

1 **Abstract**

2 Why do human societies have so many taboos? In this paper, I offer a naturalistic account on the
3 origin and transmission of taboos, drawing primarily from cognitive science and cultural
4 evolution. I argue that taboos may arise from our tendency to retrospectively attribute causes to
5 misfortunes due to a deterministic worldview, and the imperfect transmission of taboos often
6 leads to loss of their original utilitarian rationale, making them resemble mere cultural
7 conventions. While this account does not explain all cultural prohibitions in human societies, it
8 provides important insights on the psychological-social mechanisms by which many taboos are
9 generated in a bottom-up fashion. Towards the end of the paper, I offer a few suggestive
10 thoughts on the relevance of studying taboos in contemporary, modern societies.

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25 1. Introduction

26 Taboos are ubiquitous in human social life, and play a particularly prominent role in traditional,
27 small-scale societies where they serve as powerful tools to regulate human action.

28 Etymologically, the word “taboo” originated from the Polynesian term *tabu* which roughly
29 means “to forbid” certain human activities (Steiner 1956/2013). In the anthropological literature,
30 it is often associated with religious practices, carrying a sense of “sacred prohibition” (Lisiansky
31 1814; Tregear 1891), though Radcliffe-Brown (1939/2014) points out that loosely speaking,
32 taboo generally applies to any kinds of prohibition, and as such may span diverse domains from
33 diet to ritual.

34 To a modern reader, two features of taboos in traditional societies stand out. First, they
35 are numerous. A simple keyword search with “taboo” OR “taboos” in Human Relation Area
36 Files returns 13187 paragraph hits in the 2001 documents from 329 cultures, meaning on average
37 each ethnography mentions taboos more than 6 times, comparable with the frequency of “magic”
38 (16996 paragraph hits in 2168 documents from 332 cultures). In his study of Malagasy taboos,
39 Ruud (1960) identified over 600 prohibitions in virtually all aspects of life, from pregnancy and
40 birth to tomb construction. Comparative studies also show that traditional, rural areas typically
41 have more taboos than their urban counterparts (Sharifah Zahhura, Nilan, and Germov 2012;
42 Zerfu, Umeta, and Baye 2016). Secondly, many of these taboos are, *prima facie*, nonsensical
43 from a modern, scientific standpoint. Why, for instance, should menstruating women be
44 prohibited from consuming perfectly nutritious fruit (Meyer-Rochow 2009)? And why should
45 religious leaders be prohibited from engaging in sexual activity (Sobo and Bell 2001)? These
46 taboo beliefs and the associated behaviors are also puzzling from an evolutionary perspective:
47 taboos often incurs a non-trivial fitness cost (Singh and Henrich 2020) and therefore should be
48 selected against if they are not objectively true¹.

49 As a classic anthropological topic, taboos have received much scholarly attention by
50 early theorists (Frazer 1890; Radcliffe-Brown 1939/2014; Durkheim 1912/2008; Freud
51 1913/2013), and have been provided many functional, symbolic, and evolutionary explanations.

¹ Generally speaking, true beliefs confer fitness advantages and untrue beliefs typically incurs some cost. As such, humans possessing untrue beliefs is described as a puzzle that requires explanations. See McKay and Dennett (2009) for a review of this literature.

52 More generally, the subject of taboo is also often subsumed and analyzed under the larger
53 umbrella category of “rules” (Singh, Wrangham, and Glowacki 2017; Köster et al. 2022) or
54 “norms” (Akintan, Jewitt, and Clifford 2018; Roest, Visser, and Zeelenberg 2018) in human
55 societies. In particular, psychologists and cognitive scientists have attempted to address the
56 question of why certain cultural practices take specific forms (Singh 2017; Miton, Claidière, and
57 Mercier 2015; Fessler and Navarrete 2003) and the potential individual and/or group level
58 benefits these practices confer (Singh, Wrangham, and Glowacki 2017; Richerson et al. 2016).

59 While these previous efforts have achieved considerable progress in shedding light on the
60 form and function of various types of taboo beliefs and practices, they do not always provide a
61 sufficiently detailed account of how taboos are originally generated and how they are transmitted
62 over time. In this paper, I offer an account of the origin of taboos based on individual causal
63 cognition and the transmission of taboos based on cultural evolutionary theory, and highlight
64 some hitherto under-appreciated features of taboos. I argue that many taboo beliefs originate as a
65 result of error-prone, retrospective causal attribution, but the causal understanding is often lost
66 during the cultural transmission process. The resulting population level outcomes are that 1)
67 there is a tendency for the number of cultural prohibitions to increase over time and 2) there is
68 substantial vagueness and heterogeneity in individuals’ understanding of the worldly
69 consequences of taboo violation.

70 The rest of the paper is organized as follows. In section 2, I briefly lay out and examine
71 the existing accounts of taboos; in section 3, I introduce my account of the origin and
72 transmission of taboo beliefs and practices in full detail, drawing extensively from the literature
73 on causal cognition and cultural evolution theory. Finally, I discuss the explanatory scope and
74 limitations of my account and comment on the relevance of taboos in contemporary, modern
75 societies.

76 Before proceeding, I shall clarify a few points. First, throughout this paper the word
77 “taboo” will be used in a broad sense which covers both sacred prohibitions and mundane
78 actions that one is discouraged from performing, which may or may not carry moral significance.
79 In contrast to some approaches where morality is an indispensable feature of taboo beliefs and
80 practices (Tetlock et al. 2000), this broad definition takes a utilitarian stance and focuses on the
81 kind of cultural prohibitions whose transgression is believed to cause some (real or imagined)

82 worldly harm. Second, my account does not exclude other theories of taboos, but rather
83 complements them by focusing on their origination and transmission. Lastly, this account applies
84 only to taboos that spontaneously emerge in the population in a bottom-up fashion; taboos that
85 are conceived and implemented top-down (e.g., legal prohibitions) would be outside of the
86 explanatory scope of my theory. These cases will nonetheless be used for comparisons to
87 highlight some of the limitations of my theory in the discussion.

88 2. Existing theories on taboos

89 In this section, I provide a non-exhaustive review of the sociological, psychological, and
90 anthropological literature on taboos. Note that different academic disciplines tend to offer
91 explanations for taboos at different levels of analysis, and as such they are often not mutually
92 exclusive.

