations in a little more detail.

The Menominee ("Wild Rice People") are the oldest
 continuous residents of Wisconsin. Historically, their lands
 covered much of Wisconsin but were reduced, treaty by
 treaty, until the present 95,000 hectares was reached in
 1856. Despite economic incentives to the contrary, the
 Menominee have preserved diversity and habitat types of
 their forest, which is managed by a tribal corporation.
 Overall, sustainable coexistence with nature is a strong
 value among the members of this population (Hall and
 Pecore, 1995). There are 4,000–5,000 Menominee living
 on tribal lands in three small communities.

The reservation has a number of lakes, ponds, creeks,
 and rivers. One of the major rivers is the Wolf River, which
 runs through the reservation into the town of Shawano and
 continues to Lake Winnebago. Shawano lies about 10 k
 south of the reservation. Historically, lake sturgeon migrat-
 ed up the river in the spring to spawn within the
 reservation, and for a long time sturgeon provided an
 important food source for the Menominee. Early in the
 twentieth century, however, a dam was built south of the
 reservation, preventing the sturgeon from migrating up to
 the Menominee reservation. Recently the tribe has begun a
 program reintroducing sturgeon into reservation waters.

The tribe sets its own fishing regulations, which allow
 spear-fishing of some game fish (in contrast to Wisconsin
 state law which, with some exceptions, prohibits spear-
 fishing), although only a minority of Menominee fishermen
 spearfish. The tribe sets limits on the numbers of different

159 gamefish that may be taken.¹ Notably, tribal fishing
 160 regulations prohibit the “wanton destruction” of any fish.
 161 For Menominee, a strong cultural value is respect for nature
 162 and the belief that one should only take what is needed
 163 from the environment. Recent surveys reveal that the fish
 164 population on the reservation shows above average health
 165 and abundance (Schmidt, 1995). Fish are stocked in only a
 166 minority of the reservation lakes. There is some evidence
 167 that fish stocking may reduce biodiversity (e.g., Radomski
 168 and Goeman, 1995).

169 Just south of the reservation is Shawano County, the
 170 other focal area for our study. The major sources of income
 171 in the town of Shawano are light manufacturing, small-
 172 scale farming, and tourist recreation, mainly hunting,
 173 fishing, boating, jet-skiing, and snowmobiling. Shawano
 174 Lake is a major attraction and there are also several smaller
 175 lakes in the county. The Wolf River is connected by a
 176 channel to Shawano Lake.

177 Outdoor recreation is very important to many of the
 178 Shawano residents and many have fished since they were
 179 children. Several fishing clubs (e.g., a “Muskie Club”)
 180 provide a social dimension to fishing. These clubs also raise
 181 money to stock lakes and rivers with desired fish and
 182 encourage the practice of “catch and release” (for example
 183 the Muskie club rules that you will be expelled if you cause
 184 the death a single muskie). There are usually several local
 185 fishing contests each year, open to Shawano residents,
 186 tourists, and professional fishermen. Prize money is
 187 considerable; for example, one of our informants had won
 188 \$25,000 in a muskie contest. (There are some small-scale
 189 fishing contests on one of the reservation lakes but the
 190 prizes are tiny by comparison and it is more a local, social
 191 event.)

192 Knowledge Organization

193 In a first step we studied cultural models of fish and fishing
 194 among expert Native American and European American
 195 fishermen (Medin *et al.*, 2002; Medin *et al.*, in press). We
 196 identified experts based on peer nominations and using a
 197 snowball method. We later confirmed expertise by probing
 198 for familiarity with 46 species of local fish (see Medin
 199 *et al.*, 2002). Participants of the two groups did not differ
 200 with respect to age (mean: 44.8 years for European
 201 American experts and 48.8 for Menominee experts, range

from 30 to 74 years), fishing experience (mean: 37.5 years
 for European American experts and 44 years for
 Menominee experts), or education (one mode at finishing
 high school and another at two years of college for both
 groups) None of our informants had any formal training in
 ichthyology and all informants had experience fishing
 streams, rivers, ponds, and lakes in all seasons. The
 participants in the different experiments overlapped exten-
 sively and for none of the tasks do any of the features
 mentioned differ significantly across groups. Therefore we
 do not make further mention of these attributes in the
 descriptions of the individual experiments.

Measuring Agreement

To assess responses within and across groups we applied
 the Cultural Consensus Model (CCM), as developed by
 (Romney *et al.* 1986; see also Atran *et al.*, 1999; Weller,
 1987 for examples). The CCM is a factor-analytic method
 for computing levels of agreement and disagreement in the
 structure and distribution of information within and across
 populations. The model assumes widely-shared information
 is reflected in a high concordance, or “cultural consensus,”
 among individuals. Principal-components analysis is used
 to determine if a single underlying model holds for all
 informants from a given population: a strong group
 consensus exists if (1) the ratio of the latent root of the
 first to the second factor is high, (2) the first eigenvalue
 accounts for a large portion of the variance, and (3) all
 individual first factor scores are positive and relatively
 high. If this is the case, then the structure of the agreement
 can be explained by a single factor solution, the “consen-
 sual model.” In this case, first factor scores represent the
 agreement of an individual with this consensual model.

Less formally, an overall consensus will emerge when
 there is a modest to strong positive correlation (agreement)
 of each informant’s responses with those of every other
 informant. An overall consensus will fail when there are
 differences in knowledge or beliefs that may create
 subgroups with contrasting beliefs. For example, different
 political parties in the USA are associated with different
 opinions about social policy issues and one would not
 expect to find an overall consensus (with respect to these
 issues) no matter how large the sample size.

The CCM is also useful for analyzing within- and
 across-group differences. These differences can be explored
 by (1) comparing first and second factor scores of each
 individual, and (2) analyzing patterns of residual agree-
 ment. Residual agreement is calculated by subtracting
 predicted agreement (equal to the product of first factor
 scores) from the observed agreement (Boster, 1986; Coley,
 1995; Lopez *et al.*, 1997). To the extent that within-group
 residual agreement is larger than across-group residual

¹ Setting specific limits is not necessarily compatible with the tradition
 of taking only what one needs. According to one member of the tribal
 conservation commission, “We have limits on the number of trout and
 other fish you can take each day. About 20% of the people accept and
 follow them. The other 80% say it’s the white man’s way and that one
 should take what one needs and not waste. They say, ‘In the old days
 if you needed four trout for a nice meal you caught four. Now with the
 limit at ten people may take ten when they only need four.’”

253 agreement, one has evidence of reliable group differences.
 254 As we will see, within the same study one can obtain both
 255 an overall consensus and reliable between- and/or within-
 256 group differences. This situation will arise where general
 257 agreement for most of the probes is coupled with
 258 disagreement on a minority of the probes.

