

# Sense or non-sense? A critical discussion of a recent evolutionary–cognitive approach to “folk-economic beliefs”

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Laypeople hold beliefs about economics and policy issues—so-called *folk-economic beliefs* (FEBs)—that are often wrong or misleading according to professional economists. Here, I critically discuss a recent evolutionary–cognitive approach to understanding folk-economic beliefs. According to this approach (Boyer & Petersen 2018a), some economic beliefs are more prevalent than others, because such beliefs (i.e., folk-economic beliefs) resonate with evolved features of the human mind. I refer to this as the “FEB hypothesis”. A central challenge to the FEB hypothesis, with its heavy reliance on universal cognitive features, is to explain individual and cultural differences in economic beliefs and behavior. This challenge is the starting point for the discussion. Overall, the conclusion of this paper is that the FEB hypothesis relies on unnecessarily strong and controversial theoretical assumptions (e.g., “massive modularity” and the “Environment of Evolutionary Adaptedness”), and that it overlooks important findings from adjacent fields, but that the FEB hypothesis, following some modifications inspired by Dual Inheritance Theory, can be integrated with robust findings from the rest of the evolutionary, cognitive, and anthropological sciences, as well as standard political psychology. Based on this discussion, the paper ends with brief reflections on how to correct inaccurate folk-economic beliefs.

**Keywords:** folk-economic beliefs, evolutionary psychology, cultural attraction theory, dual inheritance theory

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## INTRODUCTION

### *Folk-economic beliefs*

In many walks of life, laypeople hold widely different opinions, views, and beliefs compared to professionals or experts. There are arguably few areas where this discrepancy between laypeople and professionals matters more than in the political economic sphere (Caplan 2006, 2007). Beliefs and opinions of laypeople determine the outcome of elections and thus the future direction and organization of democratic nations (Flynn, Nyhan, & Reifler 2017). It is thus in everybody's interest that laypeople hold beliefs that are generally compatible with the best knowledge of economic and political experts. However, this is far from always the case. As Leiser and Shemesh (2018) wrote:

“Non-economists’ thinking has a short range and a narrow scope. It focuses on direct links, and typically ignores indirect links, feedback loops, and aggregate effects. People without specialized training do not countenance complex causal networks. [...] The result is that the public is largely unaware of emergent processes [...]” (p. 122–123)

Boyer and Petersen (2018a) provided a few additional examples:

“It is a matter of common knowledge that most people, including the educated public in modern democratic

societies, do not think like economists (Kirby, Cornish, & Smith 2008, pp. 147–166). It is, for instance, a familiar finding that people are overinfluenced by consideration of sunk costs (Magalhães & White 2016) or fail to consider opportunity costs (Hazlitt 2010) in evaluating possible courses of action.” (p. 3)

In this paper, I will critically discuss a recent evolutionary–cognitive approach to understanding so-called *folk-economic beliefs*—a domain of beliefs about economics and policy issues that are held by laypeople but often deemed wrong or misleading by professional economists. According to this approach (Boyer & Petersen 2018a), some beliefs are more prevalent than others, because such beliefs (i.e., folk-economic beliefs) resonate with evolved features of the human mind. In the following, for the sake of brevity, I will refer to this approach as the “FEB hypothesis”, where FEB stands for *folk-economic belief* (see Boyer & Petersen 2018a).

In Part 1, I will introduce, in more detail, the concept of folk-economic beliefs and identify the theoretical frameworks and assumptions from which the FEB hypothesis is derived. I will also introduce a competing (although not entirely incompatible) evolutionary framework – Dual

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Inheritance Theory – that will function as a counterperspective on the origin and spread of folk-economic beliefs in Part 2.

In Part 2, I will critically evaluate and discuss the theoretical foundations of the FEB hypothesis. The discussion will take its outset from the challenge of explaining variation in economic beliefs and behavior across cultures and individuals.

Overall, the conclusion of this paper is that the FEB hypothesis relies on unnecessarily strong and controversial theoretical assumptions (e.g., “massive modularity” and the “Environment of Evolutionary Adaptedness”), and that it overlooks important findings from adjacent fields, but that the FEB hypothesis, following some modifications inspired by Dual Inheritance Theory, can be integrated with robust findings from the rest of the evolutionary, cognitive, and anthropological sciences, as well as standard political psychology. Lastly, I will sketch out what these insights mean for how to counter misleading and potentially damaging folk-economic beliefs in practice. Concludingly, I will briefly reflect on the originality of this paper and will summarize.

However, before embarking on the main parts, the importance of this project is outlined.

### *Importance of the project*

As alluded to at the outset of the introduction, understanding why people believe and behave as they do in modern political and economic situations is vital for democratic nations. The long-term success of democracies hinges on voters being sufficiently politically literate. By understanding how humans process and act upon pieces of political and economic information, societies can put in place interventions to counter and inoculate against misleading and potentially damaging folk-economic beliefs.

In addition, from a basic science perspective, spurring on the growth of a rigorous evolutionary–cognitive research program on the origin and spread of folk-economic beliefs is crucial, as it represents a promising arena for testing theories about the cultural evolution of ideas and behaviors in a societally important domain. This paper is a modest attempt at demonstrating the promise and potential of such a program.

## PART 1: INTRODUCING THE “FEB HYPOTHESIS”

### *What are folk-economic beliefs?*

According to Boyer and Petersen (2018a), “the term *folk-economic beliefs* denotes a large domain of explicit, widespread beliefs, to do with economic and policy issues, held by individuals without systematic training in economic theory” (p. 1, emphasis in the original; for a similar-sounding definition, see Rubin 2003, p. 153). In their article (2018a) and the related commentary response (2018b), Boyer and Petersen present a list of such folk-economic beliefs. These include the following: *international trade is*

*zero-sum* (e.g., when 2 nations engage in trade, the exporting country “win” and the importing country “loses”), *immigrants “steal” jobs* (e.g., immigrants compete with native citizens for work), *immigrants abuse the welfare system* (e.g., immigrants are “lazy” and scrounge on hard-earned tax money), and *the profit motive is detrimental to general welfare* (e.g., private companies only care about profit and are therefore uncaring and amoral) (for more examples, see Boyer & Petersen 2018a, p. 3–4, Rubin 2003, 2018, and Figure 1 below).

Although the specific folk-economic beliefs highlighted by the authors are all contrary to the views of mainstream economic and political science, the authors emphasize that this is not in itself a criteria for labeling a belief “folk-economic”. Instead, a belief is a folk-economic belief if it is common enough to be of political relevance—regardless of its truth value (Boyer & Petersen 2018b).

### *The “FEB hypothesis” and its “strong” assumptions*

According to Boyer and Petersen (2018a, 2018b) and to what I will hereafter call the “FEB hypothesis”, folk-economic beliefs are the products not of pure ignorance but of intuitions generated by *domain-specific cognitive inference systems*, or so-called *cognitive modules* (Frankenhuis & Ploeger 2007; in this paper and following the literature, I will alternate between these two synonymous labels. Sometimes, for the sake of brevity, derived abbreviations will also be used, such as *cognitive mechanisms* or *inference systems* or, plainly, *modules*).

Supposedly, these domain-specific cognitive inference systems are evolved through natural selection, are each “designed to solve one kind of exchange problem recurrent in our ancestral environment” (Boyer & Petersen 2018a, p. 6), and are therefore universal in the human species. Since no domain-general cognitive mechanism could seemingly handle the plethora of diverse adaptive challenges faced by our ancestors—from choosing a fertile mate over detecting cheaters to avoiding toxins in foods—the brain must, so the argument goes, necessarily function as a collection of many domain-specific, or highly specialized, modules (Cosmides 1989). Figure 1 illustrates the processes whereby explicit folk-economic beliefs arise from intuitions generated by domain-specific inference systems.

The FEB hypothesis thus rests on 2 strong assumptions: 1) human cognition is, at least to a significant degree, “massively modular”, in that it consists of a very large number of specialized and independent cognitive inference systems, or modules; and 2) these modules are evolved adaptations to aggregated and recurrent features of a small-scale, hunter-gatherer existence (in the Environment of Evolutionary Adaptedness (EEA); Boyer & Petersen 2018a, p. 7). I call these assumptions “strong”, because they are fundamental and unnegotiable for the FEB hypothesis to be coherent in its proposed form.

