GRANULARITY MATTERS! TOWARDS A METHODOLOGICAL FRAMEWORK FOR UNDERSTANDING ROUTINE DYNAMICS

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ABSTRACT

This paper addresses the issue of granularity. The authors argue that in routine dynamics research granularity can be usefully defined by the number of actors, the variety of places/contexts, and the amount of time it takes to successfully accomplish an action. This is an important but often overlooked aspect of studying routines. It is important because different granularities imply different challenges and opportunities for performing and patterning. The authors propose a framework to distinguish between fine-, medium-, and coarse-grained actions, illustrate how different granularities have been used in existing routine dynamics studies, and discuss the implications for understanding routine dynamics. The authors conclude that granularity is a key construct that needs to be taken seriously and suggest a four-step procedure to help researchers establish and report on the granularity of actions in their research process.

Keywords: Granularity; routine dynamics; methodological framework; action; patterning; performing

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INTRODUCTION

Actions, as the core units of observation in routine dynamics research (Feldman et al., 2021), should be reconstructed from our data in a systematic and reflective process. They are not self-evident units of observation (Schütz, 1967; Vallacher & Wegner, 1989). For scholars interested in routine dynamics the key question is how to determine the appropriate granularity for actions. What should count as one action? Is it writing a sentence in a minute on your own? Is it drafting a section over weeks with your co-authors, or publishing a chapter over the course of a year involving not just authors, but also editors, publishers, and their supporting staff? Answering questions such as these is a crucial, yet often backgrounded, part of every routine dynamics study and has important implications for how the results of our research should be interpreted.

Granularity is crucial for routine dynamics scholars because it influences the dynamics observed and the theories developed. Analyzing fine-grained actions directs our attention to smaller action patterns which often involve more agentic dynamics of interaction, driven by individual actors' situational awareness, intentions, plans, and values (e.g., Feldman, 2000). In contrast, analyzing coarse-grained actions directs our attention toward larger action patterns which exhibit more systemic dynamics, characterized by complex interdependencies, feedback loops, and nonlinearity, leading to outcomes that may diverge from actors' intentions (Kremser & Schreyögg, 2016; Kremser & Sydow, 2022). Hence, using different grain sizes in our analysis of the same case, will likely unearth rather different processes of performing and patterning and, therefore, also require different explanations.

In this paper, we want to start a conversation on the role and relevance of granularity in routine dynamics research. We first explore the granularity of actions, the central units of observation in all routine dynamics studies. Next, we address the consequences of neglecting granularity in routine dynamics studies. We then offer heuristics to help scholars systematically consider granularity when examining actions and routines. Lastly, we suggest ways to report granularity in empirical papers and discuss its implications for understanding routine dynamics.

ROUTINE DYNAMICS AND THE GRANULARITY OF ACTIONS

Deciding on the granularity of actions is an analytically consequential question for every routine dynamics study. And as we illustrate in more detail below, we find a lot of diversity with regard to the granularity of action in published research on routine dynamics. What is missing, however, is a conversation about the role and relevance of this diversity for the results of our research.

To be able to leverage this diversity in a way that can facilitate this much needed conversation, it is important to develop a conception of granularity that can be applied in very diverse research contexts. To us, this implies that we need to develop a common language for reporting on different grain sizes rather than taking a normative stance on what the "right" grain size ought to be.

Allowing for different grain sizes makes our framework useful for research that takes an etic or emic approach (see Pike, 1967), just as it can be usefully applied in research that employs a tall(er) or flat(ter) ontology (see Seidl & Whittington, 2014). If a researcher chooses to reconstruct actions from the perspective of the performing actors – if they take an emic approach – they will often but not always end up with more fine-grained actions. If they take an etic approach, they will often but not always end up with more coarse-grained actions. Regardless, it will be useful for other researchers if they have reported on the granularity of the actions in their study. The same is true for research that employs a tall or flat ontology. With a tall ontology, one might expect more fine-grained actions on the micro-level and more coarse-grained actions on the macro-level. And because of the nestedness of actions and routines, we can also expect differences between studies that employ a flat ontology. Consequently, we set out to develop a framework that outlines different grain sizes and thereby allows for a more systematic comparison and reflection on how granularity influences the dynamics we observe and the explanations we develop.