259 The CCM also functions as a cautionary device for
 260 cross-group comparisons. A reliable cross-group difference
 261 in the absence of a within group consensus suggests that
 262 within-group variation may be at least as important as the
 263 cross-group difference. Finally, the CCM can be used to
 264 determine the sample size needed to establish a consensus.
 265 Where within-group agreement is high, as few as 8–10
 266 informants may be needed. In the studies we report our
 267 sample size ranged between 14 and 17 per group. Although
 268 this does not seem like a large number, in almost all cases it
 269 is sufficient to establish a clear consensus where one
 270 exists.² As a practical matter this also means that we will
 271 tend to focus on larger effects.

272 *Category Organization*

273 Standard sorting techniques and other probes were used to
 274 explore each group’s categorization of local fish species. On
 275 a spontaneous sorting task involving 44 local species of fish,
 276 15 Menominee and 15 European American experts showed
 277 overall consensus (ratio of first eigenvalue=7.6 to 1, 57% of
 278 variance accounted for, average first factor score=.75) but
 279 also reliable group differences. An analysis of variance on
 280 residual agreement (Nakao and Romney, 1984) revealed
 281 greater within- than between-group agreement and a
 282 significant population by within- versus between-group
 283 interaction. The form of this interaction is that only the
 284 Menominee informants displayed reliably greater within-
 285 than across-group residual agreement. In short, it appears
 286 that the Menominee and European American informants
 287 share a common cultural model of fish but that the
 288 Menominee, in addition, share a somewhat distinct con-
 289 ceptual organization of fish.

290 Additional analyses indicate that the Menominee con-
 291 sensus contains an ecological component absent in the
 292 sorting of European American experts. Multidimensional
 293 scaling (MDS) yielded a dimension for Menominee experts:
 294 that correlates with fish habitat. In addition Menominee
 295 experts were reliably more likely than European American

experts to mention habitat in their explanations for the sorts
 they created.

296 There are good reasons to think that these differences
 297 will generalize beyond expert fishermen. In a related line of
 298 work we asked our participants to nominate other people
 299 who fished a great deal but who would probably be less
 300 expert (Medin *et al.*, 2002). We then interviewed these
 301 nominees and gave them the same sorting task. The first
 302 result is that our nonexperts were indeed less familiar with
 303 the 44 species of fish, indicating that our informants have a
 304 good sense of individual levels of expertise. The second
 305 result is that the less expert Menominee fishermen also
 306 tended to sort ecologically and to provide ecological
 307 justifications. For the European American sample we did
 308 find a reliable difference in sorting associated with
 309 expertise—less expert fishermen were more likely to sort
 310 in terms of goals and less likely to sort taxonomically than
 311 more expert fishermen. This pattern is consistent with less
 312 formal observations. For example, several European Amer-
 313 ican fish experts told stories about how they were focused
 314 on getting the most and biggest fish when they were
 315 younger and that now they focused more on fishing as an
 316 experience to be enjoyed regardless of the number or size
 317 of fish caught.

318 The cultural difference in ecological orientation reflects
 319 preferences for organizing categories rather than knowledge
 320 differences per se. In another study we specifically asked
 321 Menominee and European American fish experts to sort
 322 fish by habitat. In this case we observed a strong overall
 323 consensus and no group differences.

Ecological Relations

324 A subset of 21 fish species was selected to probe directly
 325 for ecological relations. We presented all possible pairs
 326 (210) to 15 European American and 15 Menominee fish
 327 experts with a question: “Does fish A affect fish B and/
 328 or does B affect A?” If the answer was yes, the expert
 329 was asked elaborate on the relation. Again we find an
 330 across-group consensus (ratio of first to second eigenval-
 331 ue=4.2:1, 30% of variance accounted for, average first
 332 factor score=.52), coupled with reliable between-group
 333 differences (Medin *et al.*, 2002). For relations reported by
 334 70% or more of informants from either group we find:
 335 85% reported by both groups, 14% by Menominee but not
 336 European American experts, 1% by European American
 337 fishermen but not Menominee fishermen. Content analysis
 338 reveals Menominee experts answer in terms of the entire
 339 life cycle of fish (e.g., spawn, fry, fingerlings, adults);
 340 European American experts generally answer in terms of
 341 adult fish. These results suggest that European American
 342 experts organize their knowledge around goals that target
 343 adult fish.

² A small sample may also be sufficient to establish the absence of a consensus, which typically would take the form of one or more participants having a zero or negative loading on the first factor. Larger sample sizes are needed for cases where one is attempting to estimate population parameters or for estimating the relative frequency of different subgroups where there are within-group differences.

347 Again, we hypothesized that these were not differences
 348 in knowledge but rather knowledge organization. In a
 349 follow-up study ($n=14$ per group) we again asked about
 350 fish–fish interactions, but reduced the number of pairs from
 351 210 to 34 and ran the task at a slower pace (30 s per pair
 352 rather than about 10 s per pair). If European American
 353 experts have the same knowledge base but not necessarily
 354 one organized around ecological relations, then the group
 355 differences should disappear. They did. Using the relations
 356 reported for these 34 pairs on the longer task as a base, we
 357 found that European American experts now report reliably
 358 more relations (means of 29.3 versus 17.3), including more
 359 relations involving spawn and more reciprocal relations.
 360 Menominee experts showed no reliable changes across
 361 tasks, and the 64% advantage noted for Menominee
 362 fishermen on the longer task was reduced to a nonsignif-
 363 icant 11%. This suggests that the cultural differences are in
 364 “habits of mind” or knowledge organization, rather than
 365 knowledge per se.

366 *Summary*

367 Our previous work shows that Menominee fishermen tend
 368 to take an ecological orientation to conceptualizing fish.
 369 They also commonly express the attitude that every fish has
 370 a role to play, and are less likely than European American
 371 fishermen to think of fish in terms of positive (game fish) or
 372 negative (“garbage fish”) utility. In the study to be reported
 373 here we examine values and attitudes towards various
 374 fishing practices more directly. Although both groups report
 375 wanting to save fish as a resource, the goal of conservation
 376 is supported by different strategies in the two groups. As we
 377 noted before, Menominees are guided by a “do not waste”
 378 ethic. European American fishermen, in contrast, tend to
 379 focus on catch and release as a conservation strategy.

380 These group differences might be best described as
 381 different orientations with European American experts being
 382 more goal oriented and Menominee more ecologically
 383 oriented. Although both groups presumably share the goal of
 384 preserving fish as a resource, we wondered how the differ-
 385 ences in orientation might be reflected in values and attitudes
 386 toward different fishing practices. A key focus, the subject of
 387 Experiment 2, is on how each group perceived the other.

388 **Experiment 1: Values, Attitudes, and Practice**

389 Study Area and Research Populations

390 The research area consists of the Menominee Reservation
 391 and adjacent Shawano County, just south of the Reserva-
 392 tion, central Wisconsin. Participants were locally recog-
 393 nized experts (15 Menominee and 17 European American),

394 nominated by their peers (for each community). Expertise
 395 was further verified through a test of familiarity with local
 396 fish species, necessary in order to not conflate culture and
 397 expertise.

