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Open Peer Commentary

Tinkering with reflection and normativity: An action-based model for the emergence of complex social systems

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Abstract

The social tinkering account explains cultural complexity without design. The account does not address ontological issues and seems to take social normativity for granted. In turn, the mechanisms they suggest remain incomplete in explaining the emergent and normative nature of sociality. The current commentary proposes complementary explanations from an action-based approach to address these gaps.

The target article proposes social tinkering as a process of directed innovation to address local challenges, which, through spontaneous order, yields complex cultural systems. We broadly agree that the accumulation of innovations can contribute to the emergence of more complex social systems. Nonetheless, we argue that (1) the recombination and repurposing of precedents need to be modeled through an action-based approach in order to allow for the qualitatively novel innovations; and that, (2) spontaneous order is not sufficient to account for the emergence of social normativity and normatively binding social systems (e.g., cultural institutions).

The target article argues that spontaneous order can account for the emergence of complex social systems, driven by the accumulation of innovations that come to constitute norms, conventions, and institutional rules. We argue that even though the target article acknowledges the role of normativity in complex social systems, spontaneous order through accumulation does not account for its emergence. The issue is that the spontaneous order does not involve normativity – it may explain regularities but not normativities, including those within (psycho-)social reality (Bickhard,

2019). Thus, the blind-spot of the tinkering account seems to be the normative ontology of the psycho-social – why do individuals feel compelled to follow social norms? The account seems to presuppose rather than explain the (psycho-)social normativity at play. That is, the ability of individuals to innovate while facing novel challenges, by using and recombining extant psycho-social structures, is subject to two different interpretations concerning the ontology of the minds driving the process: a foundationalist-combinatorial ontology and an action-based emergent ontology. To the extent that the target article is agnostic about such ontological issues, it may run into some in-principle problems.

The foundationalist-combinatorial ontology has been argued to be unable to account for the emergence of qualitatively novel psycho-social phenomena and, in turn, normative social reality (Allen & Bickhard, 2013, 2022). All “novel” ways of interacting and representing (e.g., those in social situations and culture) would be a product of assembling and rearranging already existing components. Pure recombination cannot alter the functional organization internal to precedents and, hence, innovations are constrained by the properties of the predefined combinatorial spaces. Thus, for the foundationalist interpretation, novelties cannot be qualitatively different from precedents and norms cannot be more than regularities (Campbell, 2015; Overton, 2013; Witherington, 2014).

In contrast, an action-based ontology of the mind and social reality should be used to account for the emergence of social normativity (for such an account, see Mirski et al., 2026). Such an ontology offers explicit modeling of how qualitative novelty (i.e., emergence) is possible through interactively knowing the environment (Bickhard, 2024; Carpendale & Lewis, 2006; Di Paolo et al., 2014). Such emergence increases in complexity through internal reflection on repurposing and recombination as interactive knowing (Allen et al., 2024; Campbell & Bickhard, 1986). This model of reflection is also relevant to draw a contrast with the target article in terms of its role for language-mediated culture complexity (i.e., stages 5 & 6). Although language may function to facilitate reflection on explicit representations of social rules, we would argue that individual-level reflection must develop before *any* explicit representing is possible (Allen & Bickhard, 2018). In particular, understanding language as a symbolic system requires reflection from the child and such a system could not evolve prior to the emergence of reflection in phylogeny (Campbell & Bickhard, 1986).

Our second concern is that spontaneous order is not sufficient to account for the emergence of social normativity and normatively binding systems at the societal level. The target article accounts for social normativity through mechanisms such as punishment and ostracism; yet, these mechanisms presuppose the normative organization they are meant to explain. This presupposition becomes most visible at the level of complex social systems. Institutions like political systems do not emerge from the spontaneous order of individual-level tinkering but reproduce the normative conditions under which further tinkering is possible and legitimate. That is, the spontaneous order account may describe how normativities emerge but does not explain why they are binding (Bickhard, 1980, 2019, 2024). Since the psychological and the social are intrinsically related, a consistent action-based ontology is required, one that involves self-maintaining dynamics at the societal and individual levels.

From the action-based interactivist perspective that we endorse (Bickhard, 2024), social normativity emerges through institutionalization. Institutionalization is a process in which social interactions become self-maintaining social organizations that can

recur across situations and individuals. Unlike accumulation of precedents, institutionalization occurs when social interactions are no longer ad hoc solutions to local challenges and are recognized by all parties as interactions of a specific type in the presence of a conventionalized cue (Bickhard, 1980). Such cues indicate types of situations that are defined by the range of interactions that are considered appropriate. Therefore, any deviation from this range constitutes a violation of the social organization that can entail a sanction and/or repair. Thus, institutionalization imposes constraints on potential interactions in a given situation and hence defines normative ways of interacting. It is this organization of appropriate action potentialities that generates the normative force and self-maintenance at the societal level that spontaneous order alone cannot produce. Finally, institutionalization is inherently reflexive (Bickhard, 1980, 2024). Institutionalized situations are embedded in other institutionalized situations so that meta-institutionalized situations can transform the functions and appropriateness of lower-level interactions. This reflexivity allows the emergence of meta-normative organizations and more complex social systems such as language and culture (Bickhard, 1980). Taken together, this suggests that what the target article describes as spontaneous order may itself depend on institutionalized normative grounds that it has not yet made explicit.

