Kristin Andrews and Evan Westra*

If Skill is Normative, Then Norms are Everywhere

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Abstract: Birch sketches out an ingenious account of how the psychology of social norms emerged from individual-level norms of skill. We suggest that these individual-level norms of skill are likely to be much more widespread than Birch suggests, extending deeper into the hominid lineage, across modern great ape species, all the way to distantly related creatures like honeybees. This suggests that there would have been multiple opportunities for social norms to emerge from skill norms in human prehistory.

Keywords: norms, social norms, skill, tool-making, cognition, navigation, animal normativity, chimpanzees, gorillas, honeybees

1 Introduction

Norms —or 'standards of correct or appropriate behavior,' as Birch defines them —permeate the full range of human activity. The apparent ubiquity of norms in our everyday lives raises a number of challenging questions for philosophers and cognitive scientists: how are norms implemented in human psychology? How did we become such normative creatures? Are nonhuman animals also capable of normative thinking? Jonathan Birch provides intriguing answers to these questions through his two-part skill hypothesis:

i. In modern humans, complex motor skills and craft skills, such as toolmaking, are guided by internally represented norms of correct performance.
ii. The capacity to internally represent action-guiding norms of correct performance evolved as a solution to the distinctive problems of standardizing, learning and teaching complex motor skills and craft skills, especially skills related to toolmaking (Birch 2021b, 192).

Kristin Andrews, Department of Philosophy, York University, Toronto, Canada, e-mail: andrews@yorku.ca
***Corresponding author: Evan Westra,** Department of Philosophy, York University, Toronto, Canada, email: ewestra@yorku.ca

Part (i) of the skill hypothesis is very plausible: Birch makes a compelling case for thinking of skilled action as a form of norm-guided cognition. Craft skill is one among many areas where we get things right or wrong, or perform better or worse, depending on how well the execution accords with the maker's plans. Even when crafters 'make it up as they go', the achievements are the result of the maker's own standards, and are further evaluated by observers. It's for that reason that the popular online store Etsy, which sells mainly handmade items directly from makers, is sometimes pejoratively referred to as Regretsy, after the snarky blog with the tagline 'Where DIY meets WTF'.

The skill hypothesis becomes much more controversial in part (ii), where Birch suggests that the phylogenetic emergence of these motor and craft skills also marks the origins of *all* normative thinking. As he puts it, "the evolution of skilled action and the evolution of normative cognition are entwined: rather than thinking of them as two separate stories, we should try to understand the evolution of norm-guided skill" (Birch 2021b, 192). Birch paints us a picture of how the need to standardize skilled practices across individuals laid the cognitive foundations for all social forms of norm-guided cognition that we see in modern humans. An important (though somewhat hedged) implication of this claim, according to Birch, is that norm-guided cognition is quite likely unique to the hominin lineage, since the requisite forms of skilled action capacities do not appear to be present in other species.

We think that there is merit in the idea that complex motor and craft skills constitute a form of norm-guided cognition; much of the research on social norms focuses on the social nature of norms, and Birch's suggestion that we can understand social norms by looking at individual norms provides a fresh way of interpreting the empirical evidence. However, we will argue that norm-guided skill is actually far more prevalent in hominin evolutionary history and across the contemporary animal kingdom than Birch assumes.

In the following section, we note some of the positive, innovative features of Birch's individualistic approach to norms. Next, we make the case that this kind of individualistic normativity was likely present further back in the hominin lineage than Birch contends, that it is also present in modern great apes, and that it might even be present in honeybees. Then we argue that the widespread nature of skill norms in animals implies the existence of many plausible paths from individual normativity to social normativity. We conclude by advocating for a pluralistic approach to understanding norm psychology, given the range of skill types found in cognitive creatures.

2 Individualism in the Skill-based Account of Normative Cognition

As Birch acknowledges, origin stories are notoriously difficult. Nonetheless, we agree that there is value in origin stories, because they show us the roads that humans might have taken on their voyage from there to here. Such accounts have a particular imaginative power in that they show us how some of our great achievements, from behavioral forms like Balinese dance to social structures like universities, may be supported at their bases by relatively simple cognitive capacities. For that reason, we begin by pointing out a feature of Birch's account that we take to be particularly useful to illuminate the issues at hand: its emphasis on the individual.

Central to the skill hypothesis is the idea that norms first emerged as individual-level constraints on one's own behavior and only later began to apply to interactions between individuals by constraining others' behaviors. The skill hypothesis uproots familiar stories in which norms first arose in groups and group practices, such as cooperation and joint hunting. Such accounts often suffer from a chicken-and-egg problem: norms are posited as a prerequisite for complex, cooperative forms of sociality, and yet also seem to presuppose that these forms of sociality were already in place. Locating the emergence of norm-guided cognition in individual-level processes that only later become 'socialized' suggests one way that this trap might be avoided.