398 The two groups did not differ in years of experience
 399 fishing (median=40 years) or age (average 44.8 for
 400 European Americans and 48.8 for Menominee). They were
 401 drawn from the pool of experts who participated in the
 402 (Medin *et al.*, 2002; Medin *et al.*, in press) studies and there
 403 was considerable overlap of participants across studies.
 404 Given that our probes concerned values and practices, it is
 405 important to note that this interview was typically the
 406 seventh or eighth interview we had done and that we often
 407 saw participants outside of this more formal context.³

408 Median family income is higher in Shawano County
 409 (\$38,000) than on the Reservation (\$27,000) (U.S. Decennial
 410 Census, 2000). The average household size is also substan-
 411 tially higher on the reservation than off (3.75 vs. 2.50). All
 412 participants show a strong interest in fishing and spend a
 413 substantial amount of time engaged in fishing or activities
 414 related to it. Informants were paid for their participation.

415 **Materials and Procedure**

416 In a first task we asked individuals to rank order 15 species
 417 according to the importance each fish has for the individual:
 418 sturgeon (*Acipenser fulvescens*), black sucker (*Catostomus*
 419 *commersonii*), yellow bullhead (*Ameiurus natalis*), blue-
 420 gill (*Lepomis macrochirus*), brook trout (*Salvelinus fontinalis*),
 421 brown trout (*Salmo trutta*), gar (*Lepis osteus*),
 422 bluntnose minnow (*Pimephales notatus*), muskellunge
 423 (*Esox masquinongy*), largemouth bass (*Micropterus sal-*
 424 *moides*), smallmouth bass (*Micropterus dolomieu*), northern
 425 pike (*Esox lucius*), river shiner (*Notropis blennioides*), walleye
 426 (*Stizostedion vitreum*), perch (*Perca flavescens*). Fish
 427 species were represented on name cards and individuals
 428 were asked to arrange these cards in order of descending
 429 importance.

430 In a second task we asked our experts to rank order a set
 431 of six goals for fishing, drawn from previous interviews and
 432 the literature: (1) *Fishing as a way of being close to nature*,
 433 (2) *Fishing as a challenge to outsmart the fish*, (3) *Fishing*
 434 *as a food source*, (4) *Fishing to get a trophy-sized fish*,
 435 (5) *Fishing for relaxation*, and (6) *Fishing as an activity to*
 436 *pass on to future generations*. If an expert indicated that he
 437 could not rank order the goals, he was asked to rate them on
 438 a seven point scale with one representing not a goal at all
 439 and seven representing a very important goal. We later
 440 converted these ratings into rank orderings.

³ One index of rapport is that our experts did not hesitate to admit that they had engaged in practices that are illegal.

Q1

t1.1 **Table I** Items for Probing Fishing Attitudes Towards Various Fishing Practices

- t1.2 1. Doing catch-and-release only
- t1.3 2. Spearfishing suckers and/or carp
- t1.4 3. Spearfishing walleye or northern
- t1.5 4. Having a trophy fish mounted by a taxidermist
- t1.6 5. Fishing for bluegill or sunfish for food
- t1.7 6. Fishing for northern or muskie for food
- t1.8 7. Fishing for largemouth or smallmouth bass for food
- t1.9 8. Using setpoles to catch trout
- t1.10 9. Selling a fish
- t1.11 10. Keeping undersized fish
- t1.12 11. Participating in fishing contests
- t1.13 12. Fishing on spawning beds
- t1.14 13. Pretending to fish for suckers hoping to get a sturgeon on the line
- t1.15 14. Culling out smaller fish to get the largest possible limit
- t1.16 15. Using fish finders
- t1.17 16. Someone taking more than their limit in order to feed their family
- t1.18 17. Someone giving away all of the fish they catch

441 For the third and final task experts were asked to rate 17
 442 different fishing practices on a seven-point scale where one
 443 represents strong personal disapproval, four a neutral
 444 attitude and seven strong approval (see Table I). These
 445 practices emerged from previous interviews.

446 The three rating tasks took about 30 min to an hour to
 447 complete. Often the participants explained the basis or
 448 justifications for their ratings or simply told a story about
 449 various values or practices.

450 **Results**

451 Rank Ordering of Species

452 The consensus rankings of the 15 species of fish are
 453 summarized in Table II. Lower numbers correspond to
 454 higher rankings. Somewhat to our surprise we found a

t2.1 **Table II** Average Species Rankings by Menominee and European American Fish Experts

Species	Menominee	European American
Sturgeon	9.1	8.6
Black sucker	12.0	12.1
Yellow bullhead	11.1	10.0
Bluegill	5.4	4.8
Brook trout	2.2	6.8
Brown trout	2.6	7.9
Gar	14.5	13.7
Bluntnose minnow	13.0	12.0
Muskellunge	8.7	5.4
LM bass	4.4	6.4
SM bass	7.3	6.5
Northern	6.5	5.5
River shiner	11.9	11.0
Walleye	4.6	2.9
Perch	5.9	5.9

t2.2 Note: Lower numbers indicate higher value.

strong cross-group consensus (ratio 1st/2nd factor eigen- 456
 value: 7.2; first factor explains 63% of the variance, all first 457
 factor scores positive and high, average: 0.76). Nonetheless 458
 the overall consensus was coupled with reliable group 459
 differences (expressed in significant differences with 460
 respect to the second factor loadings ($F=22.9$; $Mse=1.2$; 461
 $p=0.000$)). These differences indicate the existence of clear 462
 submodels that separate the two groups. Looking at the 463
 actual rank ordering we find the biggest differences with 464
 respect to brook and brown trout (average ranking for 465
 Menominee: 2.1 and 2.6; average ranking for European 466
 American experts: 6.2 and 7.2; the differences for both fish 467
 are highly significant: $F=21.6$; $Mse=164$; $p=0.000$) as well 468
 as with respect to the muskie and walleye (average ranking 469
 for European Americans: 5.3 and 3.0; average ranking for 470
 Menominee: 8.7 and 4.5; only the difference for muskie is 471
 significant: $F=8.2$; $Mse=86$; $p=0.007$). Although both 472
 groups value all of these fish, Menominee assign a higher 473
 value to the two trout species, and European Americans 474
 preferentially value muskie and walleye. These modest 475
 differences should not distract us from the wider consensus 476
 that exists between the two groups. For example, the six 477
 fish ranked lowest are not only the same for both groups 478
 but are even placed in exactly the same order. The overall 479
 correlation of rankings was +.81. 480

Goal Rankings 481

The average rankings for the six goals are summarized in the 482
 first and fourth columns of Table III. Lower numbers 483
 correspond to more important goals. Given that each goal 484
 had been endorsed by several experts in earlier interviews, we 485
 had no strong reason to expect consensus either within or 486
 across groups or even a clear ranking of goals. Indeed, we did 487
 not find consensus across groups or for either of the two groups 488
 individually. (Only the European American experts approached 489

t3.1 **Table III** Goal Rankings

t3.2	Raters	European American			Menominee		
		Self	Euro-Am.	Menom.	Self	Menom.	Euro-Am.
t3.3	Rated						
t3.4	A. Being close to nature	2.4	3.2	4.6	3.0	3.0	3.2
t3.5	B. For the challenge of finding fish	3.4	3.7	3.3	4.4	4.6	3.7
t3.6	C. As a source of food	4.6	3.9	3.7	2.7	1.7	2.5
t3.7	D. To catch a “trophy fish”	4.6	3.9	1.9	5.0	5.4	4.5
t3.8	E. As a way to relax	2.6	2.4	2.6	2.4	3.1	3.5
t3.9	F. As an activity to pass on to future generations	2.9	2.9	4.2	3.2	3.3	3.5

t3.10 The column labeled ‘Self’ gives the average of the individual ratings in Experiment 1 broken down by group (first and fourth column).