However, although these strong assumptions are not explicitly justified in the original article (Boyer & Petersen 2018a), they are in fact highly contested topics in both the cognitive, biological, and anthropological literatures (see, e.g., Buller 2005; Hagen 2015; Machery & Barrett 2006;

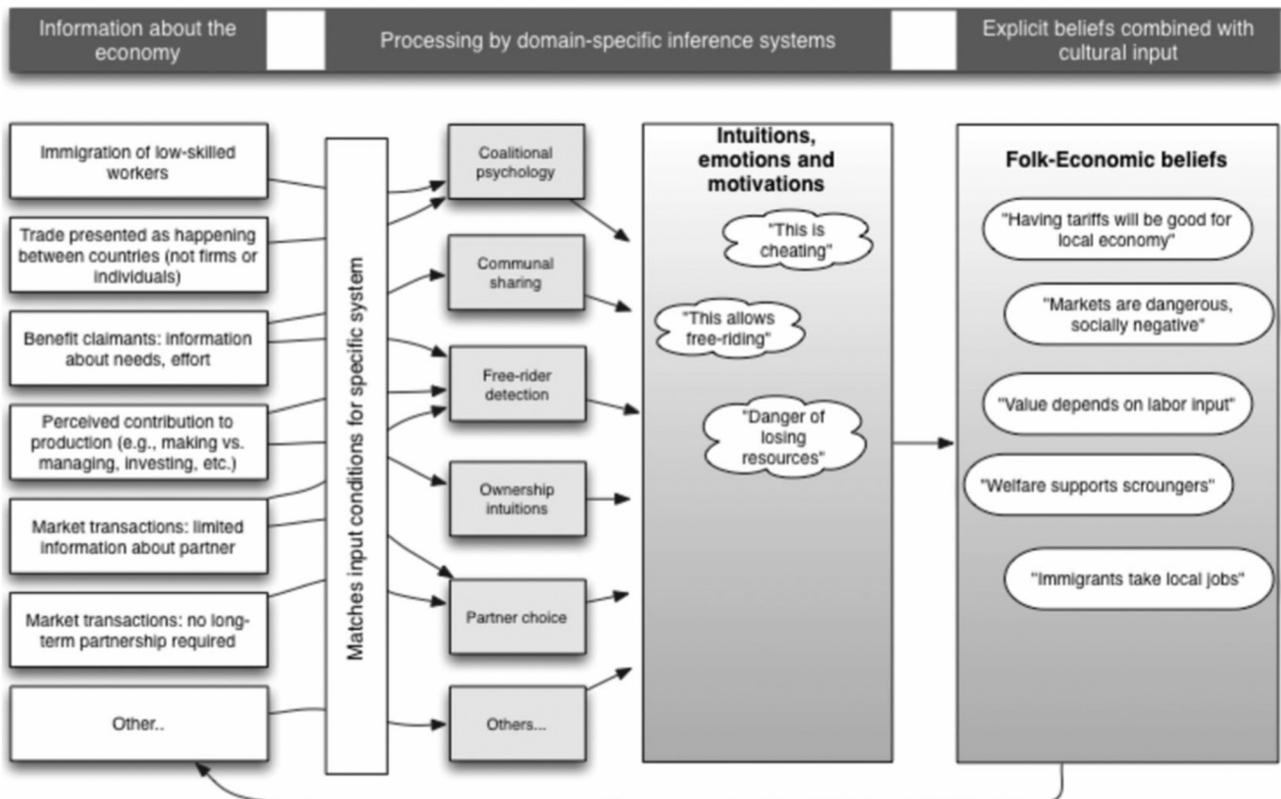


Figure 1. “Illustration of the sequence of cognitive processes involved in acquisition of economy-related information and generation of folk-economic beliefs.” (Figure and text adapted from Boyer & Petersen 2018a, p. 10).

Panksepp & Panksepp 2000). This debate is the main theme of Part 2.

*The FEB hypothesis in a larger perspective*

*Evolutionary psychology.* The FEB hypothesis is derived from a broader theoretical framework traditionally labeled Evolutionary Psychology. In essence, Evolutionary Psychology seeks to understand the cognitive mechanisms that underlie human thought and behavior along with the evolutionary forces that gave rise to these mechanisms (for a comprehensive review, see Buss 2019). Evolutionary Psychology rests on the same strong assumptions as the FEB hypothesis, namely the assumptions of “massive modularity” and the EEA (see above) (Smith 2000). Historically, Evolutionary Psychology emerged as a critique of prevailing disciplines in the social sciences of the 20th century, such as behaviorism, whose views include that humans are effectively born as “blank slates”, that biology—in contrast to culture—is a negligible aspect of human thought and behavior, and that socialization is the key to understanding human psychology (Barkow, Cosmides, & Tooby 1992; Pinker 2002).

Thus, the goal of Evolutionary Psychology was and still is to bring biology and evolutionary theory to bear on the social sciences and the study of mind. This ambition stands in contrast to not just the 20th century social science but also much of current psychology. For instance, folk-economic beliefs are sometimes said to originate from cognitive biases and heuristics, such as an “anti-foreign” bias

(Caplan 2007). However, only seldom does this kind of behavioral economics research explore the ultimate origin for such biases (for an exception, see Kenrick & Griskevicius 2013). This lack of a unifying evolutionary meta-theory in the social sciences and the study of mind has recently been identified as one main reason for the so-called “replication crisis” in the psychological sciences (Muthukrishna & Henrich 2019; see also Mesoudi 2009, 2011). Thus, from this perspective, Evolutionary Psychology appears right to demand an increasing amount of serious evolutionary thinking in the social sciences.

*Cultural attraction theory.* As Boyer and Petersen (2018a) highlight themselves, the FEB hypothesis also draws inspiration from Cultural Attraction Theory (Sperber 1996). Proponents of this framework start by noting that cultural transmission is relatively low-fidelity<sup>1</sup>.

<sup>1</sup>“Reconstructive” or “preservative” cultural evolution  
 There is an on-going debate in the literature on whether cultural evolution is generally “reconstructive” or “preservative” (e.g., Acerbi & Mesoudi, 2015; Buskell, 2015; Morin, 2016). Reconstructive cultural evolution entails that cultural transmission is in itself a low-fidelity process but certain cultural variants survive nonetheless, because they are reconstructed in similar ways during transmission as a result of the shared features of human cognition or of shared environmental conditions (Claidière et al., 2014). Preservative cultural evolution, in contrast, assumes that the process of cultural transmission is relatively high-fidelity but cultural traits can remain stable even in low-fidelity cases as a result of the continued and aggregated effects of social learning interactions (Henrich et al., 2008). In this paper, I remain agnostic on this issue. It is very possible that the debate has to be evaluated and resolved on a case-by-case basis.

For instance, when we hear a story, we do not store a perfect verbatim version of that story in our memory. Instead, we store “the gist” (Bartlett 1932) of the story, losing many details in the process. This raises the puzzle of why, in spite of the corroding forces of human memory and communication, some cultural variants (e.g., beliefs, folk tales, behaviors, art forms, etc.) can nevertheless survive culturally through many generations. The solution as proposed by Cultural Attraction Theory is the contention that cultural transmission must be both constrained and supported by the architecture of human psychology (Sperber 1996). Human cognitive mechanisms are said to function as *factors of attraction*, in which some cultural variants are easier to acquire, remember, and convey than others, because they resonate with the intuitions generated by human cognition (external, ecological factors can also function as factors of attraction, and we will return to such cases in Part 2). Recurrent cultural variants in a population are termed *cultural attractors* (Claidière, Scott-Phillips, & Sperber 2014; Scott-Phillips, Blanke, & Heintz 2018).

Translated into the FEB hypothesis, a folk-economic belief can be understood as a cultural attractor while evolved cognitive modules function as factors of attraction which make some beliefs about the economy (i.e., folk-economic beliefs) more intuitively appealing than others. Boyer and Petersen (2018a) sum up their view:

“[O]ur intuitive free-rider detection system, or our evolved set of preferences for partner-choice, do not by themselves directly generate particular views of the economy. The intuitive systems only provide a context against which external information, provided by mass media, economists, political entrepreneurs, or simply other individuals, is likely to become relevant, attention-grabbing, and therefore susceptible of cultural transmission.” (p. 15)

*Dual inheritance theory.* Aspects of Evolutionary Psychology have been heavily criticized by proponents of Dual Inheritance Theory (e.g., Bolhuis et al. 2011). This framework recognizes that the human mind comes equipped to solve some evolutionarily recurring problems, but argue that this explanation is not sufficient alone to explain the full range of human capabilities, especially the wide-spread large-scale cooperation of our species (Chudek, Zhao, & Henrich 2013). Instead, these researchers emphasize the importance of human social learning capacities. Our ability to selectively learn from other individuals and to pass knowledge on to others is unrivaled in the animal kingdom (Laland 2017; Richerson & Boyd 2005a) and has even been dubbed “the secret of our success” (Henrich 2016). By this, it is meant that in order to explain the great ecological success of the human species, we cannot rely only on invoking specialized inference systems evolved for the purpose of individual learning and problem-solving, as proponents of Evolutionary Psychology tend to prefer (Pinker 2010). Technological and social innovations—from stone-tipped spears to cooking and food preparation, from agriculture to the internet, and from building a house to building social norms and institutions—often do not arise from strokes of individual genius (Muthukrishna & Henrich 2016). They instead “[...] gradually evolve over successive

generations not genetically but culturally, as occasional beneficial modifications are selectively preserved and accumulated via non-random social learning strategies” (Mesoudi 2016, p. 17).

These social learning strategies, which have been both predicted by formal evolutionary modeling and documented by experimental and developmental psychologists, include (not an exhaustive list, only for illustrative purposes) the following: *who*-biases such as conformity (disproportionally imitating the majority), prestige (imitating the prestigious), competence/success (imitating the competent/successful), credibility-enhancing displays (imitating persons who “walk the walk” and not just “talk the talk”; Henrich 2009), and self-similarity (imitating self-similar people), as well as *when*-biases, such as imitating when uncertain, when prior knowledge is outdated, and when individual learning is costly (see, e.g., Boyd & Richerson, 1985; Henrich 2016; Henrich & Broesch 2011; Hoppitt & Laland 2013; Mesoudi 2008, 2016; Muthukrishna, Morgan, & Henrich 2016; Richerson & Boyd 2005a; however, for a critical evaluation of this literature, see Lewens 2015).

In addition to *who*- and *when*-biases, which are also collectively known as *context biases*, Dual Inheritance Theory comprises *content biases*. Content biases cover the idea that individuals are more likely to learn some cultural variant over another because of the content of that variant. This typically “[...] result[s] from calculation of costs and benefits associated with alternative variants, or because the structure of cognition makes some variants easier to learn or remember” (Richerson & Boyd 2005a, p. 69). The content bias concept can thus be viewed as related or even synonymous to factors of attraction in Cultural Attraction Theory: both terms cover the idea that some cultural variants are socially transmitted more faithfully than other variants as a result of the content of these variants (for a discussion of this point, see Acerbi & Mesoudi 2015; Morin 2016).