93 2.1. Taboos as Magic

94 The pioneering anthropologist Edward Tylor (1865) first hinted at the association between magic
95 and taboos in his *Researches into the Early History of Mankind* where he discussed the “food
96 prejudices of savage races”, pointing out that the Dayak hunters were said to avoid consuming
97 flesh from slow-going and cowardly animals, though he never used the word “taboo”. It was
98 another early British anthropologist, James Frazer, who explicitly stated the relationship between
99 magic and taboos in his masterpiece *The Golden Bough* where the laws of sympathetic magic
100 (i.e., objects that are similar or in contact may exert influence on each other) are formulated
101 (Frazer 1890). In this encyclopedia-style examination of magical practices across the world,
102 Frazer refers to taboos as “negative magic” and devotes four entire chapters to the analysis of
103 various types of taboos. For Frazer, taboos follow the same general principles as other magical
104 practices. In fact, one way to classify magical practices is by the form of their precepts:

105 ...it is to be observed that the system of sympathetic magic is not merely composed of
106 positive precepts; it comprises a very large number of negative precepts, that is,
107 prohibitions. It tells you not merely what to do, but also what to leave undone. The
108 positive precepts are charms: the negative precepts are taboos. In fact the whole doctrine
109 of taboo, or at all events a large part of it, would seem to be only a special application of
110 sympathetic magic, with its two great laws of similarity and contact. (Frazer 1890, p. 52)

111 Here, Frazer is very explicit on the explanatory power of sympathetic magic in understanding
112 human taboos. Note the implicit assumption here is that the consequences of taboo violations are
113 known, as they can be derived directly from the laws of sympathy and contagion. Among the
114 Ainos of Saghalien, for example, a pregnant woman may not spin nor twist ropes for two months
115 before her delivery, because it is believed that if she did so the child's guts might be entangled
116 like the thread (Frazer 1890, p. 55). Another feature of Frazer's account of taboos is that
117 sacredness is unnecessary. Surely, there is nothing sacred about twisting ropes. Taboos,
118 according to Frazer, are a result of our psychological tendency based on sympathetic magic
119 principles (Steiner 1956/2013, p. 94-97) to prevent undesirable outcomes from occurring, and as
120 such are mostly instrumental: the reason people avoid certain actions is because the consequence
121 of these actions are well-recognized (or "imagined" in Frazer's term), and the people are
122 behaving sensibly given such beliefs.

123 More generally, taboos may be viewed as cultural products of evolved psychological
124 intuitions. In Fessler and Navarrete (2003)'s extensive study of food taboos, meat items are much
125 more likely than plants to be "tabooed", which is suggested to be the result of the fact that meat
126 triggers the emotion of disgust. Here no magic principle is explicitly invoked; rather, our evolved
127 psychological predisposition to think of meat as disgusting makes them better "candidates" for
128 things to taboo. Similarly, Douglas (1966) theorizes that the reason certain animals are
129 prohibited to consume because they are "impure" and do not fit into normal categories. Pigs, for
130 example, were prohibited food items for the Israelites because of their ambiguous status as an
131 animal: they share the cloven hoof of the ungulates but do not chew cud².

132 2.2. Taboos as social control

133 In sociology, taboos are sometimes explained as a form of social control (Whiting 1967; Lumley
134 1925). Like many other functional explanations of taboos, these accounts emphasize the effect of
135 taboos at the societal level, both intended and unintended (Isajiw 1968/2013). More specifically,
136 this explanation states that taboo objects and actions are often significant for social order and
137 therefore their existence in societies is due to their effect in maintaining such social order (Böker
138 2010). Sigmund Freud, for example, famously analyzed incest taboos this way; for Freud,

² The Old Testament is pretty explicit on this reasoning of pork prohibition. See Leviticus 11:1.

139 humans have innate desires to engage in sexual activity with their family members³, and
140 prohibitions against intra-familial sexual relations thus set the necessary conditions for the
141 emergence of kinship and moral conscience (Freud 1913/2013). In the original Polynesian
142 context, ordinary people were prohibited from touching a chief because it was believed that
143 doing so would compromised his *mana*, or sacred power (Lambek 2015), which has been
144 interpreted as a way to consolidate political authority and social hierarchy (Steiner 1956/2013, p.
145 37-39). Here we see “taboo as magic” hiding in the background: the idea that mana may be lost
146 by human contact is an example of classic Frazerian sympathetic magic. We could therefore say
147 that psychologically, the plausibility that human contact compromising *mana* is maintained by
148 magical thinking, yet at the societal level it functions as a form of social control.

149 2.3. Taboos as cultural adaptations

150 For evolutionarily minded researchers, taboos are frequently interpreted as adaptive, in the sense
151 that they confer fitness benefits either at the individual level or the societal level (Ross et al.
152 1978; Placek, Madhivanan, and Hagen 2017; Lepowsky 1985). Johannes (1978), for example,
153 suggests that taboos on certain fishing practices and dietary restrictions serve as effective tools
154 for managing fish resources among the indigenous peoples in Oceania (but see Foale et al.
155 (2011) that challenges such adaptationist interpretation). In the burgeoning field of cultural
156 evolution, taboos are often viewed as adaptive, culturally transmitted information. An
157 illustrative, widely cited study is Henrich and Henrich (2010)’s analysis of Fijian food taboos,
158 where they argue that these taboos protect pregnant women and their fetuses from dangerous
159 marine toxins, which is used to demonstrate our psychological capacity to extract adaptive
160 beliefs and practices through social learning. Similarly, Harris (2012) proposes that the Israelites’
161 pork avoidance was a result of an implicit cost-benefit analysis (in contrast with the
162 psychological explanation as discussed in section 2.1.): the early stages of agricultural
163 development in the Middle East caused significant deforestation which destroyed pigs’ natural
164 niche. As a result, raising pig became too costly and not worth the benefit from an ecological and
165 nutritional perspective.

³ Contemporary evolutionary psychology has largely disputed this view, and argued instead for an evolved tendency to avoid engaging in sexual activities with close family members. See Lieberman and Lobel (2012) and Paul (2010).

166 3. Taboos as a result of promiscuous causal attribution and imperfect 167 cultural transmission

168 In all the above accounts, the emphasis is usually either on the form (i.e., what are the
169 characteristics of taboos?) or the function (what are taboos for in human societies?). In contrast,
170 how individual taboos are generated and transmitted is typically a secondary concern⁴. Here, I
171 provide a hitherto neglected mechanism⁵ for the generation of taboos and the transmission of
172 taboo beliefs and practices based on individual causal inference and imperfect cultural
173 transmission. To do so I will first introduce the psychological tendency of explanation-seeking
174 under a deterministic worldview, and then outline a process via which a taboo belief comes into
175 existence and gets transmitted in the population.

