BOOKS ET AL.

SOCIAL SCIENCE

Knowledge for two

A psychologist explores common knowledge and coordination **Jeremy Goodman** and **Chaz Firestone**

When Everyone Knows That Everyone Knows...
Steven Pinker
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Steven Pinker's new book, *When Everyone Knows That Everyone Knows...*, is about taking knowledge to infinity. Specifically, it is about common knowledge—not in the colloquial sense of facts we all take for granted but in a technical sense, as studied by philosophers, economists, linguists, game theorists, and political scientists since the 1960s. Common knowledge in this sense is infinitely interwoven interpersonal knowledge. For Alice and Bob to have common knowledge that it is raining, for example, it is not enough for them both to know it; they must also know that the other knows it, know that the other knows they know it, and so on, literally ad infinitum.

Pinker's excellent book brings psychology into the fold, marshaling decades of research on how "recursive mentalizing" (Pinker's term for reasoning about others' reasoning) shapes everyday behavior. In it, he argues that we regularly achieve common knowledge in all its infinite glory and that it is "a key to understanding human social life"—from meeting for coffee to successful politicking. "Two people really do need to think an infinite vortex of 'I know that he knows that I know that he knows...' thoughts to be sure they will coordinate their plans," he writes. "Two or three, or any finite number, aren't enough."

Consider a predicament called a "stag hunt" in game theory. It is lunchtime for Alice and Bob, who could each eat at their respective homes or head to the café. They are happiest eating together but do not want to risk eating alone at the café. Will they meet up? Merely knowing that they are happiest eating together might not be enough: If Alice doesn't know that Bob knows she prefers eating together, she'll worry that he'll play it safe and stay home; this worry might make her stay home herself. Without common knowledge, such doubts threaten to stymie coordination. Because coordinated behavior is commonplace, Pinker concludes that common knowledge is too.

Pinker anticipates, and deftly rebuts, numerous objections to this thesis—for example, can infinite layers of knowledge really fit in finite skulls? But the book leaves unanswered a fundamental challenge to the very possibility of common knowledge (let alone its prevalence). Epistemology—the philosophical study of knowledge—has seen an explosion of work on higher-order knowledge, provoked by Timothy Williamson's agenda-setting treatment (*1*). Williamson contends that we never have infinitely iterated knowledge of anything, even by ourselves (knowing that you know that you know...). More recently, Harvey Lederman (*2*) has argued that, even if we do have infinitely iterated knowledge as individuals, infinitely iterated knowledge between people—that is, common knowledge—remains unachievable and so cannot be what underwrites successful coordination.

Suppose Alice and Bob are neighbors who have arranged to meet for coffee on Saturday as long as it is above freezing (at least 33°F). Their smartphones have different weather apps, but they know that both apps are accurate to within a degree. On Saturday morning, they each privately check their phones and see 34°; so, they both know it is above freezing. But because they know that their apps could be a degree off, for all Alice knows, the actual temperature is 33°. From her perspective then, Bob's phone might read 33° or even 32°, and he wouldn't know it is above freezing. So, Alice and Bob lack common knowledge that it is above freezing.

The kicker is that this reasoning works at any temperature. Suppose Alice's and Bob's apps both read 60°. It is obviously above freezing, and there is no question that coffee is on. Do they have common knowledge now? No. If Alice's app reads 60°, then for all she knows it's really 59° outside and Bob's app reads 58°; in which case, for all Bob knows it's really 57° and Alice's app reads 56°; and so on, down to freezing.

This case has two morals. First, common knowledge—in the infinitary sense Pinker insists upon—may be downright unachievable. Lederman's challenge is both powerful and general: Even if Alice and Bob stand together in 60° air, how cool they feel may vary. For all Alice knows, it feels a degree cooler to Bob than to her, in which case, for all Bob knows it feels cooler still to Alice, and so on. By phone or by feel, they will lack common knowledge that it is above freezing. Second, common knowledge is not required for seamless coordination: If Alice's and Bob's apps each read 60°, they will surely meet.

Pinker does not deny that such coordination is possible; indeed, the book includes a long discussion of how salience allows us to coordinate by making educated guesses about what others will do. But Alice and Bob's coordination is not mere guesswork: At 60°, each knows that the other will show up. This knowledge is not mysterious: It simply applies an observed pattern of behavior—that the other person keeps their plans—to the case at hand. It only seems mysterious if we demand an explanation in terms of recursive mentalizing. While the book lucidly illustrates how social dynamics are often shaped by reasoning about reasoning, such demonstrations fall short of establishing its central thesis: that common knowledge is the key to coordination. □

REFERENCES AND NOTES

1. T. Williamson, *Knowledge and Its Limits* (Oxford Univ. Press, 2000).
2. H. Lederman, *Mind* **127**, 1069 (2018).

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