According to proponents of Dual Inheritance Theory, the unique reliance on social learning in humans creates a second inheritance system in addition to genetic inheritance: cultural inheritance, also known as *cumulative culture* or *cumulative cultural evolution* (Boyd & Richerson 1985). The genetic and cultural inheritance systems do not function separately from each other. On the contrary, they influence each other in crucial ways (for a review, see Henrich 2016). Genes and culture are said to co-evolve. One of the best documented examples of this gene-culture coevolutionary process is the consequences of the domestication of fire, which, through cooked food, allowed the human lineage to evolve smaller intestines and bigger brains (Wrangham 2009). Gene-culture coevolution can be viewed as a special case of *niche construction*, the more general evolutionary process whereby an organism shapes its environment just as the environment shapes the organism (Odling-Smee, Laland, & Feldman 2003).

With its emphasis on social learning, cumulative culture, gene-culture coevolution, and niche construction, Dual Inheritance Theory then offers a very different and arguably more nuanced view on human evolution than Evolutionary Psychology and thus provide different

(although not entirely incompatible) explanations to the challenges facing Evolutionary Psychology and the FEB hypothesis. Central issues of disagreement include the explanation of cultural and individual differences, the degree of modularity of the human mind, the concept of the EEA, and the role of culture. As already alluded to, these debates are the main theme of Part 2.

For these same reasons, proponents of Dual Inheritance Theory also emphasize that in order to study what makes humans human, we cannot rely solely on convenience sampling of university undergraduate students for experiments and surveys, as has been (and still is) the norm in much of social and behavioral science. This has been dubbed the “WEIRD people problem” (Muthukrishna & Henrich 2019), where WEIRD stands for western, educated, industrialized, rich, and democratic. The originators of the WEIRD-acronym (Henrich, Heine, & Norenzayan 2010) have documented how a wide range of psychological phenomena once thought to be universals actually vary substantially, to the point where they are occasionally non-existent, across cultures. These phenomena span from very basic cognitive mechanisms such as visual perception to more complex phenomena such as “fairness, cooperation, spatial reasoning, categorization and inferential induction, moral reasoning, reasoning styles, self-concepts and related motivations, and the heritability of IQ” (Henrich et al. 2010, p. 1), as well as personality (for a treatise on the possible origin of WEIRD psychology, see Schulz et al. 2019). When cross-cultural analyses are conducted, WEIRD people are often shown to be some of the least representative populations of humans.

These systematic cultural differences are a challenge to frameworks such as Evolutionary Psychology, who depend on the notion of universal cognitive features in humans, and we will encounter concrete cases of the WEIRD people problem in Part 2.

## PART 2: A CRITICAL DISCUSSION OF THE “FEB HYPOTHESIS”

### *Cultural and individual variation in folk-economic beliefs and behavior*

*Variation in beliefs.* As several commentators of Boyer and Petersen’s (2018a) article noted, there is substantial cultural and individual variation in the beliefs that laypeople hold about policy issues and the economy (Buturovic 2018; Ruisch, Anderson, & Pizarro 2018; Stastny & Houdek 2018; Tappin et al. 2018).

For instance, Ruisch et al. (2018) cites a recent Gallup World Poll that surveyed 142 countries. According to this survey and contrary to the predictions from the FEB hypothesis, 27% of respondents believe that immigrants are not in competition with native citizens, since immigrants take low-paying jobs that native citizens do not want anyway (Esipova, Pugliese, & Ray 2015). Only 29% of the respondents answered in accord with the FEB hypothesis—that immigrants “steal jobs” from native citizens. Likewise, according to another cross-national survey (Pew

Research Center 2014), which was also cited by Ruisch et al. (2018), the majority of respondents endorsed the beliefs that both international trade (80%) and a free market (64%) is “generally good”.

These beliefs are polar opposites of what the FEB hypothesis predicts, namely, that both international trade and a free market are considered “generally bad” by most laypeople (Boyer & Petersen 2018a), views that were endorsed by only 14% and 28% of the respondents, respectively. These differences in folk-economic beliefs are not only expressed between nations but also within nations. Tappin et al. (2018) cites national survey data across the UK and the US with similar results: a substantial amount of people, if not the majority, holds beliefs that are contrary to the predictions of the FEB hypothesis.

How do Boyer and Petersen (2018a, 2018b) respond to such observations? They simply acknowledge that these popular beliefs are also folk-economic beliefs, since, as noted previously, Boyer and Petersen (2018a) define folk-economic beliefs not in terms of their truth value but whether or not they are common enough to be politically relevant. However, as Stastny and Houdek (2018) argue, if mutually exclusive beliefs about economic and policy issues can both be classified as folk-economic beliefs, this questions the theoretical usefulness of the concept of folk-economic beliefs. As Bhattacharjee and Dana (2018) relatedly noted, this problem could be alleviated somewhat, if proponents of the FEB hypothesis defined folk-economic beliefs as being (statistically and generally speaking) contrary to formal economic science. This would exclude many beliefs as folk-economic beliefs. Indeed, the folk-economic beliefs chosen as example cases by Boyer and Petersen (2018a) are all framed as being in conflict with current economic science (Stastny & Houdek 2018). This is understandable. After all, the most politically interesting cases are when people hold counterfactual—and not perfectly accurate—beliefs about the economy (see also Caplan 2007; Leiser & Shemesh 2018; Rubin 2003, 2018). The FEB hypothesis would benefit from admitting this normative aspect in the study of folk-economic beliefs (Bhattacharjee & Dana 2018).

The cultural and individual differences in beliefs about the economy and policy issues are not only *substantial* but also *systematic*. Laypeople’s views on issues such as immigration, international trade, and the market vary systematically according to demographic variables, such as education and ideology (Buturovic 2018; Ruisch et al. 2018; Sheehy-Skeffington & Thomsen 2018; Stastny & Houdek 2018; Tappin et al. 2018; see also Caplan 2002). Several explanations to this finding have been proposed.

For instance, it may be the case that more educated people simply have more accurate views on the economy in general (Tappin et al. 2018). Boyer and Petersen (2018a, p. 3) reject this view as a primary explanation, as they—as already mentioned—regard whether a folk-economic belief is accurate or not as “orthogonal” to the underlying cognitive processes.

Another prominent suggestion is that belief formation is highly influenced by social conflict dynamics. This means that, on highly polarized political topics at least (e.g., immigration, international trade regulations, climate

change policy), people are motivated to publicly endorse beliefs that are in line with their group identity and political ideology in order to signal their social allegiance (Tappin et al. 2018). This psychological process is sometimes called “cultural cognition” (for a review, see Kahan 2016). As Tappin et al. (2018) pointed out, the cultural cognition perspective serves to highlight the possible divide between what people *explicitly* say they believe (e.g. in a survey) and what they *implicitly* believe. In principle, people could answer one thing in order to express what social group they belong to, but actually hold a different belief in their private mind.

Boyer and Petersen's (2018a, 2018b) framework endorses what could arguably be viewed as a variant of cultural cognition (“coalitional dynamics”, see also next section) to explain individual and cultural variation in folk-economic beliefs. For instance, they write:

“... a core ability for humans is to coordinate agendas within coalitions – that is, to agree implicitly (or, sometimes, explicitly) on a prioritized list of problems to tackle by means of collective action. When people come to identify with a particular coalition, the stance of the other members will, in other words, matter for the beliefs that people adopt, including their FEBs.” (Boyer & Petersen 2018b, p. 53; see also rest of R6.2).

I agree that something like cultural cognition—or the “coordinat[ion of] agendas within coalitions”—is a potentially plausible source of individual variation in beliefs. However, for the purpose of explaining variation in folk-economic beliefs, it is currently an underdeveloped construct. The cultural cognition hypothesis has primarily—if not exclusively—been tested in narrow samples of WEIRD people, namely US citizens, making it premature to draw any generalizable insights about either human cognition or human culture. Therefore, as van der Linden (2016) pointed out, it is at best “[...] a thesis about why specific American groups with differing preferences for the role of government in society disagree over a select number of “controversial” [...] issues” (van der Linden 2016, p. 7). Because the FEB hypothesis partially relies on something like cultural cognition (under the heading of “coalitional dynamics”) to explain cultural and individual variations, the FEB hypothesis is vulnerable to these same points of criticisms<sup>2</sup>.

*Variation in behavior.* Cultural and individual differences are not only expressed in *beliefs* about the economy and policy issues. They are also expressed in economic *behavior* across cultures. To investigate the degree of cross-cultural variation in economic behaviors, Henrich

et al. (2001, 2005) played the “ultimatum game” across several societies, ranging in scale from hunter-gatherers, horticulturalists, nomadic herders, and small-scale agriculturalists. The ultimatum game is played anonymously by two participants, a proposer, and a responder. The proposer is allocated an amount of real money and has to make a one-shot proposal to the responder of how to divide the money. If the responder accepts the offer, the proposal is implemented and the participants receive the money; if the responder rejects, none of the participants receive anything.

In their review of ultimatum game studies, Fehr and Schmidt (2006) reported that, when played in western and industrialized countries, the typical offers range between 40 and 50 percent of the allocated amount. At the same time, offers less than 20 percent of the allocated amount are rejected with probability 0.4 to 0.6.

