What constitutes a level of analysis?

Reflections on Yammarino's, "Levels of analysis and the US Constitution"

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Abstract

Purpose – This paper aims to respond to Yammarino's article in this issue on level of analysis and the US Constitution.

Design/methodology/approach – This paper expands on two concepts central to levels of analysis: entity and causal process. Then additional alternative ways of conceptualizing, analyzing, and representing multi-level organizations – beyond the organization chart – are described. A rationale for America's use of the Electoral College is sought.

Findings – The paper reveals connections among traditional notions of hierarchy (including the traditional organization chart) and contemporary social network concepts.

Practical implications – Leaders and other members of social and organizational systems should be mindful of their mental representations of hierarchy, of organizational or social groupings (e.g., US States), and of social distance. These representations can influence behaviors and perceptions, including perceived fairness of procedures.

Originality/value – The paper presents interesting information on connections among traditional notions of hierarchy and contemporary social network concepts.

Keywords Data analysis, Organizational analysis, Networking, Individual development, Collectivism, United States of America

Paper type Conceptual paper

As Fran Yammarino points out in his article "'We the People...'" (in this issue), confusion surrounds the topic of levels of analysis in the study of management and organization. He examines a real world example – from American political structure and process – to provide a lively and consequential illustration of misalignment or misspecification of concepts, measures, and interpretations across levels of analysis. Paralleling Yammarino's playful-academic approach of taking the US Constitution as a jumping off point for raising issues, in this article I will use Yammarino's article to generate some reflections on this rich topic of levels of analysis.

In the first section, I will sketch very briefly two key concepts involved with levels of analysis – entities and causal processes – concentrating on a hypothetical yet realistic illustration from research on organizational climate. Next, I will expand on Yammarino's transformation of an organizational chart, to illustrate the option of taking a particular empirical approach to identifying the hierarchically nested entities in a complex social or organizational system. Finally I will speculate on some temporal and inter-cultural differences in perceptions of aggregate entities, and the possible implications of those differences for how the USA ended up with a presidential voting system that today seems odd.

Distinguishing levels of analysis

When we distinguish levels of analysis, we are distinguishing or defining entities and processes. In distinguishing the individual and group levels of analysis, we are positing the existence of groups as entities, and we should be alert to possibilities of either equivalent or fully distinct processes or phenomena involving the entities at different levels of analysis. For example, "conflict of interests" may exist among the individuals in a group or among the groups in an organization, and the essence of this phenomenon may be essentially equivalent at the two levels of analysis (or not).

Typical findings from research on organizational climate can illustrate the operation of distinct processes at different levels of analysis. For a given climate dimension or scale (e.g., concerning how much people in one's work group show caring for one another), 20 percent of the variation in individuals' responses might be explained by work group membership (subordinates sharing the same supervisor). Another 8 percent of variation among individuals in their reports on this scale might be explained by the divisional membership of the individual or group. A small but statistically significant additional 2 percent of variation among individuals might be explained by membership in one or another organization (say, with Acer showing slightly higher climate scale averages than Dell or HP). How could entities and processes at the different levels of analysis explain these findings?

One mode of explanation would look for processes at the different levels of analysis that would be expected to produce the commonality of climate responses signaled by the proportions of explained variance at each level of analysis. Considering the group level of analysis, individuals generally interact directly with one another within groups. Within-group reciprocation of behavior that demonstrates caring could explain group effects, especially if some groups have "caring behavior initiators" and others do not (yielding variation among groups, over time, in the total amounts of caring behavior). But if the potential to express caring is mostly confined to groups, the question arises as to how the higher-level effects are generated. One way the organization-level effect (variation among organizations) could be explained is by organization-wide policies or procedures. For example, Acer might socialize new hires, throughout the organization, to be considerate to one another to a greater degree than its competitors socialize their new hires this way. In that case, "caring behavior initiators" should be more inclined to initiate at Acer than elsewhere, setting off the reciprocation process to a greater degree there.