While we believe that a broadly applicable conception of granularity is necessary, it is still useful to tailor this concept to the typical needs of research taking a routine dynamics perspective. Hence, we start our deliberations by considering its typical analytical focus: the duality of performing and patterning in organizations (Feldman, 2016; Goh & Pentland, 2019). It should be noted that as a duality, performing and pattering are two sides of the same coin. We disentangle them here for analytical purposes only.

Performing focuses our analytical attention on the situatedness of action. "The idea that routines entail situated actions is a deep and important point, crucial for everything that follows" (Feldman et al., 2016, p. 506). Taking situated action as the unit of observation in routine dynamics implies an understanding of routines as "effortful accomplishments" (Pentland & Rueter, 1994, p. 488) and focuses the analysis on the specific socio-material context in which a given routine performance is embedded (Bertels & Howard-Grenville, 2016; Howard-Grenville, 2005).

Patterning, on the other hand, refers to processes where "participants engage in and reflect on action sequences, and share information and understanding through connections with other routine participants" (Turner & Rindova, 2018, p. 1253). Through patterning processes, actions are made to "fit together to form joint action" (Dionysiou & Tsoukas, 2013, p. 186). This puts our analytical focus on the ongoing coordinating work necessary not only for the performances of multiple, interdependent routines (Geiger et al., 2021; Kremser & Blagoev, 2021; Sailer et al., 2023) but also of each individual routine (Bechky & Chung, 2018; Faraj & Xiao, 2006; Jarzabkowski et al., 2012).

Taken together, the analytical focus on patterning suggests that coordinating, or more generally, structuring efforts are of particular relevance for research on routine dynamics while the focus on performing establishes situated actions as the basic unit of observation that guides routine dynamics scholars as they try to understand those efforts.

Taking this characteristic analytical stance as a given, we can identify features of granularity that are analytically consequential for research on routine

dynamics. On the most general level, we can deduce from the definition of the performative aspect of routines as "specific actions, by specific people, in specific places and times" (Feldman & Pentland, 2003, p. 101) three dimensions of an action – actor, place/context, and duration – that will play an important role in establishing its granularity. More specifically, it suggests that for routine dynamics, granularity can be usefully defined *by the number of actors, the variety of places/contexts, and the amount of time it takes to successfully accomplish that action*.

From this definition, it is evident that there will be an almost infinite range of possible grain sizes in the domain of actions. Analyzing a problem, for example, can be done by an individual person at one place in a rather short amount of time, or over the course of multiple months, by hundreds of people who are distributed over multiple locations (see also Campbell, 1988; Haerem et al., 2015; Wood, 1986). And while both of these examples could be treated as just the same, one action, this would blackbox a lot of what is interesting and relevant about the process of accomplishing this action from a routine dynamics perspective. At the same time, it also does not seem to be sensible to assume that even the smallest difference in grain size would imply significant differences when it comes to understanding how situated actions accomplish organizational work in a structured way. Therefore, it is necessary to condense this large space of possible options. In what follows, we will therefore suggest three categorical types of granularity that are empirically useful and analytically fruitful for research on routine dynamics.

Delineating Fine-, Medium-, and Coarse-grained Actions in Routine Dynamics Research

The analytical focus on *performing* and the situatedness of actions can be used to establish *fine-grained* actions in research on routines. It is established that routine dynamics is less interested in exploring the sub-conscious basis of human behavior, but is rather interested in understanding the contextual conditions that are reflected upon as actors perform routines (e.g., Howard-Grenville, 2005). Hence, the most fine-grained action that is of analytical relevance for routine scholars will be doings and sayings from one actor in a specific situation, that is in one place, at one, rather short, moment in time.