However, Henrich et al. (2001, 2005) found that both offer size and rejection rates vary across cultures. For instance, members of Papua New Guinean societies Au and Gnau proposed “hyper-fair” offers (above 50% of the allocated stake), but also had high rejection rates, even for hyper-fair offers. This pattern might reflect the remarkable culture of gift-giving in these societies:

“[...] accepting gifts [...] commits one to reciprocate at some future time to be determined by the giver. Receipt of large gifts also establishes one in a subordinate position. Consequently, excessively large gifts, especially unsolicited ones, will frequently be refused because of the anxiety about the unspecific strings attached.” (Henrich et al. 2001, p. 76).

The Machiguenga of Peru ranked lowest in cooperation rates (i.e., the size of the offer), probably mirroring the lack of exchange or sharing beyond the family unit in Machiguengan daily life. In contrast, Orma participants of Kenya ranked very high in cooperation rates. This observation fits neatly with a culture of “widespread institutions of village-level voluntary contributions for public-goods projects such as schools or roads” in this society (Henrich et al. 2001, p. 76).

To sum up, it seems that participants brought their social norms, especially those relevant for the local market, with them into the otherwise artificial, one-shot, anonymous game situation (for corroborating findings, see Henrich et al. 2006). Thus, people not only vary both substantially and systematically in economic beliefs. They also vary substantially and systematically in economic behavior.

#### *The sources of individual and cultural variation in the FEB hypothesis*

How does the FEB hypothesis, with its emphasis on universal cognitive systems, explain individual and cultural variation in folk-economic beliefs and behavior?

Boyer and Petersen (2018b) distinguish between two sources of variation: 1) “coordination of beliefs within groups on the basis of coalitional dynamics” (p. 54), (see above); and 2) “the differential activation of domain-specific cognitive systems due to variation in available cues” (p. 54). As I have already discussed the coalitional

<sup>2</sup>One of the anonymous reviewers suggested that this argument misses the target, since I criticize the cultural cognition hypothesis and not the coalitional dynamics hypothesis per se, which is what forms part of Boyer & Petersen's (2018a, 2018b) framework. However, I postulate that these two hypotheses share enough relevant features to warrant the comparison put forward in the main text (see, e.g., the quoted paragraph from Boyer and Petersen 2018b, p. 53). In addition, coalitional dynamics are not usually invoked by proponents of Evolutionary Psychology to explain individual differences in beliefs specifically, but instead to explain phenomena such as cooperation, altruistic punishment, warfare, and in-group favoritism more generally (Buss 2019). Since cultural cognition can be viewed as one of the most well-developed variants of a “coalitional dynamics” approach to explaining individual differences in economic and political beliefs, it is—I argue—therefore appropriate to critically discuss cultural cognition in the present context.

dynamics/cultural cognition view, I here focus on Boyer and Petersen's second source.

Based on Petersen's own work, Boyer and Petersen (2018b) give an example of how individual and cultural variation can be caused by the differential activation of domain-specific cognitive systems:

"Past research suggests that when evolved motivations for communal sharing are activated, people are more prone to endorse the belief that needy individuals are "unlucky" rather than "lazy" (Petersen et al. 2014), and they are more likely to broadcast such beliefs to others (Aarøe & Petersen 2013)." (p. 54)

Thus, cues in the environment can be said to activate different cognitive modules and hence different motivational states, which in turn will influence the construction of certain folk-economic beliefs. According to the FEB hypothesis, this also explains ideological differences: ideological differences have been shown to co-vary, at least to some degree, with the activation of cognitive mechanisms, e.g., "[...] threat-detection (Hibbing et al. 2013), for mating preferences (Petersen 2018), and for conflict-resolution (Price et al. 2011)" (Boyer & Petersen 2018b, p. 54). Ideology, then, is simply the product of different people constructing their folk-economic beliefs on the background of differentially activated cognitive systems (Boyer & Petersen 2018a, 2018b).

The concept of "differential activation" of cognitive modules is one standard way of explaining individual and cultural variation in Evolutionary Psychology more generally. It is also known as "evoked culture" (Tooby & Cosmides 1992). Evoked culture refers to the individual learning processes whereby environmental cues trigger one or more psychological mechanisms, and it stands in contrast to "transmitted culture", the spreading of cultural variants through social learning (e.g., observation, imitation, teaching, etc.). Although these two kinds of cultural processes are not mutually exclusive and are often difficult to disentangle in concrete case studies, proponents of Evolutionary Psychology have tended to focus more on evoked culture (individual learning) than transmitted culture (social learning) (Brown & Richerson 2014; Norenzayan 2006).

This is also the case for the FEB hypothesis. Cultural Attraction Theory, which is integral to the FEB hypothesis (see Part 1), is of course an endorsement of transmitted culture, but for Boyer and Petersen (2018a), Cultural Attraction Theory is an explanation of *similarity*, not *variation*, in economic beliefs across cultures and individuals. The factors that Boyer and Petersen (2018b) noted as potential explanations for individual and cultural variation—e.g., "differential activation" of cognitive modules, such as life history strategies and mechanisms for threat detection, mate preferences, and conflict-resolution—are all cases of individual learning (although they do allude to social cues also being able to activate different cognitive modules).

By focusing almost entirely on individual learning when explaining cultural and individual differences in folk-economic beliefs, the FEB hypothesis is left vulnerable to at least two serious criticisms.

Firstly, by focusing overwhelmingly on individual learning processes, proponents of the FEB hypothesis simultaneously overlook important limitations of the

concept of evoked culture and important strengths of the concept of transmitted culture.

Secondly, this in turn forces the FEB hypothesis to be unnecessarily reliant on the strong assumptions of Evolutionary Psychology ("massive modularity" and the EEA) presented in Part 1, since these assumptions are fundamental to the process of "differential activation of domain-specific cognitive systems".

The following sections elaborate on these two points of criticism in turn.

#### *Limitations of "evoked culture" and the importance of "transmitted culture"*

*Evidence against the Importance of Evoked Culture and for the Importance of Transmitted Culture.* If evoked culture is the primary process whereby cultures and individuals come to vary, as proponents of Evolutionary Psychology and the FEB hypothesis argue, the prediction is that people in the same kind of environments should generally believe and behave alike, whereas people inhabiting different environments should believe and behave differently. On the other hand, if socially transmitted culture is a significant process, we would not expect this pattern, as beliefs and behaviors can stabilize culturally through social learning in a population independently of the specific features of the ecological environment (Boyd & Richerson 1985). Of course, the two processes are not mutually exclusive and can therefore function simultaneously (Mesoudi 2011). But, as already mentioned, the FEB hypothesis put special emphasis on the concept of evoked culture when explaining cultural and individual variation in economic and political beliefs and behavior. Is there evidence to justify this special emphasis? Here, I will argue that there is not.

Recall the cross-cultural ultimatum game study by Henrich et al. (2001, 2005) presented above. Since this data comprises societies spanning a range of environments, subsistence methods, and social organizations, the results represent a valuable test of the relative importance of evoked culture and transmitted culture in economic behavior. And contrary to the predictions of Evolutionary Psychology and the FEB hypothesis, the results indicate that people from the same kind of environments can behave very differently, while people from different environments can behave alike. Furthermore, individual-level variables (such as age and sex) failed to reliably predict the experimental outcomes, both within and between societies (Henrich et al. 2001, 2005). Instead, factors such as local market norms, cultural history, and social organization seemed to be more important than individual and ecological factors in explaining variation in this kind of economic behavior. These results go against the prediction of Evolutionary Psychology and the FEB hypothesis but in turn support one of the central premises of Dual Inheritance Theory, namely, the importance of social learning and transmitted culture.

Proponents of Evolutionary Psychology (e.g., Boyer 2018) often cite a study (Price 2005) that seemingly contradicts the conclusion of Henrich et al. (2001, 2005). Price (2005) found cross-cultural similarities in punitive

sentiments during a collective action game between a sample of Shuar horticulturalists from South America and participants from industrialized societies. The author took this finding as evidence that the reported kind of punitive sentiment is a universal human adaptation, thus downplaying the importance of cultural variation in economic and cooperative behavior across the human species. But as Price (2005, p. 284–285) himself noted, his sample of Shuar participants was very small ( $N = 13$ ). This cast significant doubt on the reliability and validity of the results. It would, however, certainly suit proponents of Evolutionary Psychology to conduct more of this kind of cross-cultural research, instead of relying almost exclusively on participants from WEIRD populations (Henrich et al. 2010; Sears 1986).

To return to the main argument, the conclusion from Henrich et al. (2001) is supported by a wealth of more general ethnographic data. For instance, Hewlett, De Silvestri and Guglielmino (2002) collected cross-cultural data on 109 cultural traits (e.g., marriage forms, religious beliefs, subsistence methods, and house building methods) from 36 ethnic groups in Africa along with data on the ecological environments (savannah, forest, or desert) inhabited by these groups. The analyses showed that only 4 of these 109 cultural traits significantly varied with ecology (described as “local adaptations”). The remaining traits were best explained as cases of transmitted culture, either through cultural inheritance within groups or cultural borrowings between groups. If these results can be said to be generalizable—and there are good reason to believe that this indeed is the case (see, e.g., Aunger 1994 and Guglielmino, Viganotti, Hewlett, & Cavalli-Sforza 1995 for similar results)—this means that cultural variation is more often the product of cultural histories than environmental cues “evoking” behavioral responses. This conclusion is further buttressed by the recent finding that cultural history is often a better predictor of political and economic changes among nation states than for instance geographic proximity per se (Matthews et al. 2016).

