

Coordination: A Critique of Daniel Klein

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Abstract

In several papers, Daniel Klein has documented the varied usage of the term *coordination* in the economics literature. Klein has proposed two meanings of the term, one of which corresponds to the Hayekian usage and the other to the work of Thomas Schelling. However, Klein's taxonomy is unhelpful because both of his two types of *coordination* apply to the work of both Hayek and Schelling. I propose a more appropriate distinction.

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Ever since Hayek's 1937 classic, "Economics and Knowledge," Austrians and other sympathetic writers have rightly emphasized study of the coordination properties of an economic system. However, in the wake of the pioneering work of Thomas Schelling (1960), the neoclassical mainstream has construed a "coordination game" in a very narrow sense. In several papers Daniel Klein (with co-authors) has attempted to categorize the different uses of the term *coordination* in the economics literature. Unfortunately, I disagree with his taxonomy. In this comment I will make the case that Klein has focused on a distinction that does not truly distinguish the Hayekian from the Schelling sense of the term. I will then suggest a distinction that more neatly separates the work of the two economists.

I. Klein's Taxonomy: The "Two Coordinations"

In an insightful paper (Klein, 1997) and its follow-up (Klein and Orsborn, 2009), Daniel Klein identifies two distinct (and often conflated) meanings of *coordination*. Unfortunately, his distinction—which is perfectly valid as far as it goes—cannot bear the weight that Klein puts on it. In particular, Klein is wrong to argue

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that one of his meanings of *coordination* corresponds to the Hayekian use of the term, whereas the other sense of *coordination* matches up with the modern (post-Schelling) game theoretic usage. To illustrate our position, we will first quote extensively from Klein and then demonstrate that his suggested taxonomy is ill-suited for the task he has in mind.

To understand the distinction Klein wishes to draw for the usage of the noun *coordination*, it is probably easiest to focus on the different meanings of the verb *coordinate*. As a transitive verb (which takes a direct object), *to coordinate* means to arrange or assemble things into a pleasing pattern: one *coordinates* the colors in a room. But as an intransitive verb (i.e. one that does not take a direct object), *to coordinate* means to adjust oneself to other, uncontrollable factors: one *coordinates* with a friend to meet at a certain time.

The same distinction carries over to the noun form. In the first sense, we can say that one achieves a pleasing color coordination. In the second, we can say that one achieves coordination with the friend.

In his earlier paper, Klein proposed “with some apprehension” that the first type (i.e., arranging things to form a pleasing pattern) be referred to as *metacoordination*, while the second type (i.e. adjusting actions to mesh with others’) be referred to as simple *coordination*. However, Klein and Orsborn (2009) have since updated the nomenclature, which we will retain for the remainder of this paper. The first sense of *coordination* (such as coordinating the colors in a room) shall be termed “concatenate coordination,” whereas the second sense (such as coordinating with a friend to go to a movie) shall be termed “mutual coordination.” Here Klein and Orsborn explain the updated terminology:

An interior designer coordinates colors, patterns, and textures to make a pleasing look. The businessperson coordinates factors [of production] to make profits. The verb is transitive and the result is an overall pleasure from the perspective of the coordinator or of anyone else like her. Components link one to another, forming a chain or concatenation. Call it *concatenate coordination*.

Then there is the intransitive verb: the Japanese drive on the left, and one *coordinates* to that convention (no direct object there). Call that *mutual coordination*. Mutual coordination

is usually more or less manifest, like waltzing together. Actors might not be thinking about it, but they are potentially made aware that they are taking part in mutually coordinated action. (Klein and Orsborn, 2009, p.177)

With the “two coordinations” in mind, we now examine Klein’s deployment of this distinction in the economic literature.

II. Mutual Coordination: Klein on Schelling

As Klein points out, a “coordination problem” means something very particular to the modern neoclassical economist who has been exposed to even a rudimentary survey of game theory. A standard example of such a problem (adopted by Klein, 1997, and consistent with the example in Klein and Orsborn, 2009) is two motorists deciding on which side of the road to drive. The best outcome is for them both to drive on the right side (because of the placement of the steering wheels, say), the second best outcome is for both to drive on the left, and the worst outcome occurs when they fail to pick the same side (and end up colliding).

Table 1. A Schelling Coordination Game

	Drive on the Right	Drive on the Left
Drive on the Right	2,2	0,0
Drive on the Left	0,0	1,1

In modern game theory, the above payoff matrix is called a *coordination game* because (loosely) it is in each player’s interest for the other to correctly predict his strategy; if one player chooses “Left,” he hopes the other realizes this and chooses “Left” as well.