176 3.1. There are no accidents – a deterministic worldview and explanation-seeking in 177 traditional societies

178 Contemporary psychological research has firmly established that humans have a natural
179 tendency to seek explanations, which serves to facilitate causal inference and inductive
180 reasoning⁶ (Frazier, Gelman, and Wellman 2009; Lombrozo 2006; Bender 2020). Generally, we
181 are more likely to seek explanations when unexpected outcomes happen⁷ (Isaacs 1930;
182 Pyszczynski and Greenberg 1987; Weiner 1985), when we encounter concrete problems to be
183 solved (Chouinard 2007), and when disasters and misfortunes happen (Singh 2021; Raudvere
184 2020). As Barrett and Lanman (2008) point out, though humans may not have a urge to explain
185 everything in the world around them (indeed, doing so would be extremely cognitively

⁴ Work in cultural evolution does provide a general account of the origination of cultural variation (taboo beliefs/practices included), though it is typically not the focus of this literature. Briefly, cultural evolution draws a close analogy from biological evolution: while biological variation is generated by random mutation, cultural variations is generated by accidents and errors during transmission. Adaptive cultural variations are sometimes referred to as “lucky errors” (Joseph Henrich 2016).

⁵ To be sure, the retrospective causal attribution mechanism is alluded to in some early work. For an example, see (Murdock 1980, p. 90). More recently, Fessler (2002) points out that taboos may arise from observations of causality in the context of pregnancy and birth (e.g., consumption of certain food causes sickness, see also Fessler (2006) for a discussion on the origin of rituals). This explanation, however, was presented more as a sidenote and had little follow-up work.

⁶ For a comprehensive review on the instrumental value of explanations, see Lombrozo (2011).

⁷ For a philosophical, normative account of explanation seeking in case of unexpectedness, see Wong and Yudell (2015).

186 demanding⁸), we do seek explanations for events with significant consequences for our own
187 survival and fitness.

188 While explanation seeking itself is common, people in contemporary societies are often
189 quite comfortable with invoking “chance” or “coincidence” as an explanation (van Elk, Friston,
190 and Bekkering 2016), and the mathematically quantified entity “probability” is usually sufficient
191 and begs no further questions (Piaget and Inhelder 1951/2014, p. xvi; Bandura 1982). Now
192 contrast this attitude on chance and accidents with that in societies where the quantified
193 understanding of probability is absent. A sizable anthropological literature reveals that people in
194 traditional, small-scale societies⁹ seem to have a deterministic worldview¹⁰ and are thus
195 unwilling to leave any aspects of a significant event unexplained: everything happens for a
196 reason, and there are no accidents (Jansen 1973, p. 39; Lévy-Bruhl 1926/2020; Little 1997;
197 LePan 1989, p. 165). The Azande, for example, famously explain the collapse of a granary in the
198 following way (Evans-Pritchard 1937, p.70):

199 The Zande knows that the supports were undermined by termites and that people were
200 sitting beneath the granary to escape the heat and glare of the sun. But he knows besides
201 that these two events occurred at a precisely similar moment in time and space. It was
202 due to the action of witchcraft.

203 Thus, for Azande there are no accidents, and all aspects of the collapse of the granary — a
204 significant event — could be explained (Alaszewski 2015). While the exact timing of the
205 collapse (most appropriately described as a random variable in probability theory) may not
206 interest a modern reader, for the locals these details also demand explanations which they indeed
207 provide. In a similar vein, Horton (1967) suggests that people in traditional communities often
208 are unwilling to confess ignorance on such significant events:

⁸ Generally speaking, thinking takes up computational resources, and attending to worldly events, reasoning, and coming up with explanations may carry non-trivial cognitive cost (Gabaix et al., 2006; Lieder & Griffiths, 2017).

⁹ The same deterministic attitude also occurs in the religious traditions of more hierarchical societies. In Christianity, unexpected events are frequently attributed to divine providence (Lüthy and Palmerino 2016); in Buddhism “karma” plays a similar role in explaining fortunes and misfortunes (Harvey 2012). Even in secular settings we observe a similar kind of deterministic thinking: in Roman private law, for example, the term “accident” mainly signified something being determined by fate (C. Jansen 2016).

¹⁰ To be sure, most human societies have some (objectively speaking) randomizing devices. However, from an emic perspective these devices are not viewed as generating random information; quite the opposite, the randomizing devices (e.g., various divination techniques) are typically believed to produce *non-random*, meaningful messages.

209 What the anthropologist almost never finds is a confession of ignorance about the answer
210 to some question which the people themselves consider important. Scarcely ever, for
211 instance, does he come across a common disease or crop failure whose cause and cure
212 people say they just do not know (Horton 1967).

213 As such, the deterministic worldview leaves little room for accidents and chance, and when
214 people seek to explain important worldly events, they *always* obtain some explanation¹¹. As will
215 be seen, such determinism sets up an important condition for the emergence of taboos.

216 3.2. People attribute causes to misfortunes and the incremental increase in putative 217 causes

218 The attribution of putative causes to misfortunes follows directly from ordinary causal inference.
219 To fix intuitions, let's use a hypothetical example where a woman in a community recently gives
220 birth to a child. Unfortunately, however, the child is born with cleft lips (a misfortune occurs).
221 Because of the commitment to a deterministic worldview, the mother, along with her close
222 friends and relatives, engages in a search for the causes of such deformity (causal explanation
223 seeking) and out of the total number of candidate causes, they¹² pick the one that is perceived to
224 be the most likely based on their prior beliefs (inference to the best explanation). Suppose after a
225 careful examination of the mother's behaviors and diets during pregnancy, the group conclude
226 that it was her consumption of rabbit meat that caused the deformity. Such causal attribution then
227 spreads in the population (the exact transmission mechanism will be elaborated in the next
228 section), and therefore pregnant women will avoid consuming rabbit meat during pregnancy. A
229 taboo has been formed.

230 The first point to note from the above example is on the selection of initial candidates.
231 The search for causes, though often follows discernable intuitive principles (e.g., like causes
232 like), is "promiscuous" in the sense that individuals without western, modern education often

¹¹ Note the striking similarity between such deterministic worldview and the pre-nineteenth century determinism in Europe. As Hacking (1990) points out, in as late as 1800 "chance" signified nothing, denoting lawlessness and therefore to be excluded from the thought of enlightened people. Every event was believed to follow necessarily from an antecedent set of conditions. See (Hacking 2006, 1990) for a detailed historical analysis of this important transition in European scientific and mathematic thinking.