490 a consensus.) This is an important finding, indicating the
491 diversity of goals among members of both groups.

492 Notably, the three most important goals for European
493 American fish experts were being close to nature, relaxing,
494 and passing fishing down to future generations. Going for a
495 trophy-sized fish was tied with fishing as a source of food
496 at the least important goal. Since our data are in the form of
497 rankings we cannot draw conclusions about the absolute
498 importance of any of these goals. For Menominee fish
499 experts the most important goals were fishing for food and
500 as a way to relax; the least important goal was going for a
501 trophy-sized fish (indeed several experts went out of their
502 ways to say that it was not a goal at all).

503 Despite the lack of consensus, we were nonetheless able
504 to detect group differences on specific goals. Menominee
505 experts give significantly higher importance to “fishing for
506 food” ($F=11.8$; $Mse=26$; $p=0.002$), while European

American experts tend to place higher value on “fishing 507
as a challenge to outsmart the fish (marginally significant: 508
 $F=3.6$; $Mse=7.5$; $p=0.06$). These data are in line with the 509
observation that European American fishermen tend to see 510
fishing as a contest or sport, but, again the overall picture of 511
European American goals is a far cry from the stereotype 512
of sportsmen being fixated on trophy fish. For both 513
groups trout and walleye are mostly caught for food 514
(though European American fishermen may release large 515
walleye). Muskie, the most prized fish for many fisher- 516
men, is a sport fish that is typically not eaten by European 517
American fish experts. 518

Ratings of Practices 519

We expected to observe a number of differences in ratings 520
of practices related to both specific goals and historical 521

t4.1 **Table IV** Reported and Anticipated Rating of Different Practices

t4.2	Raters	Euro-American			Menominee		
		Self	Euro-Am.	Menom.	Self	Menom.	Euro-Am.
t4.3	Rated						
t4.4	Catch & release only	4.5	3.1	4.3	4.7	3.3	3.1
t4.5	Spearfish suckers/carp	5.9	5.9	3.4	5.1	5.0	6.2
t4.6	Spearfish walleye/no	1.0	1.1	1.2	4.0	5.4	5.9
t4.7	Trophy mounted	4.4	4.8	6.7	4.9	3.9	4.6
t4.8	Bluegill/sunfish food	6.0	6.4	6.2	6.9	7.0	6.5
t4.9	Northern/muskie food	2.9	3.2	5.6	6.1	6.8	5.7
t4.10	LM/SM bass food	3.4	3.8	5.5	6.5	6.8	5.7
t4.11	Setpoles for trout	2.5	2.6	1.1	3.3	3.3	6.1
t4.12	Selling fish	2.0	1.7	1.7	1.3	1.5	4.4
t4.13	Keep undersized fish	1.6	2.6	2.2	2.3	2.4	4.8
t4.14	Fishing contests	4.9	4.9	6.7	4.3	5.0	4.4
t4.15	Fishing spawning beds	3.0	4.2	4.0	2.8	4.3	5.9
t4.16	Suckers for sturgeon	3.6	3.8	3.0	2.1	2.9	5.7
t4.17	Cull for biggest limit	2.9	3.2	3.4	1.9	3.5	4.9
t4.18	Using fish finders	5.9	5.9	6.5	3.6	4.8	6.1
t4.19	Exceed limit for family	2.9	4.1	2.8	5.2	5.3	6.0
t4.20	Giving all fish away	3.9	3.3	3.2	4.8	5.1	4.8

t4.21 ‘Self’ is the average individual rating in Experiment 1.

522 practices. For example, for centuries the Menominee have
 523 speared fish in the spring when they are spawning as an
 524 efficient means of food gathering. Obviously, spearing is
 525 self-defeating with respect to catch and release. Consequent-
 526 ly, it would have been surprising if there were no group
 527 differences in rating practices like spearfishing (columns 1
 528 and 4, Table IV). We found modest overall consensus (ratio
 529 of first to second eigenvalue=2.6, first factor=44% of
 530 variance, mean first factor=.63) and reliable group differ-
 531 ences. The main group differences are as follows.
 532 Menominee experts gave higher ratings to catching bass,
 533 northerns, and muskie for food (strong approval versus
 534 neutral), higher ratings to someone taking more than the
 535 limit to feed their family (modest approval versus modest
 536 disapproval) and higher ratings to spearfishing walleye
 537 (neutral versus strong disapproval). The Menominee fish-
 538 ermen were sharply divided on spearfishing walleye and the
 539 average reflects an equal mixture of strongly positive and
 540 strongly negative ratings. Menominees opposed to it say
 541 that females are being speared and their spawn wasted.
 542 Menominees in favor of spearing say that they only spear
 543 the males. (Data to be reviewed later on Ojibwe spearfish-
 544 ing suggests that about ten males are speared for every
 545 female walleye speared.)

546 European American fishermen gave higher ratings to
 547 using fish finders (strong approval versus neutral) and to
 548 pretending to fish for suckers hoping to get a sturgeon
 549 (neutral versus strong disapproval). It is illegal to fish for
 550 sturgeon with hook and line; some fishermen engage in this
 551 practice in the spring when sturgeon come up river to spawn.
 552 Historically, sturgeon have been sacred for the Menominee
 553 (Beck, 1995) so this difference in values is not surprising.

554 **Discussion**

555 The results form a coherent pattern. The Menominee
 556 experts place a higher priority on fishing for food and
 557 European American fishermen are more inclined to view
 558 fishing as a challenge. These differences in goals are
 559 reflected in differences in attitudes towards specific
 560 practices such as spearfishing or targeting bass, northerns,
 561 and muskies for food. One surprising result was that
 562 European American fishermen endorsed using fish finders,
 563 which, on the surface, doesn't appear to be sporting. A
 564 common comment was that it is one thing to find fish and
 565 quite another to catch them (some experts said that they
 566 only used fish finders to map out the terrain, e.g., dropoffs).
 567 Another surprising result was the wide diversity of
 568 Menominee attitudes towards spearfishing. This finding
 569 figures into the rationale for Experiment 2.

