

Causal and Constitutive Relations, and the Squaring of Coleman's Diagram: Reply to Vromen

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Abstract We respond to Jack Vromen's (this issue) critique of our discussion of the missing micro-foundations of work on routines and capabilities in economics and management research. Contrary to Vromen, we argue that (1) inter-level relations can be causal, and that inter-level causal relations may also obtain between routines and actions and interactions; (2) there are no macro-level causal mechanisms; and (3) on certain readings of the notion of routines and capabilities, these may be macro causes.

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1 Vromen's Argument

We are flattered that Jack Vromen (2010) has devoted an entire article to our discussion of explanatory problems in the field of strategic management (Abell et al. 2008). Specifically, we used the Coleman diagram to pinpoint the problematic way in which collective notions such as routines and capabilities are applied in explanation. Vromen suggests that our analysis is “wrong” in a number of respects, both general and specific. Generally Vromen argues:

1. That the macro–micro and micro–macro arrows in the Coleman diagram (arrows 1 and 3, p. 8 in Vromen 2010) cannot be conceived as “real causal relations”, but rather should be interpreted as, variously, “constitutive” or “mechanistically mediated” relations. Indeed, following Craver and Bechtel (2007), he argues that inter-level relations are never causal, but always constitutive.
2. As a consequence of this re-conceptualisation, the macro-macro relation (arrow 4; p. 8 in Vromen) can stand in its own right as a macro-level (causal) mechanism.

Specifically, he argues

3. That organizational routines can directly cause organizational behavior and performance; routines are macro-level mechanisms that causally connect the inputs of a firm to its behavior and performance.

In contrast, Vromen argues that we interpreted the macro–micro and micro–macro arrows in the Coleman diagram as causal, and denied (2) and (3). We briefly discuss Vromen's three propositions in the following.

2 Causal and Constitutive Relations

Consider, first, proposition (1) above. Let us agree with Vromen that Woodward's (2003) recasting of an old argument about causality in terms of manipulation and counterfactuals is an entirely reasonable starting point. Thus, (a) to assert that a link between the properties X and Y of an object or objects is causal is to imply that the sequential relation between X and Y is such that changes in X invariantly (in context) lead to changes in Y. Such a relation, for example, might be conceived of when considering the relationship between individuals and organizations (arrow 3, see Fig. 1). Be this as it may, Woodward's criterion is only a necessary and not sufficient component of any adequate definition of causality.

Whilst these additional components are by no means uncontested, few would disagree that in addition, (b) X and Y should be *separately identifiable*, which implies that X must not logically imply Y, nor the reverse. Thus, all four combinations; X and Y, not X and not Y, not X and Y, and X and not Y must be logically possible though, of course not contingently probable. Further, as Vromen

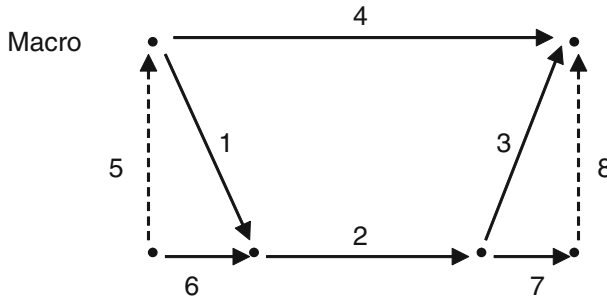


Fig. 1 Vromen's squaring of coleman diagram

notes, (c) X must precede Y. Note that (a) precludes unobserved endogeneity, the bane of vouchsafing a causal inference from co-variation.¹

Vromen, quite correctly, contrasts causal and “constitutive” relations, the latter being a characteristic of the relationship between parts (P) and wholes (W). Clearly, to assert that P is part of W (or W has a part P) is not the same as saying that P causes W. Indeed, it is the interplay of existence and causal claims concerning mechanisms which deserves more careful consideration.