¹² In reality, local experts may be consulted as well. See Lutz and Keil (2002) and Kominsky, Zamm, and Keil (2018).

233 lack a strong commitment to the mechanistic/materialistic nature of causality, allowing for a
234 much wider range of causal relationships to be formed (Hong, Slingerland & Henrich,
235 forthcoming). As we argue in Anonymized (2021), one characteristic epistemic difference
236 between traditional and modern societies is that while the metaphysical theory about causality in
237 most modern societies is mechanical and materialistic which actively denies the causal relevance
238 between events that do not have plausible physical connection, individuals in traditional
239 societies, in contrast, may readily entertain the possibility of various non-physical/mystical
240 influences. Among the Orang Asli, for example, misfortunes that happen during pregnancy and
241 childbirth can be attributed to the husband's dietary choices (Meyer-Rochow 2009), whereas in
242 modern societies what the husbands eat likely would not even occur to most people as a
243 candidate cause for child deformity.

244 A second point is that such causal attributions are likely to be faulty, i.e., the inferred
245 cause may not be the real cause of misfortune. Such faulty inferences may be the result of a
246 number of factors, including 1) our evolved psychological mechanisms that make certain faulty
247 causal relationships plausible (Miton, Claidière, and Mercier 2015; Singh 2021; Hong 2022), 2)
248 various cognitive heuristics (e.g., availability bias, recency bias) that may distort our information
249 acquisition, processing and recall, affecting subsequent causal inferences (Tversky and
250 Kahneman 1973; Ayton and Fischer 2004; Hong and Henrich 2021), and 3) the intrinsic
251 difficulty of causal inference (Anonymized, submitted). In real world settings, uncertainty and
252 noise can be substantial, and individuals typically have very limited data at their disposal. The
253 situation is further complicated by the fact that humans have a notorious tendency to mistake
254 correlation for causation (Stanovich 2009; Bleske-Rechek, Morrison, and Heidtke 2015; Kida
255 2009), adding an additional layer of difficulty in correctly identifying true causes.

256 Because the putative cause identified is most likely faulty, misfortunes¹³ will still occur
257 even when people comply with the previously identified taboo. In the above toy example, cleft
258 lips will still occur at some frequency when no pregnant women would consume rabbit meat.
259 The search for the underlying cause occurs again, only this time rabbit meat consumption is no
260 longer a candidate. Another cause will be proposed: perhaps it is decided that the mother

¹³ Note that the “misfortunes” may refer to any undesirable outcomes. Ritual failures, for example, also need to be accounted for. This may help explain why ritual specialists in many societies typically observe more taboos than ordinary people (Singh and Henrich 2020).

261 hammered a nail during her pregnancy, and now there is a second taboo. We can see how taboos
262 proliferate in this way: as putative causal actions for misfortunes are established, people will
263 avoid these actions; yet because misfortunes continue to occur and need to be accounted for,
264 more and more causes are proposed, leading to a gradual increase in the number of taboos in the
265 community.

266 In theory, the growth of taboos can be infinite. In practice, however, there can be both
267 cognitive and social factors that constrain the total number of taboos. For one thing, when taboos
268 are sufficiently numerous, individuals may not possess the cognitive resource to remember all of
269 them. Additionally, for some types of causal explanations, failure of complete taboo compliance
270 to secure a desired outcome does not rule out those causal explanations. Such explanations
271 mostly involve personalized entities such as ancestral spirits or deities: while people try their best
272 to beg, please, threaten, or even coerce them for favors (Hong, Slingerland & Henrich,
273 forthcoming), these personalized entities can be perceived as capricious and may refuse to
274 cooperate, much like humans (Horton 1960). Thus, these explanations can always be invoked
275 despite failures, and no additional causal attribution is needed.

276 3.3. Imperfect transmission of taboo beliefs and practices

277 3.3.1. Two mechanisms for taboo transmission: copy vs. inference

278 In principle, the best way to faithfully transmit a taboo is through verbal instruction that both
279 states the prohibited action (e.g., consuming rabbit meat during pregnancy) and the putative
280 consequences of violation (e.g., the child will have cleft lips). In small scale societies, however,
281 explicit verbal instruction is limited, and considerable amount of learning occurs through
282 observation (Lew-Levy et al. 2017; Kline, Boyd, and Henrich 2013; Boyette and Hewlett 2018;
283 Cheverud and Cavalli-Sforza 1986). Assuming rabbit meat is normally consumed by everyone, a
284 learner may notice that women tend to avoid it when pregnant. How exactly does learning
285 happen? Two mechanisms have been proposed in the literature. First, the learner may simply
286 copy the behavior, i.e., avoid rabbit meat during pregnancy, as is often modeled in cultural
287 evolution (Boyd and Richerson 1985). In this account, behavioral copying is a rather basic
288 human psychological instinct that is sometimes described as an automatic, implicit cognitive
289 process (Heyes 2018). This view has a few different lines of empirical support: much

290 developmental research has shown that imitation occurs very early in infancy (Meltzoff and
291 Moore 1989; S. S. Jones 2009; Paulus et al. 2011), and studies on adults show that people often
292 favor straightforward copying based on certain cues rather than conscious deliberation (Henrich
293 2016, p. 59; Kroll and Levy 1992). People also “over-imitate”, in the sense that they will copy
294 causally irrelevant actions from the model in learning tasks that involve accomplishing some pre-
295 specified outcome (Keupp, Behne, and Rakoczy 2018; Lyons, Young, and Keil 2007).

296 A different line of research, however, suggests that the cultural acquisition of behavior
297 often involves an inferential process (Atran 2001; Boyer 1998; Sperber 1996)¹⁴. The point here is
298 that during social learning, a manifested cultural representation (e.g., behavior) from a model
299 needs to be processed by the inferential apparatus of the learner. In the jargon of psychology, we
300 possess a “theory of mind” (Callanan, Cervantes, and Loomis 2011) that allows us to ascribe
301 mental states such as beliefs and desires to other agents in order to understand their action
302 (Gopnik and Meltzoff 1997). When the learner observes the avoidance of rabbit consumption
303 during pregnancy, for example, she may think “why does she avoid rabbit meat when pregnant?
304 It’s probably because thinks consuming rabbit meat is bad for her unborn child.” As much
305 research in developmental psychology points out, the individual’s cognitive capacity of
306 extracting belief from observed action has important social consequences (Lalonde and Chandler
307 1995; Astington 2001; See Aunger (1994) for an example of taboo beliefs inferred from
308 inaction). What we will focus on here is how such belief extraction affects the transmission of
309 cultural knowledge. It is certainly possible that the original belief is “recovered”, in which case
310 the learner would correctly infer that the reason rabbit meat is avoided during pregnancy is due
311 to the fear of having a child with cleft lips. However, this is not guaranteed. Because people’s
312 life experiences are idiosyncratic, they may not have the exact same set of prior beliefs.
313 Inferences such as “she avoids rabbit meat during pregnancy because she doesn’t like its taste
314 when pregnant” are also perfectly sensible. In the previous section when I talked about the
315 spread of taboos in the population, I implicitly assumed a well-connected social network,
316 unobstructed information flow, and perfect inference. Obviously, these conditions are not always
317 met in real human societies. At a more fundamental level, there are biological/genetic variations

¹⁴ The nature and the best approaches to model cultural transmission is still debated. See Morin (2016 and Henrich and Boyd (2002) for some of the key points of disputes and Mesoudi, Whiten, and Laland (2006) for efforts to united different approaches.