Another related line of evidence for the importance of transmitted culture originates from the fact that it is possible to compose so-called *phylogenetic trees* out of cultural data. Just as the evolutionary relationships between living species can be visualized using a tree-like structure representing genetic descent, so too have many cultural traits been shown to be related by cultural descent. Cultural traits that have been investigated in this way include such diverse phenomena as stone tools (Lycett 2009), languages (Pagel 2009), folk tales (da Silva & Tehrani 2016), weaving patterns (Tehrani, Collard, & Shennan 2010), religious beliefs, and rituals (Gray & Watts 2017) (for more examples, see O'Brien et al. 2013).

To be clear, this does not mean that the analogy between genes and cultural traits is perfect (Claidière et al. 2014). For one thing, cultural traits can spread horizontally within the same generation, whereas genes usually only spread vertically from parents to offspring (see Mesoudi 2011). Cultural transmission is also more “noisy” and has a lower fidelity than genetic transmission (Sperber 1996; but see Henrich, Boyd, & Richerson 2008). In addition, cultural change, unlike biological mutations, can be the

product of deliberate individual thought (Pinker 2010), as well as serendipity (Roberts 1989).

However, despite such objections, the fact that it is possible to construct cultural phylogenies at all means that many cultural traits are inherited, through social learning, accurately enough to exhibit traceable evolutionary histories more or less independent from ecological factors (Greenhill, Currie, & Gray 2009). This further underlines the importance of social learning and transmitted culture in explaining cultural variation.

*How evoked culture and transmitted culture can interact.* These arguments should not be taken as evidence that something like the process of evoked culture is non-existent and non-important. There is in fact some cross-cultural evidence showing that something like evoked culture does play a role in the construction of economic beliefs and behavior. For instance, food sharing in many small-scale societies is not only determined by social norms, kin altruism and reciprocal altruism (Fiske 1992), but also by the characteristics of the local ecology (McNamara & Fischer 2018; Gurven 2004). More generally, the field of *behavioral ecology* aims to describe and understand human behavioral variation as a function of the local environment (Laland & Brown 2011; Smith 2000). Thus, something like the process of evoked culture certainly has a role to play in our understanding of the evolution of economic beliefs and behaviors. It is just not a sufficient explanation but one piece of the bigger puzzle. In fact, evoked and transmitted culture can be thought of as interacting processes. Whether one is more important than the other may have to be analyzed on a case-by-case basis (for an exposition of this view, see Norenzayan 2006). Not enough research has been conducted to conclusively weigh up the relative importance of the two processes in the domain of folk-economic beliefs. However, if we can generalize from a related field, namely, the study of the cultural evolution of religions, we can expect to find that economic and political beliefs and behaviors are complex products of both ecological, cultural, and social factors (Botero et al. 2014; Norenzayan et al. 2016).

The overarching conclusion of this section, then, is that transmitted culture cannot be overlooked and that the special emphasis put on evoked culture by the FEB hypothesis in explaining cultural and individual variation does not seem empirically justified.

#### *Limitations of “massive modularity”*

As presented in Part 1 and as Boyer and Petersen (2018a, 2018b) themselves acknowledge, the FEB hypothesis (and Evolutionary Psychology in general) rests on the concept of “massive modularity” as one of its core assumptions, as well as an explanation for individual and cultural variation. Without it, there can be no “differential activation of domain-specific cognitive systems”. However, massive modularity is a highly controversial concept, as I discuss in this section. There are both general issues with the concept and critical concerns surrounding specific, proposed cognitive modules, many of which are theoretically crucial for the FEB hypothesis. Here, I treat these two challenges in turn.

*General issues.* Boyer and Petersen argue that the human mind consists of “[...] many distinct, specialized systems, each of which corresponds to recurrent adaptive challenges in human evolution” (Boyer & Petersen 2018a, p. 6). However, as Stastny and Houdek (2018) pointed out (as have authors before them; e.g., Laland & Brown 2011), this position is in risk of quickly becoming pure “ad-hockery”, since it allows proponents to invent a new module for every single evolutionary challenge that can possibly be imagined. Such unlimited, unconstrained theoretical space endanger thinkers to succumb to composing of what Stephen Jay Gould (1978), following Rudyard Kipling (1902), called “just-so stories”: unverifiable hypotheses about the ultimate origin of some biological or cultural trait cloaked in loose evolutionary narrative.

In addition, it is not at all obvious, as proponents of Evolutionary Psychology and the FEB hypothesis claim, that the only solution to the wide-range of adaptive problems faced by our ancestors was to genetically evolve many distinct, specialized inference systems (Lloyd & Feldman 2002). As Shapiro and Epstein (1998) put it:

“It simply does not follow from the fact that different adaptive problems require different kinds of solutions that an organism will have as many pieces of cognitive equipment as there are adaptive problems it must solve.” (p. 175)

Instead, it is very much possible that some domain-general processes, such as advanced social learning, make more evolutionary sense in many cases (Bolhuis & MacPhail 2001).

For one thing, domain-general processes such as social learning is more flexible and adaptable to changing environments and climates (Bolhuis et al. 2011). Indeed, it has been convincingly argued that social learning is in fact an adaptation to subtly varying climatic conditions (Richerson, Bettinger, & Boyd 2008). Formal evolutionary models have suggested that social learning is favored when climatic conditions are variable enough to make individual learning (e.g., by trial-and-error) costly, but stable enough so as to make a reasonable fit between the behavioral traditions of the previous generation and the current climate (for recent comprehensive reviews on the evolution of social learning in humans, see Henrich 2016; Laland 2017). When pressed on the matter, proponents of Evolutionary Psychology generally do acknowledge these robust insights from evolutionary biology (see, e.g., Laland & Brown 2011, p. 186). Boyer and Petersen (2018a, p. 4) also verbally acknowledge the importance of a sociocultural dimension. However, when it comes to forming specific hypotheses, domain-general processes such as social learning (transmitted culture) are often left out, and, as is also the case with the FEB hypothesis, the predictions go directly from specialized inference systems over implicit intuitions to explicit beliefs and/or behavior (Hirshleifer & Teoh 2018; see also Figure 1 above).

Finally, the general concept of massive modularity implies that the comprising evolved cognitive systems are non-flexibly developing, universal, and only trivially, if at all, influenced by upbringing and culture (Bolhuis et al. 2011). This stands in contrast to modern views on the ontogenetic structuring of the body and

brain. Here, it is emphasized how culture, biology, and developmental processes critically interact in shaping an individual's mind and behavior (e.g., Li 2003). To their credit, Boyer and Petersen (2018b, p. 48) do acknowledge that experience, and upbringing (primarily in the form of “environment-specific” cues) has a role to play in the individual development of cognitive modules, but again, when it comes to forming specific hypotheses, this kind of influence is ignored.

*Critical concerns with specific modules.* There are also some more specific concerns with the “massive modularity” assumption. As I argue here, the FEB hypotheses overlooks evidence from both ethnography (e.g., knowledge about the social organization of hunter-gatherers, both past and present), cultural psychology (e.g., cultural differences), game theory and evolutionary modeling (e.g., that kin altruism and reciprocal altruism cannot sustain large-scale cooperation alone) as well as alternative evolutionary explanations (e.g., Dual Inheritance Theory).

One key concept – if not *the* key concept – of the FEB hypothesis is humans' “exchange psychology”. Boyer and Petersen (2018a) explain:

“One feature that is universally prominent in both modern and ancestral human societies is the exchange of goods (e.g., tools, food) and services [...]. Exchange [...] allowed our ancestors, as it allows us, to exploit cooperative positive-sum games, engage in collective action, and buffer against predicaments such as hunger and injury [...]. [E]ngaging in exchange requires the existence of distinct, specialized cognitive mechanisms (Cosmides & Tooby 1992), including mechanisms for estimating costs and benefits of goods and services for the self and other; for comparing them in an abstract format (equivalent to utility in the vocabulary of economics); and for motivating exchange when the benefits of exchange exceed the costs for oneself. The human mind, in other words, contains a rudimentary exchange psychology.” (p. 7–8)

The “exchange psychology” is not in itself proposed as a separate cognitive module but is instead comprised of several other modules serving as subcomponents to the larger psychological system. These subcomponents include distinct, specialized systems for *cheater-detection*, *partner choice*, *communal sharing*, *coalitional affiliation*, and *ownership* (Boyer & Petersen 2018a, p. 8–10). All of these specialized systems rely on either reciprocal altruism or kin altruism (Cosmides & Tooby 1992). The main idea according to Evolutionary Psychology is that humans evolved in small-scale societies that consisted almost exclusively of close kin (kin altruism) and/or of individuals who often collaborated and reciprocated (reciprocal altruism). Encounters with strangers were purportedly very rare. Since human psychology assumedly evolved in this kind of social environment, simple cognitive heuristics such as “Cooperate with everyone you meet, because everyone is either a close relative or a close friend” evolved. In the modern world, where we engage in one-shot interactions on an everyday basis, such inflexible rules routinely “misfire”, causing people to treat even strangers as close friends or family, following these evolved mental rule-of-thumbs (e.g., Krasnow et al. 2012).

However, as evolutionary game theoretical modeling has repeatedly demonstrated, this so-called “mismatch hypothesis” is at best incomplete (e.g., Zefferman 2014). This is because those 2 evolutionary pathways to cooperation—kin altruism and reciprocal altruism—break down in even relatively small groups and are thus insufficient to account for both the scale and the frequency of human cooperation, both in Western industrialized nations and, crucially, in small-scale societies (Henrich & Henrich 2007; for mathematical expositions, see, e.g., Henrich 2004, and Boyd & Richerson 2002). Indeed, reciprocal altruism is extremely rare in the rest of the animal kingdom (Hammerstein 2003), which supports the theoretical conclusion that reciprocal cooperation is too fragile to be favored under most realistic circumstances. These theoretical insights spell trouble for the concept of a universal “exchange psychology”. This mathematical discussion, aside anthropological, ethnographical, and ethological evidence, questions the validity of the “mismatch hypothesis” more broadly and thereby the “exchange psychology”:

Firstly, many small-scale societies consist of individuals who are too distantly related in order for kin selection to be favored by evolution. Hill et al. (2011), for instance, in analyzing 32 small-scale present-day foraging societies, found that, on average, only one quarter of the bands consisted of “primary” or “distant kin”. This predicts very little cooperation from an exclusive kin selection perspective (Henrich 2016).