The important aspect of the above coordination game is that there are two equilibria, in the sense defined by John Nash, in which each player’s strategy is a best-response, *given* the strategy of the other player. (Right, Right) is thus an equilibrium, but so is (Left, Left). The frustrating part of the game is that if for some reason, one player expected the other to choose Left, then it would be in the interest of the first player to choose Left as well, even though both players would strictly prefer to end up in the (Right, Right) outcome.

However, unlike the famous Prisoners’ Dilemma, in a coordination game the incentives do not compel the players to suffer

in an undesirable (specifically, Pareto suboptimal) equilibrium. If the players could just *coordinate* with each other on the (Right, Right) outcome, it would constitute a stable Nash equilibrium. It is because of these types of considerations that the strategic arrangement characterized by the above payoff matrix is called a “coordination game.”

Klein believes that this Schelling coordination corresponds to his (Klein’s) second type of coordination, i.e., mutual coordination. In one sense, this is undeniable: the motorists must choose their own actions and hope to coordinate with each other. However, while considering such a game, the typical neoclassical might recommend some intervention in order to *facilitate* this decentralized activity. For example, she might recommend that the government fine people who are caught driving on the left side of the road. In such a case, the government officials would not be attempting *mutual coordination*, but instead would be seeking *concatenate coordination*: they would be arranging motorists like chess pieces to achieve a pleasing (i.e., Pareto-efficient) outcome.

It would seem that Klein’s two meanings of coordination are *both* used in the typical discussion of Schelling coordination. The “coordination game” from standard game theory is interesting for precisely this reason: It has the element of each player adjusting his behavior in light of the anticipated strategy of the other, but it *also* involves a higher-order strategizing in which the players (or a central planner, or private-sector road designer) attempts to nudge the outcome toward the equilibrium position in which both players are better off. If we are forced to think of *coordination* in the two senses created by Klein’s taxonomy, then we will need both senses in any comprehensive discussion of a Schelling coordination game.

III. Concatenate Coordination? Klein on Hayek

If Klein’s taxonomy does not neatly confine Schelling’s usage of the term *coordination* into a single box, Klein’s treatment of Hayek is even more dubious. At first blush, many Austrians probably would have assumed that surely Hayek’s seminal work on intertemporal-equilibrium-as-plan-coordination (1937) corresponds to Klein’s category of “mutual coordination” in which one coordinates with others. Yet Klein makes the opposite move, and casts Hayekian coordination into his (newly renamed) box of *concatenate coordination*:

[W]e may say that, when Hayek, Polanyi, and Coase spoke of coordination in economic systems, the dedicated opponents [of] any conscious effort to arrange society as a whole meant, in fact, *pleasing arrangement*. The arrangement is abstract, and the pleasure is allegorical, but that is what they meant. In the Hayek meaning, the concatenation of affairs in cases like the catallaxy is not actually coordinated by a Great Arranger, but, as Smith's famous metaphor demonstrates, their idea of coordination is clarified by an allegory of the affairs being "led by an invisible hand."

The allegory goes as follows: There is a superior being named Joy who is invisible and who beholds the vast economic order....Her pleasure increases when human society exhibits widespread prosperity, comfort, personal fulfillment, excellence, irony, and affection....In the road game...she prefers the (Right, Right) outcome, and *in that sense* the arrangement of activities at (Right, Right) is *better coordinated* than the arrangement of activities at (Left, Left). In the allegorical sense in which Joy exists within us and acts by mysteriously stirring our doings, Joy coordinates our doings in achieving (Right, Right), the way we coordinate colors in decorating our homes...

Hayek's claim is that the decentralized activity of the free catallaxy generates a dynamic, complex "spontaneous order" which Joy finds more pleasing than the order generated by the centrally-planned economic system. (Klein, 1997)

I believe the above to be an oversimplification of Hayek's position. The allegorical Joy does *not* coordinate us in the same way that "we coordinate colors in decorating our homes" because the colors in our homes are not *acting, planning* agents. It is true, there is a sense in which the impersonal price mechanism—*not* some mystical being "Joy"—coordinates us, but only by providing information with which we form our own subjective plans and attempt to coordinate our actions with each other. If all Hayek meant was that the free market generates an order "more pleasing" than any other system could, he probably wouldn't have used the term *coordination* at all. We thus see that Klein's distinction between mutual coordination and concatenate coordination does not provide a sharp contrast between

the Schelling and Hayekian viewpoints, as both writers implicitly rely on *both* concepts.¹

Klein continues with this interpretation of Hayek by going on to say:

When Hayek and Polanyi write of “coordination,” they mean a pleasing arrangement of affairs – pleasing, that is, to Joy. Hayek and Polanyi would say that in the road game...the arrangement (Left, Left), though a coordination equilibrium, shows unsatisfactory coordination. (Klein, 1997)

I frankly do not believe Hayek had any such possibility in mind when he wrote his seminal papers on knowledge. The occasional normative statements² in these papers are all related to the ‘desirability’ of *equilibrium itself* (as explained below). To rate one equilibrium more pleasing than another (as Klein does in the above quote) would seem to commit the very error about which Hayek explicitly warned – that is, it supposes that one can construct a single set of ends from the diverse ends sought by the actors in the catallaxy.