570 Before shifting to the second experiment it is important
 571 to note the broad commonalities across groups. For

example, the rank ordering of species was highly correlated
 across groups. (Menominee rank trout somewhat higher,
 perhaps reflecting their food orientation but also reflecting
 the presence of many rivers and streams on the reservation
 and the fact that one does not need a boat to fish for
 trout). Most important, however, are the similarities in
 attitudes towards various fishing practices. Both groups
 condemn selling fish, keeping undersize fish, fishing on
 spawning beds, using setpoles to catch trout, and culling
 our smaller fish to get the largest possible limit. The key
 question in Experiment 2 is to what extent these groups are
 aware of their modest differences and their substantial
 shared values.

585 **Experiment 2. Intra- and Intergroup Perception**

Experiment 2 addresses the question of the relationship
 between the actual similarities and differences noted in
 Experiment 1 and *perceived* within- and between-group
 similarities and differences. In this task we asked the same
 questions as before. However, rather than exploring each
 individual's goals and values (to be aggregated statistically
 to group models) we asked each informant how they
 thought equally expert members of their community or the
 other community might answer the probes concerning
 values, goals, and attitudes.

There is good evidence that people perceive both other
 groups and their own reference group as more extreme than
 it objectively is. For example, Prentice and Miller (1993)
 found that college students systematically overestimated the
 amount and perceived desirability of alcohol consumption
 among other students and that, at least for male students,
 this misperception led to an increase in drinking. In other
 words misperception of a group norm can cause a self-
 fulfilling feedback to make the perceived group norm even
 more extreme. This has implications for negotiation and
 conflict resolution (see Ross and Stilling, 1991; Thompson
 and Gonzalez, 1997, for an analysis). There is other
 evidence that people tend to believe that their behavior
 speaks for itself, that they see the world objectively, and
 that only other people are susceptible to bias and mis-
 construal of events (e.g., Ross, 1990). This raises the
 possibility that members of one group will feel no need to
 try to take the perspective of members of the other group in
 understanding intentions, values, and behaviors. If you see
 the world objectively and someone does something trans-
 parently inappropriate (e.g., keeping a largemouth bass),
 then the conclusion that their motives are bad may be so
 automatic that it comes to you as a fact, not an inference. To
 the extent that this tendency is common it creates greater
 opportunities for intergroup misperception.

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t5.1 **Table V** Projected Fish Value Rankings for Own and Other Group

Raters	Menominee		European American		
	Rated	Menominee	Euro-Am.	Menominee	Euro-Am.
Fish					
Sturgeon		9.6	8.7	5.4	10.9
Black sucker		11.9	11.7	11.5	11.9
Bullhead		10.9	10.3	10.6	10.0
Bluegill		4.7	6.7	6.1	4.0
Brook trout		1.6	5.5	2.4	5.1
Brown trout		2.3	5.6	3.1	7.1
Gar		14.4	13.9	13.9	14.1
Bluntnose minnow		13.4	13.4	12.2	13.2
Largemouth bass		4.2	2.8	6.8	4.3
Smallmouth bass		7.5	7.3	7.5	7.2
Northern		6.0	5.5	6.2	5.4
River shiner		12.4	12.9	12.6	12.5
Walleye		4.3	1.4	4.8	2.1
Perch		7.5	7.8	6.2	6.2
Muskie		8.6	4.6	7.9	5.9

621 **Participants**

622 The informants were 14 European American and 14
 623 Menominee fishing experts, virtually all of whom partici-
 624 pated in Experiment 1. The average age, education, and
 625 years fishing did not differ from each other or from
 626 Experiment 1. Informants were paid for their participation.

627 **Materials and Procedure**

628 The rank ordering and ranking tasks were exactly the same
 629 as used in Experiment 1. The only difference was that each
 630 participant was asked to answer each of the probes twice.
 631 For the first iteration informants were asked to answer the
 632 questions the way they thought the typical fisherman from
 633 their community, equally expert, would answer them. We
 634 added that in many cases that the answers would probably
 635 be the same as they themselves would give but that
 636 sometimes people recognize that their preferences and
 637 values might not agree with a typical expert's answers.
 638 After the species ranking, goal ranking, and practices rating
 639 task was completed, informants were asked to repeat the
 640 task, this time answering from the perspective of an equally
 641 expert fisherman from the other community. After these
 642 tasks were completed we showed participants the mean
 643 ratings for each group from Experiment 1.

644 **Results and Discussion**

645 The results were striking and largely unanticipated. We had
 646 expected that European American experts would be

surprised that Menominee experts are divided on the
 question of spearing walleye and that Menominee experts
 might think that European American fishermen are more
 sports and trophy oriented than they actually are. But we
 were not prepared for just how strongly perceived group
 differences would depart from actual differences.

Perception of Relative Importance of Fish

We asked informants to rank order the importance of 15
 species of fish for (1) members of their own group, and
 (2) members of the other group. The results show striking
 accuracy. The main data appear in Table V. Each number
 represents the average ranking, so smaller numbers corre-
 spond to more highly valued fish. For example, Menominee
 experts gave highest rankings to brook trout and brown
 trout. Note also that both Menominee and European
 American informants correctly thought that trout were
 more important for Menominee than European American
 fishermen. Both groups also predicted that European
 American fishermen would rank walleye and muskie very
 highly (and more highly than the Menominees) and that
 also was the case. The only instance of what one might call
 misperception arose for the bluegill. Although the effect is
 not large, each group thought its own group would value
 the bluegill more than the other group.

Overall, each group very accurately anticipates the
 rankings that members of the other group would give. The
 two groups generally agree on their rankings (the cross-group
 correlation was +.87) but this accuracy extends well beyond
 general agreement. Menominee estimates of European
 American values correlate +.95 with European American

677 values and European American estimates of Menominee
678 values correlate +.93 with Menominee values.

679 Goal Rankings

680 The predicted rankings for the two groups are summarized
681 in Table III. Again, smaller numbers refers to higher
682 priorities. Columns two and five give predictions for one's
683 own group and columns three and six give the predictions
684 by the other group. Each group was fairly accurate at
685 anticipating the goals of members of their own group.
686 Menominee experts thought that European American
687 experts would be much more focused on catching a
688 trophy-size fish than they actually are. Menominee fisher-
689 men also underestimated the importance for European
690 American experts of fishing as an activity to pass down to
691 future generations and for being close to nature. The largest
692 discrepancy for European American predictions is the
693 underestimation of the importance to Menominee experts
694 of fishing as a way to relax.

695 Values and Attitudes Concerning Practices

696 Predictions for own group and the other group are summa-
697 rized in Table IV. Columns two and five give predictions for
698 one's own group and columns three and six give the
699 predictions by the other group. Menominee experts think
700 that European American fishermen would be more approv-
701 ing of fishing contests and getting a trophy fish mounted
702 than European American experts report, and European
703 American experts think Menominee experts would approve
704 selling fish, keeping undersized fish, fishing on spawning
705 beds, culling smaller fish to get the biggest sized limit, and
706 using setpoles to catch trout. As we noted before, such
707 practices are disapproved of by both groups. European
708 Americans even believe that Menominee would approve
709 fishing for suckers hoping to get a sturgeon on the line.