Birch's shift of attention towards individual-level norms we use to regulate our *own* behavior has a number of appealing features, which we'll now highlight. First, norms that apply to oneself have a long history in philosophy, tracing back at least 2500 years to the Buddhist norms of the Middle Way and similar Aristotelian norms of temperance. The focus on developing practical wisdom in ancient Greek philosophy stressed the idea that finding a balance requires expertise and is a type of skill (Annas 2011). These skills also require monitoring one's actions and seeing how well they fit the model of the virtuous actor that the agent is trying to realize. Classical Indian philosophy described ideal agents we could attempt to live up to, as in Patanjali's discussion of Isvara, who is later viewed as a god (Ranganathan 2008). Norms of self-governance and self-regulation likewise have a long history, and enjoy much currency in today's discussions of ethics and moral psychology (e.g. Pinker 2012; Bloom 2017; McGeer/Petit 2002; Ismael 2010; Kelly forthcoming; Korsgaard 1996; Railton 2006).

Another feature of Birch's individualistic approach to norms is that it is refreshingly concrete. Social norms are often construed in highly abstract terms as *implicit rules* governing how people *ought* to behave, an invisible *grammar of society* that agents must infer in order to successfully navigate the social world

(Sripada/Stich 2007; Bicchieri 2006). This gives the impression that norm-guided cognition involves a capacity for sophisticated, abstract ways of thinking. But the kind of normativity seen in skilled craft performance is transparent, embodied and concrete in a way many social norms are not. Craft norms are transparent because the execution of the craft is visible to the crafter (as well as to observers or learners). It is embodied because it involves physical manipulation of objects and the feedback is proprioceptive and tactile. In contrast, understanding social norms governing domains like kinship, group membership, obligations, and taboos requires us to represent aspects of the world that cannot be seen or felt. Take prohibitions against cousin marriage: I can't see that you are my cousin, and it could take a long time for an external observer to even notice that there are kinship norms constraining behavior. Concrete norms should be easier to acquire because of these properties, and require fewer cognitive resources. Birch seems to notice this benefit of his account when he suggests that the physical tool served as an external model that could "provide a benchmark against which the agent's internal model of correct skill execution is calibrated" (Birch 2021a, 14), though he does not emphasize this as a virtue.

Finally, the individual focus shows how norm-guided cognition might emerge in the absence of complex forms of social cognition, such as a theory of mind or shared intentionality, features common in many accounts of normative cognition. Birch's account avoids social cognition altogether, since the crafter *on their own* generates the feeling of wrongness when a skilled act goes wrong; when the crafter fails to execute an expected act, there results a recognition of the mismatch and a feeling of wrongness; as Birch rightly points out, "[s]kill creates internal pressure to conform to an internalized standard of correct performance" (Birch 2021a, 7). When that intended knit stich is a purl stich, the error jumps out and irks the knitter, even if no one else ever sees it. Since coming to recognize one's own act as correct or incorrect doesn't require engagement with another agent, it is presumably a capacity that could exist for an individual who lacks social partners of any sort, much less a sophisticated capacity for understanding others. This makes for an account that is, at least in this respect, cognitively less demanding than some stories about the emergence of norms, such as those that require shared intentionality (e.g. along the lines of a norm story that might be extracted from Tomasello's 2016 account of the evolution of morality).

In short, grounding normative cognition in self-regulation rather than social regulation goes a long way towards demystifying the psychology of norms. From Birch's individualistic standpoint, it becomes much easier to grasp how normative cognition ever evolved in the first place. But it also makes it easier to see how normative cognition might manifest itself in non-linguistic creatures.

3 Norm-guided Skill

We now turn to the notion of skill itself, which Birch grounds in the idea of 'model-based control'. Briefly, the idea of model-based cognitive control is that the causal structure of the phenomenon type is represented by the agent, which allows them to anticipate the results of precise motor interventions in the specific situation. Knowledge of this causal structure allows an agent to anticipate and avoid problems specific to the case, to anticipate what a successful intervention looks or feels like, and to recognize unsuccessful interventions when they occur. When consciousness, and in particular a feeling of wrongness, is added to the picture of model-based cognitive control, we enter the realm of the normative. Agents feel affective pressure when there is a mismatch between the expected outcome of an intervention and the actual results, leading them to respond to make corrections. Importantly for the account, the cognitive control model "represents a *norm of correct performance* in the pattern of mismatches that trigger affective pressure to make an adjustment" (Birch 2021a, 8).