Perhaps Hayek would agree with Klein; perhaps he wouldn’t.³ I merely want to reiterate my claim that Hayek had no such scenario (i.e., one with multiple Nash equilibria in which one equilibrium Pareto-dominates another) in mind.

To see this, let us take a quote from Hayek that at first glance seems to support the interpretation given by Klein:

We may therefore very well have a position of equilibrium only because some people have no chance of learning about facts which, if they knew them, would induce them to alter their plans....

While such a position represents in one sense a position of equilibrium, it is clear that it is not an equilibrium in the

¹ Israel Kirzner too objects to Klein’s (original 1997) taxonomy, on the grounds that Hayek at times meant both coordination and metacoordination (Kirzner, 1999, p.199 fn 7).

² E.g., after a scarcity of a raw material, people “move in the right direction” (Hayek, 1945, p.87).

³ Clearly *Kirzner* (1998) would say that (Left, Left) was not fully coordinated, as he believes coordination implies Pareto optimality.

special sense in which equilibrium is regarded as a sort of optimum position. In order that the results of the combination of individual bits of knowledge should be comparable to the results of direction by an omniscient dictator, further conditions must apparently be introduced [which Hayek describes in a footnote as absence of “frictions”]....One condition would probably be that each of the alternative uses of any sort of resources is known to the owner of some such resources actually used for another purpose and that in this way all the different uses of these resources are connected, either directly or indirectly [to ensure equalization of marginal productivity]. (Hayek, 1937, p.53)

By itself, this passage does *not* prove Klein’s claim that Hayek would regard the (Right, Right) equilibrium as more coordinated than the (Left, Left) outcome. In the paper containing the above quote, Hayek first redefines (intertemporal) *equilibrium* as a situation in which all individual plans are compatible. Now, Hayek acknowledges (in the first paragraph from the block quotation above) that this compatibility of plans might be due to ignorance on the part of some people. Thus what Hayek calls “equilibrium” might *not* satisfy the conditions of (perfectly competitive) equilibrium as defined in the formal models of that time. These conditions – equality of marginal rates of substitution of consumer goods, equality of marginal productivity of resources, prices equal to marginal costs, etc. – are the ones that (Hayek claims) would hold if an omniscient dictator were to arrange affairs. As the economists of this time were well aware, market outcomes in the real world might fall short of this ideal because of frictions that were assumed away in the model.

However, this situation is not the same as the (Left, Left) outcome in the road game. This Pareto-inefficient Nash equilibrium is not due to ignorance on anyone’s part; the features of the game are common knowledge to all players. Nor is the inefficient (Left, Left) supported by the “frictions” (such as finite divisibility of goods or distortionary taxes) that concerned the mathematical economists of Hayek’s day. What hinders movement in the “right direction” is that any individual defection from the (Left, Left) outcome would be disastrous. Only if all players change their strategies *together* can (Right, Right) be achieved.

Another example will illustrate the distinction. Besides the road game, a typical example of a modern neoclassical coordination game is the choice between Beta and VHS standards for videocassettes. We shall omit a payoff matrix, but it is easy to see why this game has the same flavor as the road game: it doesn't matter so much which standard is chosen as long as everyone picks the same one. Furthermore, let us suppose (as many allege) that everyone would have been better off if Beta had been established, but unfortunately the market is "stuck" at the (Pareto inefficient) VHS equilibrium.

Such a case of "market failure" does *not* correspond to Hayek's first case of a suboptimal equilibrium. In the VHS case, there is no ignorance. Everyone knows perfectly well (we stipulate for the sake of argument) that it would have been better to settle on the Beta standard. Moreover, the marginal rates of substitution and factor productivity would all be equal (in a suitably designed model). On the *margin* there is no reason for any *individual* to adjust his behavior; that's why the market is (allegedly) "stuck." Only if *everybody* switched (at the same time) over to Beta would the Pareto optimal outcome be reached. Because we cannot hope for individuals to spontaneously make such a transition, many economists feel the government needs to take action.