For a constitutive claim that P is part of W (or W has a part P) to hold, a form of condition (a) holds: If P were to be changed, then so would W (counterfactual subjunctive conditional). Thus, for example, organizational routines, W, would operate differently depending on the underlying compositional elements, individuals (P), and the nature of those elements. But neither (b) nor (c) hold. As Vromen observes, part-whole relations are synchronic, ruling out (c). Condition (b) is the important difference between causality and part-whole relations, for we cannot logically have not P (or more precisely, not P or a functional equivalent of P) and W. This is arguably what Vromen is driving at when he writes that “[i]t seems that most, if not all macro-phenomena exist by virtue of underlying micro-phenomena. Take away the underlying micro-phenomena and the macro-phenomena will disappear” (Vromen 2010: 6). Thus, if we are going to define the macro (W) in terms of the micro parts (P), we cannot satisfy the conditions for a causal link between W and P. This is correct.

3 Causal Inter-Level Relations

However, we disagree with Vromen's argument (proposition 1) that inter-level relations are merely constitutive and not causal. That is, the essential feature of a mechanism-based approach connecting P to W, or the micro to the macro, is *not* that the parts cause each other, but rather that the *properties* of the parts, which must be analytically separable, stand in a causal relationship to W. Mechanisms are

¹ We might note in passing that condition (b), separate identifiability, is often violated in the routines literature where X and Y, or the micro and the macro, are conflated with such constructs as “structuration” (cf. Feldman and Pentland 2003).

constructed of parts amongst which causal relations can operate, via mechanisms, connecting the properties of those parts to the whole. The language here can be confusing. To illustrate, we can speak of one billiard ball causing another ball to move on impact. What we should say, rather, is that the *momentum* of the first ball causes the momentum of the second one.

While the moving billiard balls exemplify intra-level causation (on the physical domain), the reasoning applies to inter-level causation (on the social domain). So, to highlight this with regard to W and its relation to P (arrow 1), the “price mechanism” connects the market and the individual levels, and the relation between macro and micro parts is indeed a constitutive one. However, we can still speak of a price change (i.e., a new property of a macro variable) and the associated, *causal* changes in the consumption and production decisions of individuals (i.e., new properties of micro variables, P). A similar change might occur also with changes in the “rules of a game” (Coleman 1990). Furthermore, the beliefs and expectations of dispersed individuals, as properties of P, naturally play a causal role (arrow 3) in relation to the market system, W (cf. Hayek 1945). Indeed, as we will argue, such inter-level causal relations may also obtain between routines and actions and interactions. Thus, if P is part of W and W cannot be conceived without P, contingent propositions of the form (P) (W) [WX then PY] can be entertained. All of this depends upon being able to define X and Y independently, even though P is part of W.

Central to our arguments, given our interest in micro–macro relations (arrow 3) and the lack of such relations in routines-based work (Abell et al. 2008), is both the constitutive *and* mechanistic relationship between P, individuals, and W, organizations. For example, individuals, P, almost by definition constitute W (say, routine-based behavior or organizations), but Ps also have heterogeneous *properties* related to their abilities, preferences, beliefs, interests and associated choices, and it is the connecting of these properties via mechanisms that leads to macro outcomes. Thus, when explaining W there is a need to not just focus on the properties of P, but also on the process and forms of interaction amongst the constituent parts, P, that (perhaps multiply) realize or cause the macro outcome, W. Schelling’s model of segregation (1971) illustrates this link between Ps and their properties and interaction and the emergence of collective outcomes, W. Thus, mechanisms can be defined “in terms of interactions between individuals and other individuals, or between individuals and some social aggregate” (Schelling 1998: 33), highlighting, pace Vromen, the feasibility and even centrality of inter-level causation. To solely focus on W, say organizational routines (arrow 4), is to entirely take for granted and not explain the constitutive elements nor the underlying mechanisms and inter-level causal processes related to W and P (arrows 1 and 3).

4 Vromen’s Squaring of Coleman’s Diagram

Vromen (p. 8) introduces a useful reinterpretation of the Coleman diagram (p. 8) which involves constitutive relations (arrows 5 and 8) and in addition micro causal relations (arrows 6 and 7). What are we to make of this in terms of our above

analysis? Vromen claims that the macro–micro (arrow 1) and micro–macro (arrow 3) do not stand for “real causal relations,” but mechanistically mediated effects.