Model-based cognitive control supports the precise movements needed for complex craft skills by representing the causal structure of the type of situation, whether it be mountain-biking, Acheulean handaxe construction, or complex knitting. We agree that model-based cognitive control can instantiate a kind of normative thought. However, we think that there are two problems with skill hypothesis as an explanation for why humans are so robustly normative. First, we think that Birch's account underestimates how early toolmaking–and hence, norm-guided skill—arose in the hominin lineage. Second, we suggest that the kind of model-based control that Birch thinks underpins uniquely human forms of normativity actually reflects basic functional characteristics of individual cognition that are present even in completely unrelated animal species.

3.1 Norm-guided skill may be quite ancient

Our first point of concern has to do with the emergence of model-based cognitive control. As a description of the cognitive capacities that a skilled crafter has today, Birch's account has merit. But animal cognition researchers know how difficult it is to uncover cognitive mechanisms by observing living wild animals, and it is even more difficult to determine the mechanisms that supported the behaviors of prehistoric hominins. Birch does draw attention to this worry in his discussion of the debate about whether Oldowan tool production is complex enough to require cognitive control. However, stone tools were most likely *not* the first complex tools made by hominids, and were probably preceded by the manufacture of tools from clay and plant matter that did not survive the ages. Wands and brooms and other tools constructed from wood and grasses don't leave traces in the archeological record, and yet such tools are commonly used by modern chimpanzees, including tool sets made of vegetation that are thought by some to demonstrate cumulative culture (Sanz/Morgan 2007; 2013) as well as wooden spears used for hunting (Pruetz/Bertolani 2007).

The field of primate archeology takes the position that data from current animal material behavior and a broad examination of the primate fossil record will provide a better understanding of the origins of human technology than attention to hominin stone tools alone. In their manifesto of primate archeology, a group of scientists note that modern chimpanzees, orangutan, gorillas, and capuchin monkeys use plant material in much of their material culture, and that the first traces of wooden artefacts in the hominin lineage only trace back 800,000 years. Such observations suggest, contrary to Birch's claim, that the origins of craft skill cannot be so clearly traced in the archaeological record, because "poor preservation of organic tools in the archeological record means a significant amount of information about the origins of human technology has been lost" (Haslam et al. 2009, 339).

There is also reason to suspect that some of our more distant ancestors possessed many of the morphological features required for complex tool use. To be clear, it is true that chimpanzees, our closest living relatives, have somewhat limited manual dexterity compared to modern humans, with stiff wrists, short thumbs, and elongated fingers and palms, which make them powerful climbers and knuckle-walkers but less agile tool users. However, there is considerable diversity in the evolution of primate hand morphologies, and this limited manual dexterity in modern chimps is likely to reflect a more recent set of evolutionary changes that occurred *after* the split with the last common ancestor, as suspension became more important in that lineage (Almécija et al. 2015; Prang et al. 2021). For example, paleo-anthropological evidence suggests that *Ardipithecus ramidus*—an early hominid that lived 4.4 million years ago—possessed hand morphology much more similar to that of modern humans than other modern great apes (Lovejoy et al. 2009). This suggests that the last common ancestor might have been a more dextrous tool user than modern chimpanzees.

Such considerations put some pressure on the claim that the emergence of Acheulean tools coincided with the advent of model-based control. Even very ancient members of the hominin line likely possessed the manual dexterity for tool use; if they did make tools, they probably used organic materials that are not preserved in the archeological record. Taken together, this suggests that for all we know, norm-guided skills might be quite old indeed.

3.2 Norm-guided skills are probably present in modern apes

Contrary to Birch, we also contend that there is ample evidence for the existence of norm-guided skills in modern great apes. Birch considers that possibility by looking at chimpanzee ant dipping, and dismisses it as not requiring "flexibility in the face of *anticipated*, as opposed to observed, situational demands. Sensitivity to regular, recurring features of situations, such as the species of prey ant, may be achieved without a cognitive control model…" (2020a, 12). However, this account underrates the sophistication of chimpanzee ant dipping behaviors. Young chimpanzees take years to learn how to dip for ants, risking painful bites in the process. Humle characterizes the stages in development of ant dipping behavior in young chimpanzees at Bossou, from approximately 3 to 11 years old:

> (i) Manipulatory play and (ii) tool manufacture in infants, (iii) motor skill of tool use in infants and juveniles, (iv) knowledge of the quality of the tool and efficiency of its use in both juveniles and adolescents, and (v) refinement of motor skill in response to the antipredator behavior of the ants and increased instance of dipping in similar contexts chosen by adults in adolescents. Indeed, both juveniles and adolescents practice and perform ant dipping under both ant conditions. However, juveniles tend to dip in contexts that present less rick. Adolescents dip both at the nest and on migrating or foraging ants, but while dipping they exhibit a more-cautious approach by positioning themselves more often above ground. Adolescents are thus able to increase their understanding of the relationship between tool length, the effectiveness and suitability of a technique, the biting risk posed by the ants, and the overall efficiency of their prey procurement. (Humle 2006, 467-468)