710 For both European American and Menominee experts
711 we find strong consensus with respect to each group's
712 perception of their own group (in-group) and the other
713 group (out-group) responses (For European Americans: 1st/
714 2nd factor eigenvalue: 4.7; variance explained: 60.1% aver.
715 1st factor score: 0.76; Menominee: 1st/2nd factor eigenval-
716 ue: 9.26; variance explained: 65.8% aver. 1st fact. score:
717 0.80). This indicates that each group entertains a clear
718 model of both in-group and out-group performance.
719 Obviously, these perceptions do not necessarily reflect the
720 actual models held by each group.

721 A cross-group consensus analysis was conducted to see
722 how well the two groups agree in their perceptions. That is,
723 do European American and Menominee experts (1) have
724 the same beliefs about European American values and
725 attitudes, and (2) have the same beliefs about Menominee

values and attitudes? This cross-group analysis reveals
726 consensus for both European American and Menominee
727 experts only with respect predictions for the European
728 American responses (eigenvalue=9.3 to 1, 66% of variance
729 accounted for by the first factor, and average first factor
730 score=.80). In light of the individual group consensus this
731 suggests that the Menominee model of European American
732 experts is in basic agreement with European American
733 experts' perceptions of their own values and behaviors.
734 This basic cross-group consensus is coupled with signifi-
735 cant residual group differences, as members of both groups
736 differ significantly on their second factor scores. In other
737 words the general overall agreement is coupled with more
738 specific systematic differences in perceptions.
739

740 Corresponding cross-group analyses with respect to the
741 Menominee response pattern fail to show consensus. This
742 underscores an asymmetry with respect to cross-group
743 perception. In short, European American models of Me-
744 nominee are strikingly different from Menominee indi-
745 vidual responses and Menominee predictions for the
746 group consensus. Overall, these data indicate that
747 European American fishermen hold strong, incorrect
748 expectations concerning Menominee values.

749 Where do these misperceptions come from? Given that
750 we had not anticipated just how large the discrepancy
751 would be, this question is largely outside the scope of
752 our present inquiries. Nonetheless, we will offer some
753 suggestions and provide some additional correlational
754 analyses that may bear on them. We believe that the
755 source for these misperceptions comes from differences
756 in specific goals and knowledge organization, reinforced
757 by patterns of media coverage. Differences in specific
758 goals can lead to rejection of another group's values and
759 practices.

760 Our sample is not large enough to make conclusive
761 observations that link subgroups of European American
762 experts to stereotyping. However, in a first attempt to
763 understand the relation of knowledge structure and stereo-
764 typing we searched within group differences in task one
765 (categorization of fish) for patterns in stereotyping. We
766 expected that European American individuals sharing a
767 basic knowledge organization with Menominee experts
768 might show fewer stereotypes about Menominee values
769 and behavior. There are three reasons to make this
770 prediction: (1) Both results might be driven by social
771 network proximity—a better understanding of Menominee
772 knowledge organization may go with a better appreciation
773 of their values and attitudes. (2) A knowledge organization
774 similar to the Menominee might allow a better appreciation
775 of values and attitudes Menominee hold. (3) The more that
776 a European American expert's knowledge is strongly
777 organized around goals, the less they may understand
778 Menominee values.

779 If our hypothesis is correct we should find a positive
780 correlation between European American experts' use of a
781 "garbage fish category" and the stereotyping of Menominee
782 values and attitudes. Similarly, we should find a negative
783 correlation between their use of ecological reasoning and
784 stereotyping. Stereotyping was calculated as the difference
785 between the Menominee self-reported data and a European
786 American expert's estimate of Menominee responses on
787 (1) spearfishing walleye, (2) using setpoles, (3) selling
788 fish, and (4) fishing for suckers hoping to get a sturgeon
789 on the line.

790 Results must be considered as preliminary, given the
791 small set of individuals that were interviewed in both tasks.
792 Nonetheless, we find a clear positive correlation between
793 stereotyping and the use of "garbage fish" as a category ($r=$
794 0.51), and a clear negative correlation between the use of
795 ecological justifications and stereotyping ($r=-0.52$). These
796 data are suggestive at best, since both correlations fall short
797 of statistical reliability. Further work will be needed to
798 explore the specific causes and relations of similarities in
799 knowledge organization and stereotyping.

800 In a second exploratory analysis we examined relation-
801 ships between the fish ranking task and stereotyping. There
802 is a discrepancy between perception and actuality that we
803 have deferred addressing until now. The European Amer-
804 ican fish experts thought that the Menominee experts would
805 rank the sturgeon more highly than they actually do. As we
806 noted earlier, the Shawano dams on the Wolf River prevent
807 sturgeon from reaching the reservation itself. Many Euro-
808 pean American fishermen may be aware of Menominee
809 efforts to get ladders installed on these dams so that
810 sturgeon could return to the reservation for spawning. Some
811 may also know that sturgeon are considered sacred so it is
812 not surprising that European American experts thought that
813 Menominee experts would value sturgeon highly. Indeed,
814 we ourselves were initially surprised that our Menominee
815 experts did not rank sturgeon more highly. The responses of
816 the Menominee experts tend to be more pragmatic. A
817 typical comment was "we don't have them on the
818 reservation any more." One expert who is an elder did not
819 rank sturgeon highly because he thinks the meat is too rich.

820 The overall mean rank of 5.4 for the European
821 Americans' expectations about Menominee ranking con-
822 ceals a great deal of variability, and we decided to
823 investigate further. Specifically, we looked how answers
824 to the values probe "pretending to fish for suckers hoping to
825 get a sturgeon on the line" correlated with beliefs about
826 Menominees valuing sturgeon more than white fishermen.
827 Recall that Menominees disapprove of this practice but that
828 expert European American fishermen as a group thought
829 that Menominees would approve of it more than their own
830 group does. For each European American expert we com-
831 puted two scores: (1) rating for Menominee approval of

pretending to fish for suckers minus the same anticipated 832
rating for European American fishermen, and (2) anticipat- 833
ed Menominee ranking of sturgeon versus expected ranking 834
for European American experts. We then correlated these 835
two scores across our European American experts. 836

837 One hypothesis is that experts who knew enough about 837
Menominee culture to know that they value sturgeon would 838
be less likely to think that Menominee would approve of 839
trying to get sturgeon on their lines for entertainment. If 840
that were the case then we should observe a negative 841
correlation between the two scores. The observed correla- 842
tion was +0.70, highly significant and in the opposite 843
direction! Those that thought Menominee experts would 844
value sturgeon also thought that they would approve of 845
getting sturgeon on the line for entertainment. Another way 846
of describing the results is that the European American 847
experts who know enough about Menominee fishing values 848
to anticipate that they would NOT rank sturgeon highly 849
were also those experts who judge that Menominee would 850
NOT approve of pretending to fish for suckers hoping to 851
have a chance to wrestle with a sturgeon. 852