Let us label the variables (indicated by the dots in Vromen's “squaring” of the Coleman diagram) W_1 and W_4 at the macro level and m_1 , m_2 , m_3 , and m_4 at the micro level. So, the numbers indicate the (ordinal) flow of time. Note that m_1 may in our original formulation of the Coleman diagram (p. 4) represent prior micro actions (to m_2) which cause W_1 but at the same time m_2 (arrow 6 in Vromen). Arrow 5 would be both constitutive and causal on our interpretation. Of course, this may make the co-variation between W_1 and m_2 spurious, so that, in this sense, arrow 1 is not “real”. If this were to be the case, then the co-variation of W_1 and W_4 would also be rendered spurious, supporting our interpretation of arrow 4 (see below).

What about arrow 3? If we allow that arrow 8 can be both causal and constitutive, then it may be that the co-variation of m_3 and W_4 controlling for m_4 would approximate zero. We know of course that arrow 3 is sometimes mere aggregation and thus definitional and not causal.

5 Macro-Level Causal Mechanisms?

Let us now turn to Vromen's proposition 2. Vromen argues that “...if indeed there is a macro level mechanism then the mechanism can be looked at both at the macro and micro level”. However, even if we license the idea of constitutive relations between parts of multiple level mechanisms, there is still nothing “to look at” behind arrow 4 between W_1 and W_4 independently of the micro processes. Of course, there may be detectable intervening variables between W_1 and W_4 or they may even be spuriously related at the macro level. But whatever the links between these additional variables, they are all subject to the constraint that to understand how they are constructed, one must reduce causal/constitutive processes to individuals. Of course, one can use causal vocabulary at the macro level, but there simply is *no way* of “looking at” a mechanism at this level.

6 Routines and Macro–Micro Links

Finally, consider Vromen's proposition 3, namely that routines are “multilevel, macro-level mechanisms” that directly cause organizational behaviour and performance (Vromen 2010: 10). Given this interpretation of routines, it is not surprising that Vromen is critical of the argument that routines are macro-causes. Note in passing that this argument is our interpretation of the explanatory role that routines play in the strategic management and organizational theory fields (rather than a view we necessarily feel compelled to adopt ourselves). We maintain that routines are, in problematic fashion, used as macro-causes in the extant strategic management and organizational literature.

However, the routines literature is notorious for its conceptual and explanatory ambiguity (Becker 2004). Thus, routines are seen as at least partly designed (i.e., they are standard operating procedures) in some parts of the literature, while other

parts stress that routines may emerge in an unplanned manner. Some contributions see routines like a computer program, a set of instructions, while other contributions see routines as processes, perhaps the execution of those instructions. Given the existing diversity in the literature, we are not convinced that Vromen's interpretation is *the* correct interpretation. Parts of the routines literature clearly interprets routines as macro-causes.

Note first that for the macro–micro and micro–macro links to constitute a causal relation (which may or may not, at the same time, be constitutive), it must be possible to label the macro-level variable independently of the micro variable.² We need a sense in which routines can “exist” independently of how a particular population of individuals operate the routine at a particular time. The notion of routines as instructions or behavioural programs alluded to above fits this requirement. In terms of the history of the concept of routines, the “instructions understanding” is the original understanding of the concept, probably originating with Cyert and March (1963). It is also an understanding that is thriving within the modern routines literature, particularly in work on replication, for example, in franchise chains (i.e., the “MacDonalds approach”) which entails creating and operating similar outlets offering a certain service or product (Winter and Szulanski 2001). Making a particular outlet “run” the behavioural program contained in the routines requires quite a lot of instruction and education of employees. In this context routines play a role as macro-causes of the coordinated behaviours that may result.

In sum, this dialogue with Vromen aptly illustrates that imprecise definitions and the lack of clarity about causal and constitutive relations (between the micro and the macro) in the extant literature has led to problems with the explanatory status of the routines construct. Since the routines construct is a central building block for many literatures in organization theory, we hope that this dialogue provides an impetus for scholars to more carefully specify the underlying assumptions that they make and to carefully revisit the underlying microfoundations of macro constructs such as organizational routines and capabilities.

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² Note that it is standard practice in hierarchical model building to do this. For example, the literature on endogenous and exogenous social interactions claims to provide estimates of statistically significant causal relations (e.g., Manski 1993; Durlauf and Young 2001).

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