The expert behavior achieved during the last stage of development is described in an encyclopedia of animal tool behavior (Shumaker et al. 2011) as follows:

> After locating a nest, a chimpanzee typically pulled and scraped out handfuls of soil, which stimulated massed active aggression by the soldiers. The ape then selected and-or modified a branch and Inserted it into the nest. The sticks used to dip for ants averaged 1 centimeter in diameter and 66 centimeters in length. They were straight, without side branches … These tools must be long enough to prevent ants from quickly swarming up the stick to bite the user, but they cannot be so long that their use becomes awkward (Goodall 1986) …. Ant-dipping chimpanzees frequently stood bipedally as far from the nest or trail as possible, rushed to the nest, Insert the tool, and then withdrew it and themselves to eat the ants. Alternatively, they elevated themselves on nearby tree trunks, shrubs, vines, or branches. Each measure provided some protection against the painful bites of the aroused ants … [Researchers] saw chimpanzees Reach into the ant processions with sticks, even though the insects were completely exposed. Ant dipping thus includes not only acquiring ants from inaccessible subterranean nests by Inserting and probing, but also Reaching for them from a distance to minimize exposure to their painful bites. [Researchers] reported that the tools used for ant dipping were the longest tools in the Tool Kit of the Nigerian chimpanzees … and [others] reported that the tools used for ant dipping by Ngotto chimpanzees were longer than those used for honey dipping … there are two observed methods for consuming them, known as

> the ’direct mouthing’ and ’pull-through’ techniques … direct mouthing … involves bringing the tool directly to the mouth and either sweeping the tool through the lips or nibbling off the ants. The ’pull through’ … method involves holding the tool with one hand, dipping it into the nest hole until the tool swarms with ants, and then swiftly drawing the tool through the other hand to gather the ants into a bundle … the pull-though wand was longer (50-100 centimeters) than the wand used for direct mouthing (25 to 50 centimeters) … ant-dipping chimpanzees demonstrated behavioral plasticity by minimizing their risk of being bitten as well as by increasing their ant-dipping efficiency. (Shumaker et al. 2011, 166-167)

In other words, it takes subadults years of practice to acquire the skill of ant dipping. What chimpanzees are learning all this time is how to make accurate predictions in novel complex situations in which they need to exploit information from multiple sources to successfully dip at this spot with this tool. When approaching a new nest, a skilled ant dipper must integrate information from multiple sources to gauge how to successfully handle it, such as where to stand or whether to hang suspended, or how long the wand should be for this nest. While there are regular, recurring features in all three of the aforementioned situations that might be amenable to a simple model-free explanation, each ant dipping episode also involves tracking a number of variables and displaying a range of degrees of responsiveness and a need to adjust when predictions go awry. Like the mountain biker, the expert ant-dipper has to take what was learned in past instances that required precise behavioral interventions and apply it to this new situation, engaging in an analog modulation of each variable. While these observational descriptions do not establish the cognitive mechanisms underlying ant dipping, they do provide suggestive evidence that these behaviors are supported by the kind of complex representations and predictions indicative of model-based cognitive control, and that Birch’s simple, model-free description of ant-dipping may be incomplete.

Nettle processing in gorillas may be another example of a manual behavior in great apes that requires complex forms of cognitive control. Nettle processing is learned, risky to young gorillas who are subject to painful nettle stings, and requires precise manual manipulation and program-level skill (Byrne et al. 2011) (See Figure 1).