853 We also looked at the correlation between thinking that 853
Menominees would rank sturgeon high and a combined 854
measure of values and practices associated with stereo- 855
typing: (1) selling fish, (2) keeping undersized fish, (3) culling 856
out smaller fish to get the largest bag limit, (4) fishing on 857
spawning beds, (5) using setpoles to catch trout, and 858
(6) pretending to fish for suckers hoping to get a sturgeon on 859
the line. Again for each European American expert we took 860
the difference between anticipated approval by Menominee 861
versus European American experts as our index of stereo- 862
typing. The correlation between this index and thinking that 863
Menominee experts would rank sturgeon comparatively 864
higher was +0.65, which is statistically significant. So the 865
correlation holds not only for the item concerning suckers and 866
sturgeon but also for stereotyping as a whole. 867

868 Overall, these observations suggest that knowing a bit 868
about Menominee values in the abstract was not enough to 869
undermine stereotyping but knowing Menominee fishermen's 870
specific values was. Of course, it could be that the judgment 871
that Menominee fishing experts would not value the sturgeon 872
more highly than European American fishermen was based on 873
lack of knowledge rather than a specific belief. To address this 874
question, we did a final correlation analysis. 875

876 Recall that European American experts as a group knew 876
that Menominee place greater relative value on trout. In our 877
final analysis we looked at the correlation between 878
predicting that Menominee would value sturgeon relatively 879
more and knowing that Menominee value trout relatively 880
more. The correlation was significant and negative (-0.62), 881
In other words, the European American experts who cor- 882
rectly thought that Menominee value trout tended to think 883
correctly that Menominee would not preferentially value 884

885 sturgeon. But the more important data concern stereotyping.
 886 Using the six items mentioned previously to get an overall
 887 measure of stereotyping, we find a reliable negative
 888 correlation (-0.49) between knowing that Menominee
 889 preferentially value trout and stereotyping. The better the
 890 European American experts knew Menominee rankings, the
 891 less stereotyping they displayed. We are currently gathering
 892 social network data as a converging source of evidence.
 893 Data collected so far are consistent with the idea that
 894 knowing specific Menominee who fish is negatively cor-
 895 related with stereotyping.

896 We should also bear in mind that our observed asym-
 897 metry in accuracy of cross-group perceptions may be as-
 898 sociated with the asymmetry of cross-group experiences.
 899 Specifically, it is more common for Menominees to conduct
 900 business off the reservation than for European Americans to
 901 do so on the reservation.⁴ This could also lead to more
 902 opportunities for Menominees to observe European Amer-
 903 ican fishermen than vice versa.⁵ The social network data we
 904 are collecting should bear on the asymmetry hypothesis.

905 **General Discussion**

906 The most striking finding is that the very modest actual
 907 differences in goals, values, and attitudes are accompanied
 908 by massive perceived differences. Furthermore, the effect is
 909 strongly asymmetrical. Menominee fish expert judgment
 910 modestly exaggerated the sportsman's model of fishing but
 911 European American fish expert judgments of Menominee
 912 values are wildly discrepant from stated Menominee values.
 913 One explanation that can readily be rejected is that the
 914 Menominee stated values do not correspond to actual be-
 915 haviors. As we noted earlier, however, recent surveys of fish
 916 populations in lakes and rivers on the Menominee reserva-
 917 tion show that fish populations are healthy and abundant
 918 (Schmidt, 1995). In short, the Menominee tribe has done a
 919 good job of managing fish as a reservation resource.

920 We suggest that these misperceptions are mediated by
 921 differences in specific goals and associated knowledge
 922 organization, reinforced by patterns of media coverage (for
 923 related analysis of effects of media coverage see Gilens,
 924 1996; Gilliam and Iyenger, 2000). In the remainder of this
 925 paper we briefly consider the modest stereotyping of
 926 European American fishermen by Menominees and then
 927 turn to the much larger stereotyping by European American
 928 fishermen.

⁴ We thank an anonymous reviewer for emphasizing this point.

⁵ One might think that the situation is more symmetrical when both European American and Menominee fishermen are fishing off the reservation, but since state regulations apply to both groups in this context this still leaves room for speculation about how Menominees fish when they are on the reservation.



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The sportsman's model of searching for trophy-sized 929
 fish is common in the media. It is easy to get the idea that 930
 getting a trophy fish is the be all and end all of fishing. 931
 Fishing contests on cable television only reinforce this 932
 impression. Sporting magazines are full of photographs of 933
 particularly large game fish that anglers have caught. 934
 Rarely does an article mention someone catching two 16- 935
 inch walleye and making a nice meal from them (and there 936
 certainly would be no photo). It is also important to note 937
 that although the Menominee as a whole tended to have 938
 stereotypes about European American fishermen, there 939
 were a number of exceptions—these are group trends that 940
 do not hold for every individual. 941

If the gap between prediction and reality is large for 942
 Menominee predicting European American values, then it is 943
 enormous for European American fishermen predicting 944
 Menominee values. The fact that they thought that Menom- 945
 inee would be more approving of spearfishing walleye than 946
 they are is not so surprising. But they also thought, contrary 947
 to fact, that Menominee fishermen would strongly approve 948
 of virtually every practice that both groups condemn. 949

Differences in specific goals can lead to rejection of 950
 another group's values and practices. For example, Menom- 951
 inee fishermen uniformly endorse eating largemouth and 952
 smallmouth bass, a practice that many European American 953
 fishermen reject because "they are such good fighters that 954
 one should only do catch and release." Fishing for sport is 955
 institutionally sanctioned and encouraged. For example, the 956
 ethic of catch and release (Hummel, 1994) is reinforced by 957
 Wisconsin Department of Natural Resources (WDNR) 958
 policy. In parts of Wisconsin the WDNR fishing regulations 959
 include a "catch and release only" season for largemouth 960
 and smallmouth bass in the spring when bass are spawning 961
 (Wisconsin Department of Natural Resources, 2002). In 962
 2005 the state legislature mandated that the WDNR 963
 approve the normally illegal practice of culling fish for a 964
 number of bass tournaments. 965

Q1
 Q1

966 Media coverage of the controversy surrounding Native
 967 American spearfishing exacerbates the effects of these
 968 differing orientations, especially when these rights cover
 969 off-reservation waters. When we revealed the Menominee
 970 ratings to European American fishermen, a common
 971 response to the mismatch was, “You know, I think I was
 972 answering the way that the Chippewa might answer.”
 973 (Another common response was “Well, I know Menominee
 974 really take care of their forest, so it makes sense that they
 975 also take care of their fish.”)

976 The Chippewa (or Ojibwe) have received the greatest
 977 publicity as the only tribe with off-reservation fishing rights
 978 (in the territories they ceded in the nineteenth century,
 979 which cover much of northern Wisconsin). In these waters,
 980 the daily limit on walleye is lower than in the rest of
 981 Wisconsin and it is a natural inference that spearfishing of
 982 walleye in the spring when they are spawning depletes the
 983 resource. A decade ago Ojibwe spearfishing of walleye and
 984 the associated demonstrations and protests in the spring by
 985 organizations like Protect Americans Rights and Resources
 986 (PARR) attracted nightly attention. This attention seemed to
 987 have the goal of creating heat, not light. Moderate voices
 988 were rarely quoted and the television coverage focused on
 989 the fact of controversy, not on factual information that
 990 might be relevant to it.