318 in individuals' theory of mind capacity (Xia, Wu, and Su 2012), with autism and schizophrenia
319 being at the end of the spectrum (Abu-Akel and Bo 2013; Baron-Cohen 2000), leading to
320 heterogenous inferences (more on this in the next section).

321 At a first glance, these two transmission mechanisms seem incompatible: while in both
322 cases the avoidance behavior is passed on from one individual to another, knowledge of the
323 consequences of taboo violation *is not* transmitted in the behaviorist account of learning, whereas
324 this knowledge *is* transmitted through inference in the inferential account. I suggest, however,
325 that humans are capable of both types of learning: developmental research has shown that infants
326 as young as one year are able to engage in selective and rational imitation (in which inference is
327 likely involved) yet at the same time frequently exhibit unselective, seemingly irrational
328 imitative behaviors (Keupp, Behne, and Rakoczy 2018). In reality, the role of belief extraction in
329 the transmission of taboos is likely to be domain and situation specific, and the transmission of
330 the putative consequence of taboo transgression should be viewed as probabilistic rather than
331 deterministic for any given learning episode¹⁵.

332 The domain-specificity means that the extent to which the consequence of taboo violation
333 is inferred likely depends on the characteristics of different types of taboo. Although all taboos
334 are strictly speaking “intentional inaction”, some are more attention-grabbing and thus inference-
335 provoking than others. Food taboos during pregnancy, for example, are highly salient because
336 most people eat every day, and pregnant women are avoiding food items that are normally
337 consumed by everyone. Taboos that prohibit women from attending certain ritualistic
338 ceremonies, on the other hand, may not appear as surprising given the prevalent sexual division
339 of labor in most human societies (Panter-Brick 2002; White and Brinkerhoff 1981). Other factors
340 such as ritual costliness has also recently been shown to be a significant predictor for the
341 individuals' tendency to come up with explanations (Xygalatas and Mano 2022). Relatedly, there
342 might be differences in how these inactions are interpreted: if they are interpreted as
343 *instrumental*, i.e., inaction being merely means to achieve some end (often to prevent something

¹⁵ There have been evolutionary and cognitive accounts of human observational learning that take a similar view. In their most recent proposal, Jagiello, Heyes & Whitehouse (forthcoming) put forward the “Bifocal Stance Theory” of cultural learning where the actions may be construed by the learner as either instrumental or ritualistic, with important consequences in cultural transmission (e.g., fidelity). Notably, the same action may trigger different stances depending on situational factors, or “cues” such as confidence, experience, conformism, deference to tradition, etc.

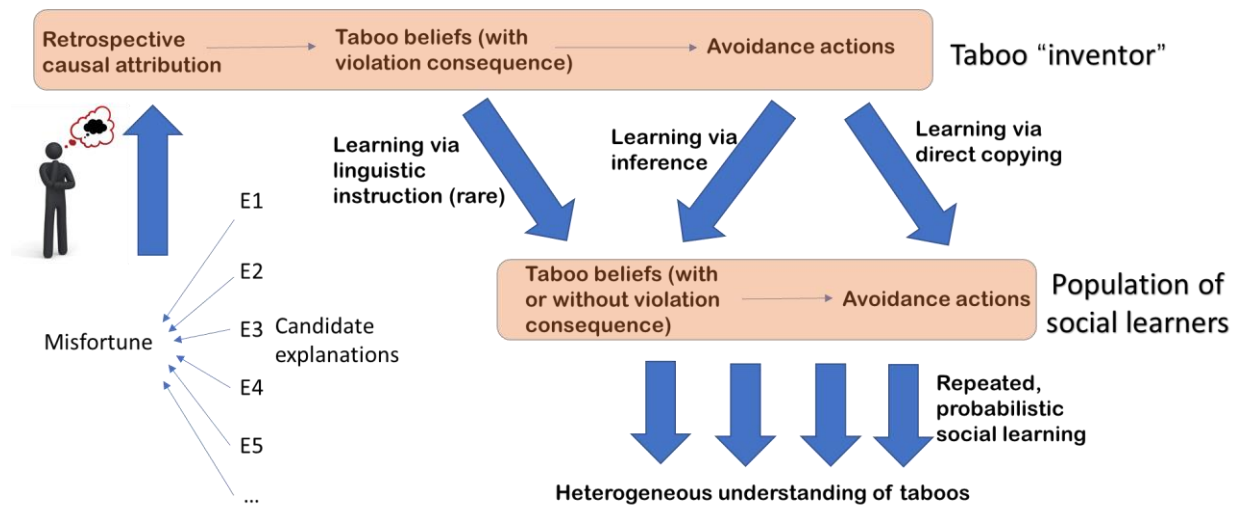
344 bad from happening), then inferences are more likely to occur; on the other hand, if the inaction
345 is interpreted as conventional, then the action is more likely to be copied in an automatic manner
346 (See Keupp, Behne, and Rakoczy (2018) for how this logic has been used to explain over-
347 imitation in psychology, and Whitehouse (2022, p. 35) for ritualistic behaviors).