Secondly, the assumption that people in small-scale societies almost exclusively interact with close friends, is also not supported by the bulk of anthropological and ethnographic work (Bird et al. 2019; Hill et al. 2014). For instance, many anthropologists today argue that even small-scale societies are not just isolated units, but instead form part of large and nested networks of interacting families, bands, and tribes that regularly come together to exchange resources, perform collective rituals, and seek mates. These shared and culturally evolved practices bind the networks together, since the networks often comprise too many individuals for any single individual to know in person (direct reciprocity) or by reputation (indirect reciprocity), thus undermining crucial criteria for the evolution of reciprocal altruism (Boyd & Silk 2017; Chudek & Henrich 2011; Chudek et al. 2013). In the above-cited study by Hill et al. (2011), for instance, the remaining 3 quarters of the average band is tied together by culturally evolved practices, such as marriage and in-law norms.

Thirdly, many non-human primates live in small, tightly knit, closely related groups, similar to those of our own ancestors, according to the “mismatch hypothesis”. However, none of these species exhibit any general tendency to cooperate with every individual they encounter (Henrich 2004). For instance, if a band of chimpanzees meets a stranger upon patrolling their territory, the encounter often escalates into fierce and sometimes fatal violence (Goodall 1986). In other words, non-human primates—just like humans—seem highly sensitive to differentiating between “in-group” and “out-group” members.

There are also specific problems pertaining to the individual subcomponents of the exchange psychology:

As already mentioned, neither kin altruism nor direct or indirect reciprocity is an adequate explanation for cooperation on even a small scale (Chudek et al. 2013). This weakens the foundations of the “partner choice” and the “cheater-detection” modules of the FEB hypothesis, respectively, since these are often regarded as extensions of kin and reciprocal altruistic dynamics (Chudek et al. 2013). Furthermore, there are large cross-cultural differences in practices having to do with “communal sharing” and “ownership” (McNamara & Fischer 2018), casting doubt on whether the human mind really possess universal specialized modules for such situations too.

This latter objection from cross-cultural research also affects an additional critical feature of the proposed cheater-detection module. According to Boyer and Petersen (2018a), the intuitive free-rider system that categorizes a person as a cheater or not is “highly sensitive to intentions” (p. 8). However, recent cross-cultural research has suggested that the role of intentions (compared to the actual outcome of an act) in categorizing someone as a norm violator may vary significantly between societies with different cultural histories. Intentions are much more salient to individuals from western and industrialized societies than to, say, indigenous Yasawans (Yasawan Islands, Fiji), who in turn put more emphasis on the outcome of an act (McNamara et al. 2019). The notion that the cheater-detection module is said to be “highly sensitive to intentions” is most likely an artifact of the standard practice in Evolutionary Psychology of almost exclusively performing experiments on WEIRD populations.

*Towards a conciliatory integration.* The preceding arguments do not exclude the possibility that humans are endowed with a rich, evolved, and reliably developing social psychology (Machery & Barrett 2006). In contrast, reciprocal altruism and kin altruism are definitely real phenomena and have almost certainly shaped parts of our social psychological dispositions and motivations (Henrich & Henrich 2007).

What the arguments in the previous sections do demonstrate, however, is that our evolved social psychology, in isolation, is not a sufficient explanation for the impressive scale of human social exchange and that we need to include the importance of culturally evolved norms and institutions into the FEB hypothesis framework and Evolutionary Psychology more generally. This is not an unsurmountable challenge, since some aspects of Boyer and Petersen's (2018a) “exchange psychology” are similar to what other evolutionary scholars have termed “tribal social instincts” (Richerson & Boyd 2005a).

The tribal social instincts hypothesis forms a central part of Dual Inheritance Theory and posits that humans are naturally endowed with a psychology evolved for selective social learning. Specifically, it posits that we come prepared to learn and enforce social norms (also known as a “social norm psychology”) and that we decide who to learn from based on a wide range of cues (e.g., *who-* and *when-*biases; see Part 1), many of which have to do with ethnicity, such as language, clothing style, and other symbolic, identity markers (also known as an “ethnic

psychology”) (Chudek & Henrich 2011; Richerson & Boyd 2005a).

The tribal social instincts are imagined to be a product of niche construction and gene-culture coevolution. In short, the argument goes like this: when the lineage leading to modern humans began to rely more and more on culturally transmitted information (e.g., concerning tool making, food preparation, social norms, etc.), probably as a result of changing climatic conditions (Richerson et al. 2008), natural selection would have favored those individuals who were better at selectively inferring and learning norms and new practices as well as at enforcing norms. In tandem, this created a population that became more and more adept at and reliant on cultural learning, creating even stronger selection pressures for brains capable of acquiring culture effectively. With time, this would have created a “cultural niche” (Boyd, Richerson, & Henrich 2011), in which genes and culture coevolved in a runaway, mutually reinforcing dynamic, creating in the process a species that is deeply dependent on culturally transmitted know-how and practices (for comprehensive expositions of this view, see Henrich 2016; Laland 2017; Richerson & Boyd 2005a).

There is a swath of psychological evidence for the existence of a social norm psychology and an ethnic psychology in humans. Young children seemingly expect their world to be structured by social norms. For instance, they are quick to infer and learn social norms and, once learned, they enforce these norms in the case of norm violations. This is so even when the norms are completely arbitrary and invented for the specific experimental situation (for a recent review, see Tomasello 2016). In other words, at least to some extent, children *internalize* local social norms as goals in themselves. Children are also selective social learners by, for instance, preferring to imitate people who speak and dress like themselves. Of course, there is also ample evidence for this kind of advanced social learning in adults (for recent reviews, see Henrich 2016, chapter 11; Chudek & Henrich 2011). House et al. (2019) provides very recent cross-cultural evidence for the existence of something like a universal and reliably developing “social norm psychology” in humans.

One particularly debated strain of experiments is worth highlighting at this point, which have to do with children's and adults' purported ability to pay special attention to cheaters or “free-riders”: The Wason Selection Task (Wason 1966).

The Wason Selection Task is often cited by proponents of Evolutionary Psychology and the FEB hypothesis as the primary evidence for the existence of a social exchange psychology and, specifically, a cheater-detection module (e.g., Boyer & Petersen 2018a; Buss 2015; Cosmides 1989). The task can be summarized like this:

“Imagine that four cards are lying on a table. Each card has a letter on one side and a number on the other, but you can see only one side. Now consider this: Which cards would you need to turn over to test the following rule: “If a card has a vowel on one side, then it has an even number on the other side. Turn over only those cards you would need to turn over to test the truth value of this rule:

[The four cards are:] A B 2 3” (Buss 2015, p. 265–266)

The correct answer is to turn over card A and 3, but most people in most studies turn over A and 2, and thus fail the test (Buss 2015). However, when the exact same problem is framed as being about cheating or “free-riding” (e.g., legal drinking; Cox & Griggs 1982), most people successfully pass the test (Gray, Heany, & Fairhall 2003).

As noted, Cosmides (1989) and other proponents of Evolutionary Psychology take such findings as strong evidence that humans have an evolved specialized inference system for detecting cheaters and “free-riders”, and, hence, a psychology shaped for reciprocal altruistic interactions. However, this conclusion has been deemed premature by several commentators (e.g., Gray et al. 2003; Richerson & Boyd 2005b). Apart from the criticisms of the general idea that the human evolved for reciprocal altruism discussed above, here, I focus on just one further point of criticism (for a more in-depth critique, see Gray et al. 2003).

Versions of the Wason Selection Task have also been performed with children and these studies show essentially the same pattern: even young humans can solve this logical problem when framed as a “free-rider” scenario (e.g., Harris & Núñez 1996). However, as Henrich (2016, p. 359) pointed out, Cosmides' (1989) interpretation is seriously challenged by the fact that both children and adults solve the Wason Selection Task (or versions of it) *not only* in “free-rider” scenarios, but *whenever* it has to do with any violation of culturally transmitted norms, even norms not concerned with cooperation or altruism. These findings do not fit with the idea of an evolved cognitive module for cheater-detection and reciprocal altruism per se. However, it is in full accordance with the tribal social instincts hypothesis, which, as noted, emphasizes the unique human capabilities of both inferring and learning social norms (even seemingly arbitrary ones), as well as enforcing those norms.

The Wason Selection Task debate serves as an example of how the FEB hypothesis, through modifications, can come to be integrated with the broader fields of evolutionary biology, anthropology, ethnography, and ethology: instead of postulating a “social exchange psychology”, based solely on the narrowly applicable framework of human reciprocal altruism, the FEB hypothesis could include something like a “social norm psychology”. As I will elaborate later in this paper, this move would allow the framework to become much more consistent with the observed cultural and individual variation in human economic beliefs and behavior—namely, by opening up the framework for the dynamics of transmitted culture—while not being dependent on the problematic assumption of massive modularity.