Hypothetical situations like these – in which all plans mesh, everyone is fully informed, there are no external frictions, and yet the omniscient social planner could nonetheless improve on the outcome – simply did not occur to Hayek, at least in his papers on knowledge.⁴ In these papers he is clearly concerned, not with whether the market will select the "best" equilibrium, but whether and how the market approaches equilibrium *at all*.

Let us be clear: Hayek certainly *does* have in mind the notion of an interlocking arrangement of individual plans such that a social optimum is achieved, however vague that sense of optimality may be defined, and regardless of whether Hayek would feel comfortable with Klein's notion of a "superior being named Joy who is invisible and who beholds the vast economic order." Armed with Klein's definition of *concatenate coordination*, one will certainly see the concept spilling out of Hayek's work.

⁴ Klein points out that Hayek considered "lock-in" in *The Road to Serfdom* (Klein, 1997, p.334 fn 5).

However, our main point is that surely Klein's definition of *mutual coordination* is also embedded in Hayek's work. For example, consider this passage from Hayek's 1937 paper:

[T]he knowledge and intentions of the different members of society are supposed to come more and more into agreement....In this form the assertion of the existence of a tendency toward equilibrium is clearly an empirical proposition...which ought, at least in principle, to be capable of verification. (Hayek, 1937, p.45)

Note the similarity between Hayek's passage above and the quotation below that Klein (and co-author) selects from Schelling to motivate the discussion of mutual coordination. Schelling gives the example of a man and wife separated in a department store and comments:

What is necessary is to coordinate predictions, to read the same message in the common situation, to identify the one course of action that their expectations of each other can converge on. They must "mutually recognize" some unique signal that coordinates their expectations of each other. (Schelling 1960, as quoted in Klein and Orsborn, 2009, p.181, italics removed)

Schelling's discussion seems quite complementary to Hayek's work on intertemporal equilibrium, especially if changing market prices are the "signal that coordinates their expectations of each other." Yet in their 2009 paper, Klein and Orsborn introduce the above Schelling quote to distinguish the *new* usage of the term *coordination* from the older meaning that economists such as Hayek (and others at the London School of Economics) had had in mind.

To repeat my earlier claim, I suggest that if a randomly selected Austrian (who was unfamiliar with Klein's treatment) were asked whether Hayek's knowledge papers had to do with *coordination* in the sense of an interior designer planning the color scheme of a living room versus the sense of friends synchronizing their plans to meet up for a movie, then it is very likely that the Austrian would say Hayek's usage lined up with the second sense (i.e., Klein's "mutual coordination"). Yet, this second sense Klein wishes to reserve for

modern neoclassicals steeped in Schelling's work on coordination games, while the interior designer sense is reserved for Hayek.

IV. A Better Distinction Between Hayek and Schelling

Klein has undeniably put his finger on an important difference in the Hayekian versus the modern game theoretic understanding of a "coordination problem" in the social sciences. My argument is that Klein's taxonomy of the word *coordination*, unfortunately, does not overlap with the Hayekian/Schelling distinction. Rather than claim (as Klein does) that Hayek focused on concatenate coordination (in which individual actions must fit together in such a way to yield a pleasing outcome to a superindividual observer), whereas Schelling focused on mutual coordination (in which an individual must adjust his action in light of what others are expected to do), instead I would say the critical distinction between the two camps is this: Hayek focused on the tremendous difficulties *in achieving equilibrium at all*, whereas Schelling (and many modern neoclassicals) assume away this real-world problem and instead focus on choosing from *among possible equilibria* in stylized games that are much simpler than the actual economy.

To bolster my interpretation – namely that Hayek thought many economists were assuming away the problem of equilibration in the first place – we can again quote from Hayek's 1937 paper:

[M]y main contention will be that the tautologies, of which formal equilibrium analysis in economics essentially consists, can be turned into propositions which tell us anything about causation in the real world only in so far as we are able to fill those formal propositions with definite statements about how knowledge is acquired and communicated. (Hayek, 1937, p.33)

V. Conclusion

The term *coordination* has had an extensive and varied history in economics, as Klein and Orsborn (2009) document. It is also true that there is an important distinction between the work of earlier economists, particularly Hayek, when they discussed coordination in an economic system, versus the modern game theoretic notion of a "coordination problem."

Unfortunately, after spending so much time outlining his suggested taxonomy (originally between *coordination* and *metacoordination* but now between *mutual coordination* and *concatenate coordination*), Klein fails to distinguish the essential differences between the Hayekian and Schelling uses of the term. *Both* of Klein's senses are involved in both economists' work.

Rather than focusing on the transitive versus the intransitive meaning of the verb *to coordinate*, I suggest that a much more useful distinction is the Hayekian focus on the equilibration process, versus the Schelling (and more generally, mainstream neoclassical) focus on the choice *among* potential equilibria.

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