348 Another factor that contributes to the domain-specificity for inferring the consequence of
349 taboo violation is that some taboos are more difficult to interpret and extract belief from than
350 others. Many human actions are causally opaque, if not simply incomprehensible (Csibra and
351 Gergely 2011). The recent psychological literature on goal demotion has shown that for many
352 ritualistic actions, it is impossible to infer and understand the actor's reason for producing these
353 actions (Nielsen, Tomaselli, and Kapitány 2018; Kapitány and Nielsen 2019; Legare et al. 2015).
354 In the case of taboos, what the learner observes is the absence of certain actions that are normally
355 expected, and these "inactions" may also appear too mysterious to infer any specific reasons
356 behind such inactions. This is indeed what is observed anthropologically: while early taboo
357 studies leave the impression that the consequences of taboo violation are often quite specific, in
358 practice people may only have a very vague idea that some bad outcomes will happen if certain
359 taboo is transgressed (Boyer and Liénard 2006). In Radcliffe-Brown (1939/2014)'s classic
360 exposition, he makes this point very clear: "So far as ritual avoidances are concerned the reasons
361 for them may vary from a very vague idea that some sort of misfortune or ill-luck, not defined as
362 to its kind, is likely to befall anyone who fails to observe the taboo, to a belief that non-
363 observance will produce some quite specific and undesirable result."

364 3.3.2. Individual heterogeneity in taboo transmission and its consequences

365 Even for the same taboo, there could be individual level variation in the way it is
366 transmitted and understood. In particular, there could be variation in whether or not knowledge
367 about the consequences of taboo violations is passed on along with the behavioral prohibitions,
368 and if passed along, there could be variation in the method of transmission of that knowledge:
369 direct verbal instruction versus inference. Therefore, successful transmission of information
370 about taboo violation consequences should be viewed as a probabilistic event. Many of the
371 published studies on taboos indicate substantial heterogeneity in whether the
372 informant/interviewed subjects are aware of both the behavioral prohibition and the reasons
373 behind these taboos in the community (Tsegaye, Tamiru, and Belachew 2021; Lee et al. 2009;

374 Parmar, Khanpara, and Kartha 2013; Sharifah Zahhura, Nilan, and Germov 2012). As an
 375 example, Diana et al. (2018) found that many individuals do not know the consequences of food
 376 taboo violations, and that the underlying “philosophy” or “reason” for such taboos had to be
 377 discovered after many in-depth interviews in a detailed case study among the Madurese in
 378 Indonesia. Because individuals in traditional societies typically acquire cultural knowledge as
 379 specific learning opportunities present themselves (Sterelny 2012), they may not have had the
 380 chance to learn every single taboo and the associated violation consequences (See Fig. 1 for a
 381 full diagram)¹⁶.



382

383 *Figure 1. Diagram of the origination/transmission of taboos. Here, learning via linguistic instruction is listed as a possible*
 384 *learning mechanism, though it is probably not used as often as direct copying and inference.*

385 Failure to transmit the putative consequences of taboo violation has two primary effects.
 386 First, it makes falsification of the causal claim embedded in taboos (doing X causes undesirable
 387 consequence Y) difficult, as the observed inaction itself does not indicate what would happen if
 388 the action was to be performed, contributing to the persistence of taboo beliefs that are often
 389 false and behavioral prohibitions that are often maladaptive. Relatedly, if the putative
 390 consequence of taboo violation is vague, then any undesirable outcome that occurs after a taboo
 391 transgression can be viewed as confirmation of the taboo.

¹⁶ Such heterogeneity is likely to be a general feature of ritualistic actions or inactions: while it is true that many people cannot articulate why certain rituals are performed (Hinde 2005), some do, and there is usually substantial diversity in individuals' responses (Xygalatas and Mano 2022; McCauley and Lawson 2002).

392 Second, it opens up the possibility for the knowledge of violation consequence to be
393 completely lost from the community¹⁷. In this scenario, the taboo loses its causal component and
394 looks very much like a behavioral custom. In a way, this echoes Chibnik (1981)’s proposal that
395 cultural rules may originate from individuals/groups experimenting with different alternatives to
396 achieve certain desirable outcomes (doing Z causes desirable outcome Q) in the past, yet over
397 time many people may treat these rules as mere customs without knowing their original
398 rationale; in other words, the reasons why these rules are in place are lost in the population. Note
399 such “instrumental → conventional” transition may also happen in hierarchical, large scale
400 societies: for example, many of the conventional rituals during the Zhou dynasty (1046 BC – 256
401 BC) in China can trace their instrumental origins back to magic practices in earlier times (Li
402 2015).

403 3.3.3. Examples of potential “taboo knowledge” loss

404 Let me use two examples to illustrate the point of potential knowledge (putative
405 consequences of taboo transgressions) loss more concretely. The first one is from my own
406 fieldwork among the Lahu people in southwest China: in the village of Dabangli (大邦利) near
407 China-Burma border, there is a cultural prohibition against home-brewing alcoholic drinks. The
408 Lahu people, however, love home-brewed alcohol: it is much stronger (it is made using the
409 distillation method with 30-35% alcohol) than commercially available beer, and plays a very
410 important role in Lahu social life (Detpitukyon et al. 2018). Nearly all home-brewed alcohol
411 consumed in Dabangli is imported from Xiaobangli (小邦利), another Lahu village about two
412 kilometers away. Note that although this distance seems negligible by modern standards, it was a
413 non-trivial walk before the construction of roads in this mountainous area. It seems at least, that
414 if someone was to start a business of home-brewing alcohol it would be very lucrative. So why
415 hasn’t anyone start one? My interviews of more than 40 people in the village during the autumn
416 of 2020 show that while most locals were aware of the behavioral prohibition, the vast majority
417 of them were unable to articulate any reason for such prohibition (Anonymized, unpublished).
418 The typical responses were “it’s our convention” or “it’s our way of doing things”, a common

¹⁷ Although it is tricky to definitively demonstrate the loss of some cultural knowledge since many small-scale societies do not have written records, archeological and longitudinal ethnographic work has enabled researchers to document a few cases of loss of cultural knowledge (Jones 1995; Henrich 2016, p. 247)

419 finding in anthropology (Henrich and Henrich 2010) . Towards the end of my fieldwork,
420 however, I visited a 70-year-old man who was presumably knowledgeable about local history,
421 and he told me that in the past, there was someone who attempted to make home-brewed alcohol
422 but died from a horrible illness shortly after, and since then people only purchased alcohol from
423 nearby villages. Although at the time it wasn't possible to verify the validity of this story, it
424 stood out as a plausible explanation. Conceivably, when these knowledgeable individuals pass
425 away, the original rationale, whatever it was, would be lost in the community and can only be
426 recovered through inference and imagination.