What does all of this have to do with presidential elections in the USA? As Yammarino pointed out, whether that voting process is flawed is a question of alignment of voting process with levels of analysis. Whether a process is seen to be misaligned depends partly on how one represents and thus perceives the complex reality that is a nation, or organization, or other complex system.
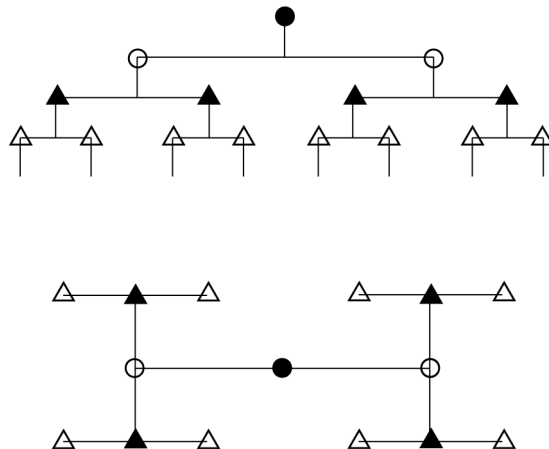
Representations

Accordingly, Yammarino rearranged a familiar representation of relationships within an organization – an organization chart – in order to compare the conventional view of levels of management with the concept of levels of analysis. By design, representation is not reality, and Yammarino's elegant transformation shows what a difference a representation can make. To transform the organization chart representation in the top of his Figure 1 to the levels of analysis representation in the bottom, Yammarino basically just removed the short downward lines and pivoted on some of the dots that represent individual people in his structure. The transformed figure implies that people

are "linked" with one another "through" their bosses. This implication is emphasized by the redrawing of Figure 1 that appears in the present paper also as Figure 1.

Having invented the illustration, Yammarino certainly is entitled to imply that the better "lens" (his word) for understanding the social and organizational relations is the lower one, which identifies 15 persons, 14 dyads, seven groups, two collectives, and one organization. In some organizations, the primary flows of communication, helping, or other exchange could take the pattern at the bottom of our Figure 1. Or even if these flows do not match the revised figure, there may be a conceptual/theoretical basis for taking this latter view of social/organizational structure, and for acting accordingly (in the conduct of research, of management, etc.)

Returning to the top of our Figure 1, however, it is possible that the primary "flows" are not through bosses but directly among peers – laterally, that is, in terms of the organization chart. Thus, we can make an empirical question of how the individuals should be grouped, how the groups should be combined into collectives, and so forth. One way to do this is by collecting data on communication or resource flows (or other inter-relations such as sentiments) and analyzing them in ways that will reveal the natural groups. Various existing methods of network analysis (e.g., Scott, 2000) can guide this data collection and analysis. (It should be noted that Dansereau *et al.* (1984) worked out different empirical methods for analysis of levels of analysis.)

Figure 2 presents, schematically, findings of a network analysis that I conducted some time ago for Warner Burke Associates, a consulting firm that was working with a public agency having a well-defined management structure resembling the top of our Figure 1 (i.e. a conventional organization chart). The data in this analysis concerned communication – how frequently each individual spoke with or otherwise communicated with each other. There are no lines in Figure 2 because communication frequency is represented by distance, with shorter distances implying higher frequency of communication. (These distances were determined by multi-dimensional scaling analysis.). What we observed was that peers at the same level of the management hierarchy tended to communicate most frequently with one another, and in this sense they seemed to be the most linked to one another. Hence, the first grouping above the individual might best be conceived as dyads, triads, or n-ads of peers instead of manager-subordinate groupings exclusively.

Figure 1.
Levels of management and levels of analysis redrawn

Actually, in the case of the public agency, of course there were more than two departments. The form of the rest of the network representation was radial. That is, the various department heads (corresponding to open circles in Figure 2) formed a ring around the overall agency head (closed circle), and the subordinates of the department heads (and their subordinates) radiated out from the center beyond their own department head.

Despite this empirical grounding, getting from this or other empirically-based representations to delineation of hierarchically nested levels of analysis most likely will draw on some a priori conception or theory of the domain at hand. In the organizational climate domain, where one research question asks about variance explained in climate ratings by the various levels of analysis, groupings like those in Figure 3 would be most common. That is, climate rating aggregates (averages) would be formed for the most fine-grained groupings (here, the oval-circled dyads or n-ads, not shown, forming a work group), then for groups of groups (such as corporate divisions, represented by the tilted square), and so forth. In this organizational climate example, only the data from subordinates (people represented by open triangles) are being retained, but for other domains or research questions other handling of the data could occur.