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Tinkering toward what? On the absence of fitness goals in cultural evolution

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Abstract

Chater and Christiansen rightly argue that cultural change is intelligent, directed, and coordinative rather than blind. But the metaphor of tinkering they borrow from Jacob is intelligible only because biology specifies what tinkering is for: inclusive fitness. In their account, the analogous criterion is missing. Restoring fitness, channeled through local ecologies, would supply what the framework currently lacks.

Chater and Christiansen's target article makes a welcome and overdue argument. Against five decades of cultural evolutionary theorizing built on analogies with Darwinian natural selection – blind variation, selective retention, and individual transmission – they argue that cultural change is intelligent, directed, joint, and coordinative. Their reconceptualization of culture as creation rather than replication, and their systemic vision of culture as spontaneous order, mark a substantive reorientation of the field.

But the framework rests on a metaphor whose explanatory weight the authors do not fully bear. They borrow François Jacob's (1977) image of evolution as tinkering: an opportunistic, local, recombinative process operating on whatever materials lie to hand. The metaphor is powerful, but in Jacob's original setting, it is not free-standing. Biological tinkering is intelligible because it sits inside a theory – the modern evolutionary synthesis – that specifies the criterion by which some recombinations are retained and others discarded: inclusive fitness. The bricolage of evolution is not a random walk through the space of biological forms; it is constrained at every step by differential reproduction. Remove that constraint and Jacob's metaphor collapses into mere shuffling. It is fitness that makes the bricolage interpretable.

In the social tinkering account, the analogous criterion is absent. Cultural tinkering is described as directed, agents as intelligently choosing, and innovations as solutions to the problem of the moment. But what counts as a problem, what counts as a solution, and which solutions persist while others vanish are taken as given. The authors offer a cognitive psychology of how tinkering proceeds (joint reasoning, virtual bargaining, shared intentionality, and focal-point coordination) but leave open the prior question of

what selects among its outputs. Cultural tinkering, in their telling, is Jacob without the synthesis.

Two explanatory tasks become tractable only once a fitness criterion is restored. First, persistence: among the countless innovations agents produce, which become entrenched and which fade? The authors invoke entrenchment of precedents, but this leaves open why some precedents entrench while others die in a single generation. Solutions persist when they reliably enhance the fitness of those who adopt them – either directly, by improving access to resources, mates, or alliances, or indirectly, by becoming necessary conditions for participation in cooperative networks. Without that constraint, persistence is left as a brute fact.

Second, convergence. Cultural systems converge on structurally similar arrangements wherever conditions are similar: subsistence ecology predicts kinship structure, pathogen prevalence predicts conformity and in-group orientation, resource defensibility predicts inheritance regimes, ecological precarity predicts ascetic values, and resource abundance predicts the cultural elaboration of romantic love (Baumard et al., 2022; Baumard & André, 2025). These regularities are systematic, replicable, and well documented. Pure tinkering cannot generate them: clever local recombination has no reason to converge on the same outputs across unrelated societies. An adaptationist account does: shared evolved goals, pursued under similar ecological constraints, converge on similar solutions.

Importing fitness into a theory of cultural change does not require the strong modularist commitments Chater and Christiansen rightly criticize (§4.2). Their concern with rigid Pleistocene modules rests on a confusion between what evolved psychology specifies and how it operates. What evolution specifies are goals – the functional outcomes that promote fitness: harm avoidance, resource acquisition, mate attraction, parental investment, alliance formation, status, and reputation. What evolution does not specify, and could not have specified, are the particular means by which those goals are pursued. Means are read from the local environment in real time.

Across the living world, this is what evolved adaptations look like. The vertebrate immune system does not store fixed antibodies; it generates variants and amplifies the ones that bind, with binding success serving as the local proxy for the underlying fitness goal of pathogen neutralization. A satin bowerbird does not execute a bower template; it builds, evaluates, and rearranges decorations using whatever its environment offers in pursuit of the fitness goal of mate attraction. Trees do not unfold from blueprints; they grow by responding to local light, gravity, and obstacles in pursuit of the fitness goal of photosynthetic capture. In each case, evolution specifies the end and a generative system, leaving the means to be assembled from local materials.

Human behavior shows the same architecture, only more so. The fitness goal of social standing is pursued through hunting prowess in one ecology and through scientific publication in another. The goal of mate attraction is pursued through skillful flute-playing in one society and through high-status credentials in another; the goal of harm avoidance is through fear of snakes in ancestral environments and fear of cars and electrical outlets in modern ones. None of these means is evolutionarily ancient. All of them recruit ancient motivational systems whose ends are conserved while their means are reassembled to fit the local ecology. The flexibility Chater and Christiansen attribute to social tinkering is not in tension with an adaptationist explanation – it is what an adaptationist explanation predicts, once one recognizes that adaptations specify goals and leave means open.