Q1 991 These facts are as follows. Records over the past decade
 992 (Wisconsin Department of Natural Resources, 2000, 2002)
 993 indicate that sports fishermen harvest more than 12 walleye
 994 for every one taken by Ojibwe spearkers. The Ojibwe also
 995 maintain fish hatcheries, strip the spawn from any females
 996 they spear and restock in the same waters where they spear
 997 (e.g., in 1998 Ojibwe stocked ceded territory waters with
 998 over 26 million walleye fry and more than 700,000 walleye
 999 fingerlings [Wisconsin Department of Natural Resources,
 1000 2002]). Despite these numbers, many sportfishermen may
 1001 balk at the image of spearkers taking large female walleye.
 1002 But WDNR monitoring also undermines this image.⁶
 1003 Sexing of harvested fish during the 1985–1999 period
 1004 shows that a breakdown of 83% males, 10% females and
 1005 7% of unknown sex. The average length of walleye taken
 1006 has been 15.5 in. So the image that best fits is of a 15-inch
 1007 male walleye, not a 25-inch female.

1008 The WDNR may indirectly and perhaps inadvertently
 1009 contribute to the perception that Ojibwe spearkers are
 1010 depleting the walleye population by its policies concerning
 1011 limits. A 1998 study commission recommended that the
 1012 statewide limit be set at three walleye (a review board
 1013 overturned this policy). If the DNR is implementing this
 1014 policy where it can, namely where lakes have been declared

⁶ For 2003 walleye limits for lakes where Native Americans have off-reservation spearfishing rights, see <http://www.dnr.state.wi.us/org/water/fhp/fish/ceded/walleye.htm>



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Q2

for spearing, then the result may be that Ojibwe fishermen 1015
 take the blame for the lower limits. 1016

Another source of misperceptions consists of anecdotes 1017
 and stories, sometimes rooted in reality, often not. Lurid 1018
 stories about tossing walleye in dumpsters are highly 1019
 memorable and tempting to repeat, regardless of the 1020
 authenticity of the source or the veracity of the information. 1021
 In at least one case, a television station dispatched a TV crew 1022
 to document this waste, only to discover that what appeared 1023
 to be discarded walleye were actually the leavings of fish that 1024
 had been cleaned—Ojibwe practice of leaving the head 1025
 intact during filleting had fooled casual observation. 1026

Returning to the mispredictions of Menominee values 1027
 and practices, again it is important to note that the results 1028
 reflect group patterns and in no way characterize every 1029
 individual. A significant minority of the European Amer- 1030
 ican fishermen accurately predicted Menominee reported 1031
 values. These tended to be men who had firsthand 1032
 experience with Menominee fishermen and were familiar, 1033
 for example, with the fact that Menominee preferentially 1034
 value trout. Perhaps the best summary comes from one such 1035
 fisherman who said, “I don’t care if someone is Native- 1036
 American, African-American, Asian, or white, the vast 1037
 majority will have good values and a few won’t.” 1038

The generality of our results and the relative contribu- 1039
 tions of media coverage and mental models of nature to 1040
 misperceptions is an open question. Nonetheless there is 1041
 considerable reason to think that that our findings are not 1042
 confined to fish experts and that mental models matter. In 1043
 parallel research we have interviewed Menominee and 1044
 European American hunters from the same study area in 1045
 Wisconsin. Media coverage is much less of an issue with 1046
 respect to hunting.⁷ Nonetheless we observe parallel and 1047
 asymmetrical misperceptions of Menominee values and 1048
 attitudes. European American hunters often say things like 1049

⁷ There has been some controversy over tribes allowing hunters to shine deer, though the Menominee tribe has banned the practice.

1050 “Menominees kill all their deer. You can drive through the
 1051 reservation and not see a single deer.” This impression is
 1052 inaccurate—surveys show that the deer population on the
 1053 reservation is exactly in the midrange of estimates of the
 1054 carrying capacity.

1055 The cultural differences in ecological orientation also
 1056 appear to be very robust. For example, we find parallel
 1057 differences in Menominee and rural European American
 1058 children on a reasoning task where both taxonomic and
 Q1 1059 ecological strategies may come into play (Ross *et al.*,
 1060 2003). In a further ongoing project, we have interviewed
 1061 rural European American and rural Menominee parents and
 Q3 1062 grandparents (Bang *et al.*, 2004). One of our questions was
 1063 “What are the five most important things for your children
 1064 (or grandchildren) to learn about the biological world?” We
 1065 then coded the responses into categories representing
 1066 different perspectives on the natural world. Parents in
 1067 general took a moral stance. For example, European
 1068 American parents commonly said that they wanted their
 1069 children to realize that they have a responsibility to take
 1070 care of nature. In contrast, however, Menominee parents
 1071 tended to talk about “Mother Earth” and wanting their
 1072 children to understand that they are *a part of* nature. They
 1073 were also more likely to mention continuity between the
 1074 past and the future, mentioning both ancestors and coming
 1075 generations. Note also that the term Mother Earth implies
 1076 that it takes care of us rather than vice versa. It also
 1077 embodies a relational view of nature, rather than seeing it as
 1078 something external.

1079 In conclusion, the most striking finding is the contrast
 1080 between perception and reality: despite the strong overall
 1081 consensus in knowledge, goals and values, European
 1082 American fishermen see Menominee as vastly different.
 1083 These results suggest that differences in how groups con-
 1084 ceptualize nature may be critical to understanding inter-
 1085 group conflict over resources.

1086 **Supplemental Materials**

- 1087 S1. Individual Activity Ratings
 1088 [http://www.northwestern.edu/environment/ActivityRatings.](http://www.northwestern.edu/environment/ActivityRatings.htm)
 1089 [htm](http://www.northwestern.edu/environment/ActivityRatings.htm)
- 1090 S2. Individual Cross-Group Ratings
 1091 <http://www.northwestern.edu/environment/Rawdata.htm>

- S3. Averaged Cross-Group Ratings 1092
<http://www.northwestern.edu/environment/Tabledata.htm> 1093

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AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES.

- Q1. Boster (1986), Coley (1995), Gilens (1996), Gilliam and Iyenger (2000), Hall and Pecore (1995), Lopez et al. (1997), Medin et al. (in press), Nakao and Romney (1984), Radomski and Geoman (1995), Ross and Stillinger (1991), Ross et al. (2003), Ross (1990, 2002) Schmidt (1995), Thompson and Gonzalez (1997), U.S. Decennial Census (2000), Weller (1987), Wisconsin Department of Natural Resources (2000, 2003) were cited in the text but were not found in the reference list. Please check.
- Q2. Please provide figure captions and figure citations for the following figures.
- Q3. Bang et al. (2005) was changed to Bang et al. (2004). Please check if appropriate.

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