To further specify fine-grained actions, we turn to the phenomenological work of Alfred Schütz (1967). In his oeuvre, Schütz is concerned with understanding what drives and inhibits the (social) actions of a specific person. He essentially takes an emic approach to conceptualizing the unity of action by linking it to Husserl's concept of projection. He defines "the unity of the act [as] a function of the span or breadth of the projection" (Schütz, 1967, p. 62). Put simply, from the perspective of the individual actor, the limits of what that actor will likely consider as one specific action depend on how far into the future they can predict the outcomes of their micro-behaviors. For example, riding a bicycle to the university would be one action in so far as it is possible for the actor to form this "projection" and then accomplish it without having to significantly re-construct this projection while they are riding their bike to the university.

Importantly, this implies that the individual action as a unit of observation will be different for different actors, contexts, and times because the span of the projection of an action will usually change as a function of experience. When the operational task of an action is unfamiliar, difficult, or complex, the projections of actors will usually not reach very far into that actor's extended present (Vallacher & Wegner, 1987). When beginning to learn a new task an actor will have to concentrate separately on each of the specific doings and saying that are involved. However, when executing the operational task repeatedly over a longer period of time, the projection of each action usually becomes larger. That is, what an actor perceives as recognizable units in their continuous flow of activity will be changing when a task is being accomplished repeatedly.

Taking the example of a couple dance, it seems natural to assume that the span of the projection of one action will be different when two professionals or when two beginners dance with each other. The professional dancers will most likely have most of the bodily micro-movements and step-sequences already internalized so that they can project rather coarse-grained actions – a complete dance figure as a whole, for example – into their extended present. The beginners, however, will be very much concerned with focusing on how to move a specific foot in a specific place without hurting their dance partner too much. The span of projection will therefore be significantly shorter than that of the professional couple. However, as our beginner couple attends several dance lessons, they will learn different figures – complex combinations and variations of these standard sequences. Over time and with exercise these figures become the actions that make up the pattern of their dance routine, rather than the individual micro-movements constituting each individual figure. Hence, as the span of the projection of actions changes over time, so does the pattern of the routine as a whole. By building on Schütz (1967) we can comprehensively define fine-grained actions as those actions that an individual actor can accomplish "without further ado" (Schatzki, 2008, p. 122).

Turning to the analytical focus on *patterning* in research on routine dynamics helps us to establish an analytically useful distinction between the fine-grained actions of individual actors and actions of medium grain size. More specifically, shifting the granularity of one's observations from individual to more collective forms of action represents a significant analytical difference when examining patterning processes. Consequently, we propose to define medium-grained actions as those that cannot be achieved by a single individual but instead necessitate the cooperation of multiple actors. In studies that establish patterns comprised of collective rather than individual actions, a considerable portion of the inherent patterning work is going to be backgrounded during analysis. For instance, if an analysis of patterning processes begins with the collective actions of entire teams (e.g., the marketing group and the pricing team in Zbaracki and Bergen (2010) and investigates how their collective actions (e.g., "conducting a competitive analysis" or "determining a list price") are integrated into a larger pattern, it will background the patterning work that took place among individual team members to achieve these collective actions initially.

In a similar vein, we can establish an analytically valuable threshold to differentiate medium-grained actions from coarse-grained ones. Specifically, we

draw on the distinction between coordination by programming and coordination by feedback as the two primary coordination modes employed in organizations (March & Simon, 1958). Coordination by feedback refers to an ad hoc method of coordination that depends on real-time information about the current state of specific actors or "work units" (Thompson, 1967). In contrast, coordination by programming represents an impersonal mode that involves "integrating mechanisms such as pre-established plans, schedules, forecasts, formalized rules, policies, procedures, and standardized information and communication systems" (Van de Ven et al., 1976, p. 323). A vast body of coordination research demonstrates that these two coordination modes present actors with distinct challenges while simultaneously offering unique opportunities (Okhuysen & Bechky, 2009). As a result, we categorize collective actions that exclusively rely on ad hoc coordination as medium-grained, whereas those collective actions that necessitate a combination of both ad hoc and programmed coordination are considered coarse-grained.