427 The second example comes from transmitted texts. In an analysis of the phylogenetic
428 relationship amongst a few encyclopedia-style handbooks for everyday practices, Song (2004)
429 showed that many of the same “advices” appear in multiple books, with slight variations in how
430 they are recorded. What is most interesting for our purposes, however, is that some of the records
431 include what would happen if these advices are not followed, while others do not include such
432 information. See the two following examples from *Ge Wu Cu Tan* (~1831 CE):

433 There should be no puddles in front of the door.

434 There should be no digging of wells in front of the main hall, and the doors should not
435 face the impluvium.

436 In a different publication *Ju Jia Bi Yong Shi Lei Quan Ji* (~1568 CE), we find essentially the
437 same prohibitions, but with consequences of violating such prohibitions specified:

438 [If] there are puddles in front of the door, [then] misfortunes will happen to the household
439 and family members will die.

440 There should be no digging of wells in front of the main hall, and the doors should not
441 face the impluvium. [Otherwise] the owner of the house would suffer frequent
442 misfortune.

443 As Song (2004) suggests, it is very likely that *Ge Wu Cu Tan* copied these advices from *Ju Jia Bi*
444 *Yong Shi Lei Quan Ji*, though it is also possible that these specific advices came from some
445 earlier ancestral source. In either case, we see evidence from transmitted texts that cultural
446 prohibitions may lose its consequence of violation, and therefore appear rather mysterious.

447 These examples are merely illustrative, and further systematic, quantitative studies are
448 needed to fully assess the extent to which taboo belief loss occurs in human societies.
449 Fundamentally speaking, it is trivially true that some individuals know more than others in all
450 human societies, and observational learning will occasionally make mistakes. Part of the reason
451 why belief heterogeneity and loss is understudied may be that anthropologists often assume there
452 is some “cultural truth” out there (Batchelder and Anders 2012) and certain individuals not
453 knowing such truth is attributed to their lack of cultural competence (Romney, Weller, and
454 Batchelder 1986). Once we seriously consider the information transmission dynamics in the
455 historical context, belief loss looms as a real possibility.

456 4. Discussion

457 4.1. Explanatory scope and limitations of the present account

458 The account that I have offered above defines taboos in a somewhat unconventional way, in that
459 it does not take sacredness and the emotional/symbolic aspects to be essential. This is not to say
460 that they are unimportant: these aspects no doubt play a significant part in human social life
461 (Durkheim 1912/2008). My attempt here is rather to show, by analyzing taboos as utilitarian
462 behavioral prohibitions, that there are fundamental cognitive, psychological, and social
463 mechanisms that give rise to these prohibitions in the first place. On top of that, I show that
464 during the transmission process, the belief component (consequence of taboo violation) may get
465 distorted and even lost in the population. As such, my account applies not only to typical
466 examples of taboo such as ritual prohibitions but also ordinary, “common-sense” rules against
467 certain behaviors such as “do not put your hand in the fire”¹⁸. More precisely, I suggest that the
468 same set of psychological tendencies and social dynamics give rise to both ordinary cautions and
469 mysterious taboos: the search for explanations in case of misfortune and the imperfect
470 transmission of behaviors and beliefs play significant roles in producing the wide array of
471 cultural prohibitions that we observe in human societies.

¹⁸ Notably, Frazer does not think that this counts as a taboo, because “the forbidden action (hand in fire) entails a real, not an imaginary, evil” (Frazer 1905, p. 53). But as Marett (1914) emphatically points out, in the eyes of the “savages”, the putative harms caused by taboo violations are terribly real and nothing “imaginary”.

472 As mentioned, this account of taboos does not aim to explain prohibitions that are
473 invented and implemented by the elite class in hierarchical societies in a top-down manner,
474 utilitarian or not. Often, we know from written historical records the exact political, religious,
475 social, and economic incentives behind the making of such prohibitions. In medieval Europe, the
476 Catholic Church's ban on cousin marriage was clearly out of religious and social considerations
477 by the Church leaders at the time (Schulz 2016). The prohibition on keeping hair in the forehead
478 by the Manchu people when they defeated the Ming dynasty and took over China (so that
479 everyone had to conform to the Manchurian Queue hairstyle) was another clear example of
480 political symbolism and social control (Gong 1986). In contemporary, modern societies, the
481 elaborate law codes that not only specify various prohibitions but also the consequences of
482 transgression are also the result of intentional design. In such cases, it is not ordinary individuals'
483 retrospective attribution of what caused some observed misfortune, but the conscious
484 deliberation of powerful elites that establishes the prohibitions.

485 Nonetheless, my account does provide an explanation for many otherwise puzzling
486 cultural prohibitions in decentralized settings. Pregnancy taboos, for example, are an extremely
487 wide-spread phenomenon in virtually all human societies, and while some have been suggested
488 to be adaptive, most are not (Ogbeide 1974), and can have significant fitness consequences
489 (Aunger 1994). In a review of the recent work published on cross-cultural food taboos during
490 pregnancy, Iradukunda (2020) found that most prohibited food items for pregnant women appear
491 harmful, especially in traditional, rural communities. Pregnant women are frequently
492 discouraged from consuming nutritious food such as meat, eggs, dairy products, as well as some
493 fruits and vegetables. Although there is some evidence that excessive consumption of red meat is
494 associated with maternal and fetal complications such as gestational diabetes, preeclampsia and
495 fetal macrosomia (Brantsæter et al. 2014; Zhang, Rawal, and Chong 2016), the culturally
496 transmitted food prohibitions tend to be absolute (no specification on what quantity may be safe
497 for pregnant women), and it is much more likely for mothers in these middle and low-income
498 communities to suffer from malnutrition as a result of limited protein intake than maternal and
499 fetal complication from excessive intake (Black et al. 2013),

500 Granted, many of the food taboos do appear to follow sympathetic magic principles,
501 which have been suggested to have deep psychological and evolutionary bases (Nemeroff and

502 Rozin 2000; Hong 2022). An exclusive focus on evolved intuitions, however, tends to ignore the
503 empiricist component of human cognition and decision making. Despite sometimes being
504 described as “emotional” (Lorber 1973) and “mystical”(Levy-Bruhl 1926) in their epistemic
505 orientations, people in traditional societies (and everywhere else) do exhibit a great deal of
506 empiricism (Liebenberg 1990; Hong, Slingerland & Henrich, forthcoming), in the sense that they
507 are psychologically prepared to identify cause and effect, to make inferences from observation,
508 and to obtain information from others to aid their own decision making. The point here is that
509 innate predispositions and empirically-triggered causal attribution explain different aspects of
510 taboos in human societies: evolved intuitions (often quite specific) accounts for why we find
511 certain beliefs and practices plausible and attractive once they already exist in the population,
512 and causal attribution describes the mechanism via which these beliefs and practices first arise.