Fig. 1

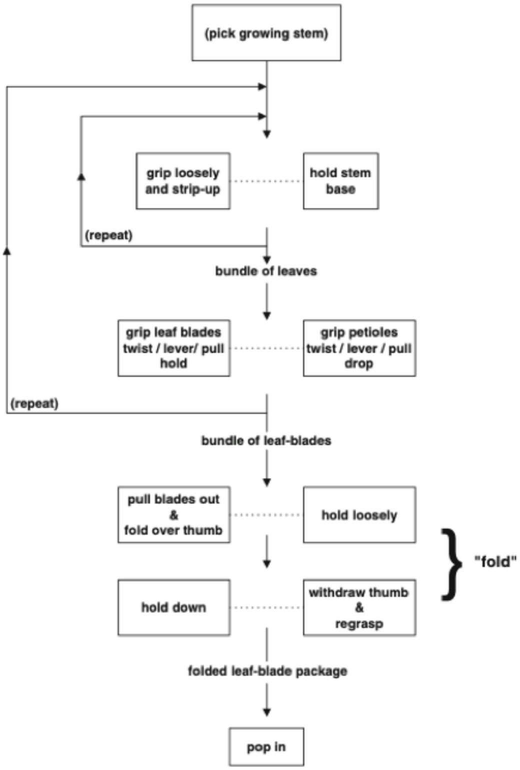

Fig. 1 The Karisoke technique of mountain gorillas for processing nettles. The technique involves six stages (Byrne 1999b, 2001; Byrne and Byrne 1993): (1) pulling a nettle stem into range, holding the tip of the stem where stings of the young leaves are not yet active; (2) stripping up the stem with cupped hand, supporting the stem if necessary with the other hand, thus detaching the leaves; (3) detaching the leaf petioles, by levering or twisting them off with the other hand; (4) pulling the leaf blades, loosely held in the hand, slightly out, and then folding them over the thumb, using a precision grip of the other hand; (5) pulling out the thumb and using it to regrasp the folded nettle parcel; (6) placing the folded leaf parcel carefully through the open mouth, generally avoiding contact with the lips. A gorilla may repeat part of this program, thus accumulating larger bundles of leaves for subsequent processing, by treating sections of the whole program as subroutines; in addition, inedible debris if any is present can be removed at several points, most commonly before leaf folding. In the flowchart, the sequence of actions starts at the top and moves down: rectangular boxes show action elements, described by the words in them; optional processes are given in brackets. Definitions of all elements are given in ESM_3. Dotted lines indicate bilateral coordination between separate movements of the two hands; branched lines represent alternative methods for achieving the same end; loops indicate where a process may repeat or iterate until an appropriate size of handful is reached

From Byrne et al. (2011).

This capacity looks to us to be a good candidate for a norm-guided skill, and avoids the social variable inherent in ant dipping, where two species are interacting (For much the same reason, monkey hunting, which is another hard-won skill some chimpanzees develop, and which clearly involves predictions and subtle responses to changes in environment, may be a case, though not an ideal one, given the social nature of the interactions between predator and prey.)

Birch may object that the chimpanzee ant-dipping and the gorilla nettle processing behaviors are not precise enough to indicate model-based control, and that they can be understood as discrete techniques that are grounded in situational demands. But in these cases, like in his example of the mountain biker, there is the opportunity for a pattern of mismatches that could feel wrong; at each stage of the gorilla nettle processing the actions are described in terms of degree, such as 'grip loosely' or 'twist'. The skilled nettle processor must anticipate how twisting this much vs. that much will impact the ability to go onto the next step, just as too much pressure on the brake will feel wrong to the elite biker.

If Birch remains skeptical that the ant-dipping and nettle processing behaviors offer sufficient evidence of model-based skill in apes, we invite him to explain the *degree* of precision he takes to be required for skill-guided normative cognition, and what sorts of behaviors a chimpanzee ant-dipper or gorilla nettle-processor would have to produce to provide evidence akin to what we see in mountain biking.

4 Generic Norm-guided Skill and Cognition

So much for model-based control in hominoids. As Birch himself acknowledges, if it turns out that the capacity for norm-guided skill emerged earlier in the hominin lineage than he has suggested, this only pushes back the timeline of his hypothesis without altering it significantly. However, we suggest that the extent of norm-guided skill might be even wider still, in a way that not only alters the timing of the skill hypothesis, but suggests that there might be multiple simultaneous or overlapping paths from skill to norms.

One striking feature of Birch's account of model-based control is that it seems to describe abilities that are present in some form or another in *any* cognitive creature capable of rational decision-making. Consider that cognitive control allows one to "make trials and errors in one's head rather than in overt behavior" which is one definition Millikan gives of rationality (Millikan 2006, 117). Or compare the power of cognitive control models to Dennett's Popperian creatures, who "extract information about the cruel world and keep it handy, so they can use it to pretest *hypothetical* behaviors offline, letting 'their hypotheses die in their stead' as the philosopher of science Karl Popper once put it" (Dennett 2017, 98).

Cognitive control models—which were introduced as an alternative to 'mindless' accounts of skill—reflect familiar properties of cognition. Cognitive processes, as compared to associative processes, tend to demonstrate a cluster of properties: context sensitivity, speed, generalizability, abstraction, multi-model integration, inhibition, monotonic integration that supports timing and sequence-learning capacities, and expectation generating and monitoring (Buckner 2015). All cognitive beings appear to have the capacities relevant for normativity on the skill view, since they anticipate obstacles and problems and predict the flow of sensory feedback indicating successful execution. Cognition, plus a type of sentience that permits feelings of wrongness in the face of mismatches, should together be sufficient for having a normative psychology.