Summing up, we have taken the processes of performing and patterning as a stepping stone to establish differences between fine-, medium-, and coarse-grained actions as empirically useful and analytically fruitful in research on routine dynamics (see Table 1). As a unit of observation, one action can be considered to be fine-grained, if this action can be performed by a specific actor without further ado. This would typically imply that accomplishing a fine-grained action will happen in one rather specific location and take the individual actor seconds, minutes, or hours to accomplish it. The threshold to medium-grained actions is crossed if an action requires contributions from a group of actors relying on ad hoc modes of coordination (by feedback). The reliance on ad hoc coordination alone also implies that medium-grained actions will typically take place in a rather specific location, allowing for immediate feedback, potentially taking one or a few days to be accomplished. Finally, the threshold to coarse-grained actions is crossed if an action not only requires contributions from a group of actors, but also requires this group to make use of a mix of ad hoc and programmed modes of coordination. By implication, coarse-grained actions typically involve a large group of actors distributed over different locations and can take weeks, even months to be accomplished.

Examples of Different Granularities in Empirical Studies on Routines

We will now apply these three granularities to an authoritative sample of empirical studies in order to get a better understanding of different granularities in routine dynamics research. By discussing some of the most cited routine dynamics

Table 1. Analytically Useful Categories of Granularity for Research on Routine Dynamics.

	Fine-grained	Medium-grained	Coarse-grained
Actor	Individual	Collective	Collective
Location	Single location	Single location	Multiple locations
Duration	Seconds to hours	Hours to days	Weeks to years

studies we illustrate how big, yet largely unreflected, the differences are with regard to what is treated as one action, and consequently one routine in the current literature.

Studies that reconstruct fine-grained actions observe the specific doings and sayings of individual actors in one specific location for seconds or minutes. Dittrich et al. (2016), for instance, study the role of reflective talk in routine change by investigating the performance of the shipping routine of a pharmaceutical start-up. In their description of the shipping routine, the authors observe fine-grained actions to (re-)construct the routine. They, for example, distill the action "receive customer order" (Dittrich et al., 2016, p. 682) which is enacted by "the sales agent or the CEO" (a single actor) more than 100 times in 12 months within the same location (presumably since the authors do not explicitly mention the location). Similarly, the action "employee X closes and seals the box" (Dittrich et al., 2016, p. 682) also provides a fine-grained description of the action "sealing a box." Together with six other actions of a comparable grain size, these actions constitute the pattern of actions that the authors describe as the shipping routine (for plates). This study, therefore, describes a rather small pattern of interaction with a focus on very concrete actions and interactions.

Turner and Rindova's (2012) study on garbage collection routines can serve as an example that uses a medium grain size to reconstruct the actions that together form a routine. The authors identify, for example, the action "crews return to organizational facility" (Turner & Rindova, 2012, p. 29). This action was enacted by a small group of people (multiple actors) and – due to the fact that the performance of the entire routine took one working day – most likely took the team minutes to hours (duration of action) to return to the facility (location/context) (Turner & Rindova, 2012). Being a rather small group that interacted on a daily basis, actors could very likely rely on an ad hoc mode of coordination. As a result, this action could be classified as being of medium granularity. The resulting pattern describes how a whole team – rather than a specific individual – addresses the needs of other groups, like their customers, in accomplishing their work.

Howard-Grenville's (2005) investigation of a roadmapping routine in a high-tech manufacturing firm, which is central to the organization's strategic planning processes, operationalizes actions quite differently than the two previous studies. The collective action of "executing a roadmap" (Howard-Grenville, 2005, p. 624), for example, involves a large group of engineers dispersed throughout the organization, likely in various locations. We can surmise that the enactment of this one action alone already takes an extended period of time (possibly months or even a year), as completing the entire roadmapping routine requires over two years. The substantial number of people and the long duration needed for this action suggests that the actors need to rely on planning to coordinate their contributions. Thus, this is an example that uses coarse-grained actions. Since this holds true for the majority of the seven actions constituting the roadmapping routine, we would classify the entire routine as a large pattern.