513 Appreciating the role of causal attribution in taboo formation also helps us understand
514 some prominent features of taboos. Consider the following points:

515 1) The numerosity of taboos in human societies may be explained by the fact that people
516 constantly look for explanations for misfortunes, which serve as a cognitive-social engine
517 that keeps pumping taboo beliefs and practices into the population.

518 2) Retrospective causal attribution theory can account for the phenomenon that one
519 salient candidate cause may be associated to both misfortunes and unexpected fortunes.
520 Menstrual blood, for example, is believed to cause both fertility (e.g., it encourages the
521 growth of wheat) and infertility (e.g., it causes flowers to wither and trees to perish) in
522 different societies (Buckley and Gottlieb 1988), suggesting that cultural outcomes are not
523 solely determined by our evolved intuitions regarding specific associations; rather, there
524 seems to be a more general process where individuals retrospectively seek the putative
525 causes of some (typically negative, but occasionally positive) unexpected events.

526 3) The many behavioral and food prohibitions observed by religious leaders (Singh and
527 Henrich 2020) may be partially caused by the fact that these people are often viewed as
528 ritual experts in charge of a variety of instrumental activities (e.g., healing), which
529 inevitably fail at some substantial frequency. These failures will trigger a search for
530 causes, creating the potential for taboo formation.

531 4) Although causal attribution is often promiscuous and therefore error prone, its original
532 aim is to identify true cause and effect (*cf.* proper domain vs. actual domain distinction in
533 evolutionary psychology (Sperber 1994)), and as such offers an additional explanation for
534 why many taboo beliefs are false while some are in fact sensible¹⁹. The belief that meat
535 consumption during pregnancy causes increase in birth weight, leading to difficulty and
536 dangerous labor, for instance, is probably accurate (Fessler and Navarrete 2003).

537 In addition to the above explanatory utility, retrospective causal attribution theory also specifies
538 the transmission mechanism of taboo beliefs and practices, and suggests the important possibility
539 of belief loss as a result of imperfect inference in heterogeneous learning episodes. In this
540 account, cultural beliefs are not viewed as static properties of the population but rather
541 probabilistically transmitted pieces of knowledge in a dynamic setting of information transfer.

542 The present account of taboos has testable predictions. If causal attribution is indeed a
543 primary force in taboo formation, then we would expect 1) putative consequence of most taboo
544 violations to be frequently occurring misfortunes rather than rare ones, as common misfortunes
545 would trigger retrospective causal attribution more often, and 2) *ceteris paribus*, societies that
546 experience fewer misfortunes should have fewer taboos in general. These predictions merit
547 further empirical studies, and it is my hope that this paper will spark more interest in the classic
548 anthropological study of taboos.

549 4.2. Moving beyond the traditional: what's the relevance of taboos in 550 contemporary, modern societies?

551 Many classic anthropological topics are no longer fashionable in anthropology. In a way, such
552 lack of interest is out of good reason: although we still live in a world very much dominated by
553 rules and norms, there simply are not that many taboos in the traditional sense. Take pregnancy
554 taboos as an example: when asked about “things not to do during pregnancy”, the only “taboo”
555 that average American definitively recognize is alcohol prohibition (Anonymized, unpublished),

¹⁹ Even prohibitions that seem magical at first glance may have some plausibility: for example, eggs were not given to children in most of the Mid-West State of Nigeria for fear that they may develop the habit of stealing (Ekwochi et al. 2016). Though the belief looks like just another groundless superstition, a closer examination reveals a plausible mechanism provided by the very people holding this belief: eggs are expensive and if children are reared on expensive food, they will acquire expensive food habits which they cannot afford unless they steal (Ogbeide 1974).

556 in sharp contrast with the numerous taboos that people in traditional societies readily observe.
557 Since the enlightenment movement, ancient tradition, religious doctrines, superstition, and
558 various kinds of transmitted wisdom have been firmly framed as the opposite of reason (Pinker
559 2018; Outram 1995/2019). In the words of Max Weber, one defining feature of modernity is the
560 “disenchantment” of the world (Carroll 2011). As mentioned previously, the mechanistic
561 worldview in modern societies makes many candidate causes of worldly misfortunes
562 implausible. The cognitive division of labor also makes our cognitive lives more secure: most of
563 the time, our knowledge about causalities in the world is provided by the experts who are
564 capable of generating true beliefs and effective technologies (Hong and Henrich 2021). Our
565 familiarity with quantified uncertainty in our lives also makes us more comfortable with
566 attributing worldly events to “chance”, avoiding the promiscuous and obsessive causation-
567 seeking which frequently provide incorrect explanations.

568 I shall emphatically point out that I am not simply positing a traditional-modern
569 dichotomy: surely, all human societies have culturally transmitted prohibitions, and there is
570 always substantial within-population heterogeneity regarding individuals’ understanding and
571 compliance of these prohibitions. What I am suggesting, however, is that post-industrial, large
572 scale, organizationally complex societies do seem to be qualitatively different in the production,
573 veracity, and justification of cultural prohibitions (and knowledge production in general) from
574 previous human societies. A full analysis of the particularities of epistemic modernity is
575 necessarily beyond the scope of the this paper; interested readers may consult Wootton (2016)
576 for a detailed historical analysis.

577 What, then, is the relevance of taboos in our times? We need to keep in mind that the
578 psychological tendencies that give rise to taboos always exist. Many epistemic features of
579 modernity are the result of the knowledge institutions in our society which cannot be taken as
580 granted. In many developing countries and other areas where these institutions are weak, various
581 types of taboos still persist, often with significant economic and health consequences (Parmar,
582 Khanpara, and Kartha 2013; Tsegaye, Tamiru, and Belachew 2021). Understanding the
583 mechanisms that produce and sustain taboos thus are important whether we wish to promote
584 taboos that are beneficial to the well-being of the individual/group or to suppress taboos that are
585 harmful.

586 At a deeper level, the examination of historically and cross-culturally prevalent cultural
587 phenomena such as taboos can shed light on the workings of our own society. The reason people
588 in modern societies have relatively more “true beliefs” is the joint outcome of many
589 psychological, social, and cultural factors. Our species’ desire to identify causal relationships,
590 when properly disciplined by modern science, has given rise to spectacular material
591 achievements and an unprecedented understanding of the world. Our educational institutions
592 ensure a much more secure transmission of knowledge through explicit verbal instruction and
593 active teaching. In a way, it is precisely these differences that enable us to see the particularities
594 of modernity and to critically reflect not only upon our own society at the present moment, but
595 also the not-so-distant past and the journey we took to get here.

596 Conflict of Interest

597 None declared.

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