Animal cognition researchers, who are typically held to higher standards of evidence than human cognition researchers, have found evidence of cognition in a wide range of species who have to survive a complex and ever-changing world. Consider the role of map-like representations in honeybee navigation. To examine whether bees have cognitive maps of their environments, Menzel and colleagues (2005) captured bees as they were about to return to the hive after feeding from a known feeder, and then released them in a different direction from the hive. At first the bees flew in the direction they would have flown from the feeder, but after a few hundred meters they switched to a circuitous searching path that allowed them to recognise enough features of the landscape to determine the correct vector leading to the hive, at which point the bees again took a straight path, this time on the correct route. We see that the bees regulate their behavior once they notice, literally on-the-fly, that they are heading the wrong way. The regulation comes after a period of searching, which is an attempt to find the correct vector.

Navigation via mental-maps looks to be a norm-guided skill, though it does not have the precision we find in human skilled craft-making. We suggest that the kind of cognitive processes that Birch has in mind have functional equivalents—call them 'generic skills'—that are present across a highly diverse, phylogenetically distinct species, including honeybees. The great achievement of cognitive beings—those who learn and form representations to guide their behavior—is that they can recognize patterns of mismatches between their representation and states of affairs, and modify their actions accordingly. That is, they can generalize to new situations based on past experience, predicting problems that are specific to this situation, and avoiding them.

5 Many Paths From Norm-guided Skill to Social Normativity

Given that generic skills of the sort honeybees have can be sufficient for normativity at the individual level, the range of possible paths from individual norms to social norms dramatically increases. It is not that hard to imagine how social norms might even emerge from honeybee generic skills. Honeybees use their cognitive maps to recognize mismatches between anticipated landmarks and the landmarks on the map, and then use that information to regulate their behavior by switching from a vector pattern to a search pattern. If we also permit honeybees some degree of conscious experience, which, while remaining an open question (Birch 2020), is a scientifically respectable premise (Andrews 2020b), then these mismatches may well create a feeling of wrongness. At this point, the bees would have normative cognition, but only at an individual level. Now suppose some evolutionary pressures make it such that worker bees have to travel together in groups of 2-7 when they seek food or new hive locations. This presents ample opportunities for disagreements to arise, when one bee flies to a different location. Motivation to resolve the conflict makes the individual norms social, and the behavior to be modified is another's, rather than one's own. How this plays out would be an interesting act of speculative fiction—Adrian Tchaikovsky gives us such a story for portia spiders in his novel *Children of Time*—but it could involve group policing the outlier, shepherding her back toward the hive. Policing takes energy, and so it is a metabolic cost to the policing bees to make the effort to herd the outlier home.

This may sound like a far-out story to tell about bees, but there does currently exist evidence that honeybees correct their conspecifics. The well-known waggle dance is how scout bees indicate the location of food or possible new hive sites. When selecting a good location for the next hive, scout bees will explore the area and come back with a number of alternative possibilities. Both the number of bees dancing for a location and the vigor with which they do so appears to impact the final decision. But there is another factor as well–the stop signal. Stop signals are given to dancing bees by another worker who butts into the dancer and vibrates. The dancer then stops dancing and leaves the dance floor. The signal is interpreted as offering negative reinforcement, a 'wrong' signal, and is typically seen when a dancer is advertising a site that is dangerous or overcrowded (see biologist Thomas Seeley's 2010 book *Honeybee Democracy* for a delightful review of this literature). In the case of evaluating food sources or nest sites and advertising those they take to be good, honeybees engage in regulative behaviors directed at both themselves and others, behaviors of the sort that show one way in which norms move from the individual to the social.

We aren't claiming that bees do indeed have socially normative cognition. Rather the point is to show how generic skills could support normative cognition not just earlier in the primate lineage, but as alongside rationality, which we take to be widely found in cognitive animal species. If we have individual norms in a range of species engaged in a multitude of skilled action types, the particular version of the skill hypothesis Birch offers looks to be one of many ways in which social normativity could arise from individual normativity.

The observation that a plethora of individual norms implies a plethora of possible paths to social norms highlights the chicken-and-egg worry Birch raises and answers. Recall, this worry is that social norms of some sort would have had to exist prior to the development of the technological standardization practices proposed to be the first social norms in hominins. Birch responds that simple forms of "proto-teaching" and coordinated toolmaking could emerge without full-blown social norms, thanks to "[p]rosocial dispositions towards campmates and kin" (Birch 2021a, 17). However, if there are many domains of skilled action that could lead to social norms, we worry that norms that support the standardization of technology would not be among the first. Rather, given the simplicity and ubiquity of norms, norms to support social groups that can develop sophisticated technological practices would precede standardization and teaching norms. Consider norms supporting communication, leadership, policing, mothering/alloparenting, relationship maintenance, and cooperation. Prosocial dispositions can get us only so far to explain how group behavior of social and cognitively flexible animals can be stabilized when there are also individual interests at play, or if there is inclination for cheating or deception.