*Concluding remarks on “massive modularity”.* No evolutionarily oriented critic of Evolutionary Psychology or the FEB hypothesis disagree that humans have an evolved psychology and that, for this reason, some cultural variants are more psychologically or culturally “attractive” than others (Lewens 2015). These researchers, however, stress that culture, which itself is a product of evolved social learning capacities (e.g., Richerson & Boyd 2005a), will often have evolved to harness, extend, or

suppress parts of our evolved psychology (Henrich & Boyd 2016). Further, even small-scale societies are entirely dependent on culturally transmitted norms and institutions to function. Our evolved psychology for kin and reciprocal altruism is not sufficient to explain the extraordinary scale of human cooperativeness and cannot therefore serve as the principal theoretical foundation for specialized cognitive modules.

Proponents of Evolutionary Psychology and Dual Inheritance Theory agree that a very large number of “cognitive features” are needed to function in even the most traditional societies (McNamara & Fischer 2018). However, proponents of Evolutionary Psychology and Dual Inheritance Theory disagree on whether these “cognitive features” are primarily genetically evolved (domain-specific cognitive modules) or primarily acquired through social learning (in the form of social norms, traditions, know-how, cultural practices, etc.). I have argued that the current evidence seems to be heavily in favor of the latter view, but that this conclusion can be integrated into the FEB hypothesis with some modifications by, for instance, substituting the “exchange psychology” with a “social norm psychology”.

#### *Limitations of the EEA*

Like massive modularity, the concept of the EEA is both a core assumption in the FEB hypothesis, important for explaining individual and cultural variation (as the environment in which human cognition evolved), and the center of heated scholarly debate.

*Do we know enough about the EEA?* For Boyer and Petersen (2018a, p. 7), the EEA does not represent a specific time or place in prehistory. Instead, the EEA is a statistical aggregate of the features that were recurrent during most of human evolution. However, since the human species has spent most evolutionary time as nomadic hunter-gatherers in Pleistocene Africa and Eurasia, it is often assumed that it is for this kind of life that humans are physiologically and psychologically equipped (Hagen 2015).

Critics of the concept of EEA pointed out that we are largely ignorant of these recurrent ancestral features, so much so that deriving hypotheses about modern human cognition on this foundation alone amounts to nearly pure speculation (Buller 2005; Laland & Brown 2011).

Proponents of the concept of EEA, in turn, usually respond by cataloging a long list of features that, according to them, can be uncontroversially inferred about the ancestral environment of the human species (Hagen 2015; Machery & Barrett 2006). As Hagen (2015) put it:

“The giant insects of the Carboniferous were gone, the dinosaurs were gone. Many of the plant and animal taxa of the Pleistocene are similar to those that exist today. Physics and chemistry were the same – the refractive index of the atmosphere was close to 1, for example, just as it is today. Geology was the same. Much of the ecology was similar to what we see today. Our bodies were almost the same. Even the social environment was not so different: there were people of various ages and both sexes, that lived in groups, that were healthy and sick, that were of varying degrees of relatedness, and so on.” (p. 18)

But to critics of Evolutionary Psychology, this attempt at a rebuttal is likely to be unsatisfying. The listed features are not particularly relevant to the overall discussion. The real question is whether we can say enough about the social organization and cognitive challenges of our evolutionary pre-history to deduce any meaningful hypotheses about the workings of the modern human mind (Laland & Brown 2002).

As noted above, to the extent that we do think that we know anything about human sociality in ancestral environments, the available ethnographic and archeological data suggest that human social organization in pre-history was more complex than what is typically assumed by proponents of Evolutionary Psychology. Like modern hunter-gatherers, Pleistocene human social groupings seemed to have been arranged in nested relationships, going from family to band to tribe etc. (Pearce & Moutsiou 2014; Boyd & Silk 2017). Even small to medium-sized bands do not appear to primarily consist of close kin, but are instead knit together by shared norms, beliefs, taboos, and rituals (e.g., Bird et al. 2019). These kinds of social arrangements cannot have evolved solely through kin selection and/or reciprocal altruism, since cooperation based on such principles breaks down beyond a relatively small number of individuals (Zefferman 2014). Instead, modern hunter-gatherers rely on a large number of social norms and institutions to sustain cooperation (Henrich & Henrich 2007). These observations stand in stark contrast to the view from Evolutionary Psychology, where it is assumed that human genetically evolved psychology (e.g., “coalitional psychology”; “exchange psychology”) are optimally tuned to match the social life of hunter-gatherers (Henrich 2016).

*Has evolution stopped since the EEA?* A somewhat implicit assumption in the concept of the EEA is that humans have not evolved (very much) since the EEA (Laland & Brown 2002). This assumption is what underlies the “mismatch hypothesis” presented above: since we are adapted to a Pleistocene life, mismatches can arise between our evolved psychology and the modern environment.

Proponents of the concept concede that the human species has undergone some selection since the end of the EEA (Hagen 2015). Most notable and well-documented examples include the evolution of lactose tolerance, sickle cell trait, and skin pigmentation (Bolhuis et al. 2011). However, Hagen (2015) also points out that, so far, no recent *cognitive* evolution has been unanimously established. This encourages Hagen (2015) to conclude that—to a close approximation and to the best of our current knowledge—the design features of the human mind must be universal.

Hagen (2015) is right to consider it an empirical question whether (or how much) evolution has shaped human cognition in recent millennia. However, genetic evidence suggests that human evolution has actually sped up since the advent of agriculture around 10,000 years ago, an event that is often assumed to mark the end of the EEA (Hawks et al. 2007). Such findings, in turn, suggest that cultural inventions (e.g., agriculture) can be powerful drivers of evolution and that cultural evolutionary dynamics cannot be overlooked when deriving theories about the

genetic foundations of the human body, mind, and behavior. As Smith (2000) noted: “If the divergence from the EEA is a product of cultural change, then culture is inescapably important in explaining contemporary human behavior” (p. 38).

Another related challenge for the EEA and the “mismatch hypothesis” is that the human species actually began to really flourish not until *after* the advent of agriculture and, with it, civilization. Since then, the human population has exploded, and we have since come to dominate almost every corner of the terrestrial parts of the Earth. If our cognitive make-up was specifically fine-tuned to life as hunter-gatherers, this is not the expected outcome (Richerson & Boyd 2005b). However, this fact is in full accordance with Dual Inheritance Theory: humans' advanced and flexible social learning capabilities give rise to evolving technologies, as well as complex cultural norms and institutions, which allow humans to cooperate on larger and larger scales and to manipulate their environmental surroundings to their benefit. This niche construction view contradicts the view from Evolutionary Psychology of humans as “passive victims of selection” (Laland & Brown 2002, p. 181) and instead emphasizes the adaptable nature of the human species through non-genetic pathways.

In addition to these criticisms, it has further been argued that the Pleistocene climate was highly variable, and perhaps even too variable to reliably select for a large number of very specialized cognitive modules. Conversely, evolving a smaller set of more general learning capacities can be a more adaptive response to variable ecologies under a wide range of conditions (Brown & Richerson 2014).

### The “FEB hypothesis 2.0”

Where does all this leave the FEB hypothesis? As I proposed above, the FEB hypothesis can be integrated with several of the important criticisms of reviewed above, if the concept of an “exchange psychology” is substituted with something like a “social norm psychology” and an “ethnic psychology”.

This approach, which I propose to call the “FEB hypothesis 2.0”, does not rule out folk-economic beliefs being generated on intuitions from evolved psychological mechanisms. As noted above, many of the folk-economic beliefs proposed by Boyer and Petersen (2018a) (including beliefs about immigrants, ownership, distribution of resources, and the anti-sociality of markets and firms; see also Figure 1) purportedly originate from intuitions generated by social exchange and cheater-detection mechanisms. This overall idea can in principle be retained, if the beliefs are instead regarded as originating from intuitions generated by more general-purpose systems for detecting norm violations and ethnic cues more broadly—and not only in “free-rider” scenarios. Specifically, placing social learning and transmitted culture dynamics at the center of the hypothesis makes the research program more flexible in scope. Because of this increased behavioral and developmental flexibility, the strong assumptions of Evolutionary Psychology—massive modularity and the EEA—can

be relaxed. For instance, if we concede that socially transmitted cultural inventions—such as norms, taboos, and institutions—are indispensable tools for solving the challenges of human group living, the imagined existence of a very large number of modules evolved for social exchange in stable Pleistocene savannah conditions becomes unnecessary.

By embracing the “social norm psychology” and “ethnic psychology” instead of a “social exchange psychology”, the FEB hypothesis can also be made consistent with the substantial amount of observed individual and cultural variation in economic and political beliefs and behaviors. In the FEB hypothesis 2.0, such a variation is viewed as a product not only of evoked culture (i.e., environmental cues) but also, and perhaps even more importantly, of transmitted culture (i.e., social learning). This in turn allows us to understand folk-economic beliefs as parts of greater complexes of cultural traditions, histories, norms, and institutions.

The FEB hypothesis 2.0, then, does not necessarily predict *different* folk-economic beliefs than the ones Boyer & Petersen (2018a) discussed. Instead, the FEB hypothesis 2.0 predicts *a) variability* in beliefs and behaviors across cultures and individuals, and *b) that this variation can be explained using not only evoked culture but also transmitted culture*. In this sense, preliminary but suggestive data—in the form of the above-reviewed evidence of individual and cultural variations in economic beliefs and behavior—are already available to evaluate the merits of the FEB hypothesis and the FEB hypothesis 2.0, and, as argued here, the evidence appears to be primarily in support of the latter.

Finally, compared to the FEB hypothesis, the FEB hypothesis 2.0 is more easily merged with general findings from political psychology, as I will outline below.