Constitutions and collectivities

As Yammarino notes, something does not look quite right when the popular vote (total of all individual votes cast) can yield a majority for one candidate but the state-by-state results from the Electoral College voting – that is, the vote that determines the winner – can elect the other candidate. The levels of analysis in play here are individual voters, states, and the nation as a whole. The nation gets a single president. Thus it would be logical, and evidently preferable to Yammarino, if the election process instead were a
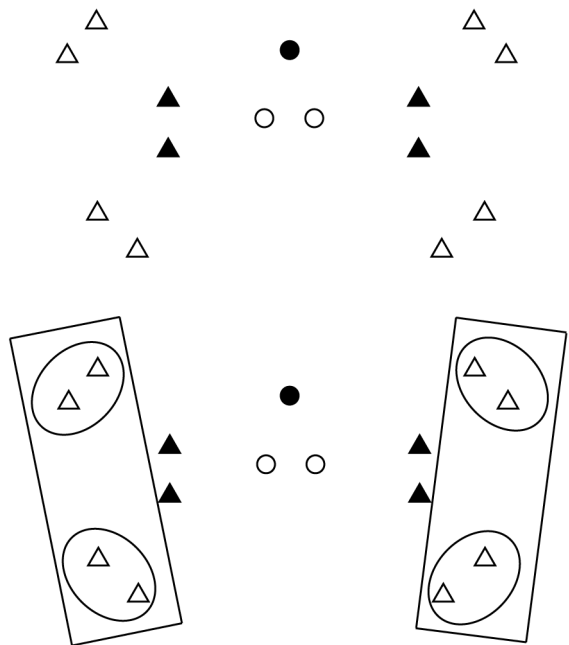
Figure 2.
Empirically-based
representation of social
distance

Figure 3.
Empirically-based
representation of
groupings

"national" one in which individuals' votes are tabulated at the national level – a straightforward popular vote, bypassing the state-based Electoral College.

To say that the vote should be national and not state is, in effect, to deny the primacy of the states that the US Constitution enshrines. But the Founding Fathers did enshrine that primacy. Why? One possible answer is that they took the states much more seriously as entities than Americans do today.

My perspective as an American expatriate tells me that regional or provincial identities can be much stronger elsewhere than they are in contemporary America. For example, in Canada, discussion of many politically charged national issues soon get around to addressing the regional dimensions of the questions Who wins? and Who loses? National bodies such as research grant adjudication panels are carefully constituted to include representatives from all regions and both official languages of the nation. Of course, America has some of this (including multiple languages dimensions on some issues), but being a citizen of a US state seems, in most respects, more a matter of being a "Hoosier" or a "Buckeye" – that is, mostly symbolic – as opposed to a more tangible matter of allocation of resources and relative power.

Furthermore, it is commonly asserted that an individualistic orientation has displaced or at least reduced collectivism gradually over time in the USA. If so, it may have become less acceptable to voters that the vote of their social grouping (state) is determined by voters' individual votes within states. That is, today the voters' individual votes "should" count directly toward determining the election outcome (i.e. popular vote). But when the nation was formed, in the absence of telephones and modern transportation, social interaction was much more confined to states. The corresponding network structure would have been more like Figure 3 in the past than it is now if, for example, we imagine communities as ovals and states as squares. People may have had more group (state) identity and, thus, more of a conception (though implicit) of a state as a true entity.

All of this is not to say that the US Constitution should not be changed to reflect contemporary thinking and values. But it at least suggests that entities and processes at different levels of analysis may be thought about in different ways, and those understandings have consequences.

In sum, social and organizational reality is complex. As Yammarino's transformation of the organization chart initially demonstrated, different representations can and should call attention to different aspects of that reality. Differing conceptions of levels of analysis do matter to our understanding of organizations, to our understanding of societies, and even to the occasional outcome of an election.

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