Further support of the multiple paths position comes from recent arguments that there might be social normativity in modern nonhuman primates (Andrews 2020a; 2020b; Danón 2020; Fitzpatrick 2020; van Schaik/Burkart 2019). While Birch introduces the idea that other species might have normative cognition, he dismisses the possibility on the grounds that the conformity and cultural differences we see in chimpanzees isn't sufficient evidence for norms. We agree that culture doesn't entail normativity, but note that the evidence for animal norms is stronger than conformity; for example, there is suggestive evidence that animals may incur costs to conform, and that they protest violations of candidate norms (see Andrews 2020 for a discussion).

6 Conclusion: A Plea for Pluralism

We have agreed with Birch that model-based control is plausibly understood as a form of normativity. However, we have also argued that such skills are likely to be found in a vast array of animal species. If skill constitutes a kind of normative thinking, then normative thinking can be found anywhere there are cognitive agents. But now we add an important caveat: we do not think there is a single story to be told about the psychology of norms or its evolution (Westra/Andrews, in preparation). Even if apes and ancient hominins and honeybees possess a variety of normative cognition, there are probably many other varieties of norm whose scope and spread are yet unknown.

As Birch notes at the beginning of his paper, human activities are guided by a vast array of norms or 'standards of correct or appropriate behavior.' We agree. Modern humans abide by norms governing the ways we speak and move, cover and modify our bodies, make moral decisions, play games, interact in different situations—nearly every aspect of our lives. Some of these norms are explicit and linguistically encoded, while others are implicit and inarticulable; still others seem to emerge out of the behavior of large groups of people, or to be limited to a single dyad. That there are norms is culturally universal, with norms appearing in societies as diverse as hunter-gatherers, pastoralists, small agrarian societies, and in western, educated, industrialized, rich, and developed (WEIRD) populations. Why would we assume that such a heterogeneous array of activities is supported by a single kind of cognitive process?

A better, more modest starting point for researchers pursuing this sort of project would be to assume that the psychology of norms is pluralistic, supported by a wide array of motivational and cognitive processes. Different norms might have different psychological explanations, and different individuals might bring to bear different psychological abilities when conforming to the same norm. Researchers would do well to delimit their explanada to types of norms, or perhaps even to particular norms emerging in specific contexts. More general claims risk underrating the sheer diversity of the phenomenon in question.

This points to a final limitation of Birch's account. Though he has provided a very reasonable narrative for how norms of toolmaking first evolved in the human lineage, he has also fallen into the trap of assuming that all normative cognition will share a common evolutionary history and rely on a single set of mechanisms. But if the cognitive element of being guided by norms simply requires the generic ability to appreciate 'standards of correct or appropriate behavior,' as Birch claims, then we should be open to the possibility that normative cognition can be multiply realized. If Birch is right and normative cognition coevolved with skilled action, then the cognitive requirements for norms are plural, and everywhere, because skill is plural, and everywhere. The invitation to focus attention on the coevolution of skilled cognition and normative cognition tempts us to also see norms in all sentient cognitive agents, entangled with skills of a plurality of sorts.

References

Almécija, S./J. B. Smaers/W. L. Jungers (2015), The Evolution of Human and Ape Hand Proportions, in: *Nature Communications* 6(1), 7717

Annas, J. (2011), *Intelligent Virtue*, Oxford

Andrews, K. (2020a), Naïve Normativity: The Social Foundation of Moral Cognition, in: *Journal of the American Philosophical Association* 6(1), 36-56

— (2020b), *How to Study Animal Minds*. *Elements in the Philosophy of Biology*, Cambridge

Bichieri, C. (2006), *The Grammar of Society: The Nature and Dynamics of Social Norms*, Cambridge

Birch, J. (2021a), Toolmaking and the Origin of Normative Cognition, in: *Biology and Philosophy* 36(1), 1-26

— (2021b), The Skillful Origins of Human Normative Cognition, in: *Analyse & Kritik* 43(1), 191-202

— (2020), The Search for Invertebrate Consciousness, in: *Noûs* 1–21

Bloom, P. (2017), *Against Empathy: The Case for Rational Compassion,* New York

Buckner, C. (2015), A Property Cluster Theory of Cognition, in: *Philosophical Psychology* 28(3), 307–336