### The FEB hypothesis 2.0 and political psychology

Unsurprisingly, understanding why people believe and behave as they do in modern political and economic situations has been a central theme in much of political psychology (Levy, Huddy, & Sears 2013). Here, I non-exhaustively exemplify how some prominent sociological approaches to political belief and attitude formation fit into the FEB hypothesis 2.0. This exercise serves the purpose of supporting the FEB hypothesis 2.0 by showing that it is consistent with several of the well-tested concepts within the sociological strains of standard political psychology.

*Sociological approaches – social networks, conformity, “social proofs”, and prestige.* According to social network researchers (e.g., Huckfeldt, Johnson, & Sprague 2004), people's political attitudes and behavior are influenced by their social network, e.g., by discussing politics with peers, friends, colleagues, and family. Empirical evidence do indeed suggest that people's social environment influence their political behavior, for instance, in whether or not to participate in politics and how to participate (e.g., Huckfeldt et al. 2013). Importantly, in this perspective individuals are not simply assumed to be passive members

of a social network, but to actively seek out and select networks of other individuals that resemble themselves in attitudes and demography. Proponents of social network theory usually term this phenomenon “homophily” (Marks et al. 2019).

Several components in social network theory are fully compatible with Dual Inheritance Theory and the FEB hypothesis 2.0. For instance and most notably, like Dual Inheritance Theory, social network theory emphasizes the importance of social learning, especially conformity, in attitude and belief formation. On a more technical note, social networks are integral to the mathematical modeling of the spread of cultural variants (Henrich & Henrich 2007).

Also, the concept of homophily is congruent with the self-similarity bias observed in human social learning: humans have a tendency to imitate and learn from self-similar people (Haun & Over 2015). The self-similarity bias is assumed to be an adaptive aspect of humans' advanced social learning capacities: in order to figure out whom to learn from, imitating someone from your own group—and not an exotic stranger from another group or another country—on average ensures that the learnt information is locally adaptive (Richerson & Boyd 2005a).

A broader concept, not exclusively ascribed to social network theory per se but to sociological approaches in general, is the concept of “social proof”: the tendency, especially in uncertain situations where accuracy matters, to look out for what other people believe and how they behave and imitate them, if their behavior is congruent with their espoused beliefs (Cialdini 1984). In this way, social proof is somewhat akin to “credibility-enhancing displays” in Dual Inheritance Theory, the idea that people will adopt another person's behavior if this other person not just “talks the talk” but “walks the walk” (Henrich 2009). Credibility-enhancing displays, like self-similarity bias, are also generally thought to be an adaptive social learning strategy. For instance, if someone advertises a food preparation method it is probably a good idea to be skeptical, if the advertiser does not dare consume the food himself.

Something like a “prestige bias” is another sociological concept that can be found in both Dual Inheritance Theory and in political science: people's attitudes and beliefs are substantially shaped by prestigious sources (e.g., Ahn et al. 2013). In the political domain, this includes the media, pundits, and political parties, as well as celebrities. Imitating prestigious individuals (i.e., the individuals that other people are imitating) is adaptive to the extent that prestige is an accurate proxy for competence and success (Henrich & Gil-White 2001). This has probably been the case on average during our evolutionary history, when our social learning capacities were shaped and honed.

Construed like this, the FEB hypothesis 2.0 is thus more straightforwardly compatible with political psychology approaches, particularly the sociological strains, than Boyer and Petersen's (2018a) FEB hypothesis. This is so because the FEB hypothesis 2.0 regards social learning as a central feature, while Boyer and Petersen (2018a) places most emphasis on differential activation of cognitive inference systems prompted mainly by environmental cues.

### *Practical implications: correcting inaccurate folk-economic beliefs*

The insights discussed in Part 2 have practical implications for how society and communicators can go about correcting misleading and potentially damaging folk-economic beliefs.

Boyer and Petersen (2018a, 2018b) insist that their approach to folk-economic beliefs is non-normative, meaning that their ambition is not to describe which beliefs are right and wrong, and desirable or undesirable. As already mentioned, they proclaim that whether a folk-economic belief is accurate or not is “orthogonal” to the proposed research program (Boyer & Petersen 2018a, p. 3). Therefore, the FEB hypothesis does not include explicit reflections on how to correct inaccurate folk-economic beliefs. However, Boyer and Petersen (2018b) do agree that inaccurate folk-economic beliefs can be potentially damaging for democratic societies.

Several commentators comment on the lack of normative reflections in the FEB hypothesis and offer their own suggestions that could be integrated into the FEB hypothesis. Acerbi and Sacco (2018), for instance, propose the use of argumentation, which, according to proponents of Cultural Attraction Theory (Sperber et al. 2010), can succeed in spreading non-intuitive beliefs and impede the spread of intuitive beliefs, such as folk-economic beliefs, at least under certain conditions. However, as Acerbi and Sacco (2018) themselves note, “argumentation works better in long, face-to-face, interactions, and its strength is inversely proportional to the complexity of the topic” (p. 18). These conditions are not easily satisfied in a media landscape dominated by “soundbites”, “click-baits”, “breaking news”, and increasingly polarized political debates (e.g., Kahan 2016).

Acerbi and Sacco (2018) also propose the use of metaphorical narratives. Narratives provide a short-cut in human cognition to forming mental models about the surrounding world (Oatley 2016). Indeed, Lee and Schwarz (2018) suggest that many folk-economic beliefs in fact may stem from misapplications of familiar metaphors to complex economic and policy issues. For instance, the folk-economic belief that “immigrants steal jobs” can be regarded as a product of a metaphor that portrays a nation as a container of a fixed size: when immigrants occupy an increasing part of the container, someone else (i.e., native citizens) are displaced (Lee & Schwarz 2018). This focus on metaphors and narratives is echoed by Leiser and Shemesh (2018), who also argue for the efficacy of using relevant metaphors to communicate complex economic information. But as Lee and Schwartz' (2018) commentary highlight, such metaphors need to be both familiar and appropriate in order for them not to backfire.

However, Leiser and Shemesh (2018) are themselves rather pessimistic about the ultimate success of completely countering misleading folk-economic beliefs. They argue that some economic information simply cannot be communicated to the public, because it is inaccessible without years of specialized training in economic thinking. This in turn mirrors the conclusion of reviews on other domains

of science communication, such as vaccine hesitancy: no single psychological intervention has been shown to be really powerful in making vaccine-hesitant parents vaccinate their children (e.g., Dubé et al. 2015; Jarrett et al. 2015). As is often the case, more research is needed to learn how to optimally communicate specialized knowledge to laypeople.

However, the FEB hypothesis 2.0 suggests different, although not incompatible, solutions to the ones outlined above. The suggested solutions from this perspective would be to focus on the *context*, or the source, of the information, and not only the *content* of the information. As noted in Part 1, Dual Inheritance Theory distinguishes between content biases (ideas spread because of their content) and context biases (ideas spread because of their source) (Boyd & Richerson 1985). The predictions from the FEB hypothesis 2.0 (and more broadly speaking, Dual Inheritance Theory) are that context biases or social learning strategies, such as conformity bias, prestige bias, and credibility-enhancing displays should be recruited in order to correct misinformation. Cues and narratives about what everybody else believes (conformity) and what trustworthy and objective experts believe (prestige) could be recruited to increase peoples' political and economic literacy. Credibility-enhancing displays could consist of prominent people (e.g., politicians) not just *saying* what they believe, but *acting like* they believe it. Since there is evidence that political parties can shape their partisan supporters' view on political subjects in important ways (Bisgaard & Slothuus 2018), for politicians, this would mean actually doing political work in accordance with the best knowledge of economists and not actively endorsing known folk-economic beliefs with either words or actions.

Of course, such interventions are easier to propose than to implement, since there are counterforces working against correcting certain pieces of misinformation, e.g., from ideologically motivated parties, actors, and organizations (e.g., Kahan 2016). There is also an ethical discussion to be had on the extent to which it is appropriate to manipulate public cues and information to achieve certain agendas, however well-meaning the intention.

Furthermore, these suggestions come down to whether context biases can in fact overcome content biases in political communication. No direct empirical comparison has been conducted on the relative strength of content biases and context biases in economic or political beliefs (Acerbi & Sacco 2018). However, the relative strength of content and context biases has been investigated in a few other domains.

For instance, Acerbi and Tehrani (2017) tested whether content biases or context biases were most important in participants' preferences for internet quotations. They found that quotations were preferred according to their content—not their source.

On the other hand, Willard, Henrich, and Norenzayan (2016) investigated the relative strength between a specific content bias thought to be relevant for religious beliefs and credibility-enhancing displays (a context bias) and found the context bias to be substantially more important in shaping the participants' level of belief in the experimental material.

These results would seem to indicate that the relative strength of the 2 kinds of biases needs to be investigated on a case-by-case basis. There is no reason why similar experimental procedures could not also be employed to study the relative strength of content and context biases in the spread of economic and political information.

## CONCLUSION

In this paper, I have critically discussed a recently proposed evolutionary–cognitive approach to so-called folk-economic beliefs, a domain of beliefs about economics and policy issues that are held by laypeople but often deemed wrong or misleading by professional economists. According to this approach, which I dubbed the “FEB hypothesis”, some beliefs (i.e., folk-economic beliefs) are more prevalent than others, because these beliefs resonate with evolved features of the human mind and are therefore easier to acquire, remember, and transmit to others.

Overall, the conclusion of this paper is that the FEB hypothesis relies on unnecessarily strong and controversial theoretical assumptions (e.g., “massive modularity” and the “Environment of Evolutionary Adaptedness”), and that it overlooks important findings from adjacent fields, but that the FEB hypothesis, following some modifications inspired by Dual Inheritance Theory, can be integrated with robust findings from the rest of the evolutionary, cognitive, and anthropological sciences, as well as standard political psychology.

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