Byrne, R. W./C. Hobaiter/M. Klailova (2011), Local Traditions in Gorilla Manual Skill: Evidence for Observational Learning of Behavioral Organization, in: *Animal Cognition* 14, 683-693

Danón, L. (2020), Animal Normativity, in: *Phenomenology and Mind* 17, 176-187

Dennet, D. C. (2017), *From Bacteria to Bach and Back: The Evolution of Minds*, New York

Fitzpatrick, S. (2020), Chimpanzee Normativity: Evidence and Objections, in: *Biology & Philosophy* 35, 45

Ismael, J. T. (2010), Self-Organization and Self-Governance, in: *Philosophy of the Social Sciences* 41(3), 327-351

Haslam, M./R. Hernandez-Aguilar/V. Ling/S. Carvalho/I. de la Torre/A. DeStefano/A. Du/ B. Hardy/ J. Harris/L. Marchant/T. Matsuzawa/W. McGrew/J. Mercader/R. Mora/M. Petraglia/H. Roche/ E. Visalberghi/R. Warren (2009), Primate Archaeology, in: *Nature*, 460(7253), 339-344

Humle, T./T. Matsuzawa (2009), Laterality in Hand Use Across Four Tool-use Behaviors Among the Wild Chimpanzees of Bossou, Guinea, West Africa, in: *American Journal of Primatology* 71(1), 40-48

Kelly, D. (forthcoming), Two Ways to Adopt a Norm: The (Moral?) Psychology of Internalization and Avowal, in: M. Vargas/J. Doris (eds.), *The Oxford Handbook of Moral Psychology*, Oxford

Korsgaard, C. (1996), *The Sources of Normativity*, Cambridge

Lovejoy, C. O./W. W. Simpson/T. D. White/B. Asfaw/G. Suwa (2009), Careful Climbing in the Miocene: The Forelimbs of *Ardipithecus ramidus* and Humans are Primitive, in: *Science,* 326(5949), 70-70e8

Menzel, R./U. Greggers/A. Smith/S. Berger/R. Brandt/S. Brunke/G. Bundrock/S. Hülse/T. Plümpe/ F. Schaupp/E. Schüttler/S. Stach/J. Stindt/N. Stollhoff/S. Watzl (2005), Honey Bees Navigate According to a Map-like Spatial Memory, in: *Proc Natl Acad Sci USA,* 102(8), 3040-3045

McGeer, V./P. Pettit (2002), The Self-regulating Mind, in: *Language & Communication* 22(3), 281-299

Millikan, R. (2006), Styles of Rationality, in: M. Nudds/S. Hurley (eds.), *Rational Animals,* Oxford, 117-126

Pinker, S. (2011), *The Better Angels of Our Nature: Why Violence has Declined*, New York

Prang, T. C./K. Ramirez/M. Grabowski/S. A. Williams (2021), *Ardipithecus* Hand Provides Evidence that Humans and Chimpanzees Evolve from an Ancestor With Suspensory Adaptations, in: *Science Advances* 7(9), eabf2474

Pruetz, J. D./P. Bertolani (2007), Savanna Chimpanzees, pan troglodytes verus, Hunt with Tools, in: *Current Biology* 17(5), 412-417

Railton, P. (2006), Normative Guidance, in: R. Shafer-Landau (ed.), *Oxford Studies in Metaethics, Vol. 1*, Oxford, 3-34

Ranganathan, S. (2008), *Patanjali's Yoga Sutra*, London

Sanz, C. M./D. B. Morgan (2007), Chimpanzee Tool Technology in the Goualougo Triangle, Republic of Congo, in: Journal of Human Evolution 52(4), 420-433

— /— (2013), Ecological and Social Correlates of Chimpanzee Tool Use, in: *Philosophical Transactions of the Royal Society of London. Series B, Biological Science,* 368(1630), 1-14

Shumaker, R. W./K. R. Walkup/B. B. Beck (2011), *Animal Tool Behavior: The Use and Manufacture of Tools by Animals*, Baltimore

Sripada, C. S./S. Stich (2006), A Framework for the Psychology of Norms, in: P. Carruthers/S. Laurence/S. Stich (eds.), *Evolution and Cognition. The Innate Mind,* Vol. 2., *Culture and Cognition*, Oxford, 280-301

Tomasello, M. (2016), *A Natural History of Human Morality*, Cambridge/MA

Westra, E./K. Andrews (in prep), Normative Cognition is Pluralistic

van Schaik, C./J. Burkart (2019), The Evolution of Human Normativity: The Role of Prosociality and Reputation Management, in: N.Roughley/K. Bayertz (eds.), *The Normative Animal?: On the Anthropological Significance of Social, Moral, and Linguistic Norms*, Oxford, 139-153