Directly comparing studies that construct their actions with different granularities immediately highlights the importance of these differences for our understanding of routines. When comparing actions performed by individual actors

in a specific location, completed within seconds or minutes, to actions that take months or even years to be completed and are carried out by a large group of actors across different departments, it does not seem reasonable to assume that they are essentially the same when it comes to the dynamics of performing and patterning. For example, it seems reasonable to assume that the dynamics of smaller routines, like Dittrich et al. (2016) shipping routine, are by and large the consequence of reflective and intentional actions. This, however, is much less likely for the dynamics that will drive Howard-Grenville (2005) roadmapping routine. Research on strategy processes in comparably large organizations illustrates how the dynamics of these much larger patterns are driven by systemic forces that can easily veer out of control of the performing actors (e.g., Koch, 2011).

THE PROBLEMS OF SIDE-STEPPING GRANULARITY IN ROUTINE DYNAMIC STUDIES

The above examples of routine dynamics studies illustrate that there are significant differences across different studies when it comes to the issue of granularity. Comparing the different operationalizations of action reveals that there seems to be no established agreement, implicit or explicit, as to what should be understood as one action – the smallest analytically relevant, or atomic, unit of observation – in routine dynamics studies. Instead, we find a wide variety of differences ranging from fine-grained actions like "sealing a box" (Spee et al., 2016), that can be accomplished by a one person in a minute or less, to coarse-grained actions like "executing a roadmap" (Howard-Grenville, 2005) that will require contributions from hundreds of actors over the course of several months, maybe even years. We also find that a considerable share of the studies does not systematically report the information that would enable the readers themselves to properly and easily establish the granularity of the analyzed routines.

Notwithstanding the important insights that routine dynamics studies have provided us with (Feldman et al., 2021), we believe that further progress in our field will in part depend on routine dynamics scholars becoming more systematic in reporting and reflecting on the granularity of their observations. We will now try to further substantiate our concerns by discussing what appears to us to be among the most relevant differences that we overlook, if we keep ignoring granularity. To do that in a more systematic fashion, we will discuss how each dimension of granularity – number of actors, distributedness across locations, duration – is relevant for understanding key epistemic interests of research on routine dynamics. In addition, we will also discuss the problems that might arise if we construct a routine with actions that have very different grain sizes.

The Relevance of the Number of Actors

The number of actors involved in performing an action will clearly make a difference to both performing and patterning. A researcher who reconstructs fine-grained actions from their data and uses it to understand the endogenous dynamics

within a routine will end up analyzing the dynamics of interaction between specific individuals trying to accomplish some operative task. Understanding these dynamics requires us to understand individual capabilities (Selznick, 1957), as well as motivations and needs (Steers et al., 2004) for performing specific action(s) and the goal(s) that actors seek to accomplish, their emotions (Fineman, 2000) and how they coordinate with other actors in close vicinity, for example, via role-taking (Dionysiou & Tsoukas, 2013) or boundary performances (Geiger et al., 2021).

Studying medium-grained actions involves groups or teams that jointly perform a specific action, and therefore, brings entirely different challenges of performing and patterning to the fore: Different groups that will likely have different values and norms need to find an agreement on how to collaborate, which alerts us to issues of power play and politics between groups with different interests (Burns, 1961; Crozier & Friedberg, 1981), it reminds us about the political nature of decision making (Cohen et al., 1972) and it foregrounds questions of group composition (Van Knippenberg et al., 2004). Also, knowledge sharing strongly depends on common occupational conventions, skilled performances, and the norms and values of a shared (functional) community (Lave & Wenger, 1991; Wenger, 2000).

Studying the performance of coarse-grained actions by larger groups will likely focus our research on the more formal and strategically relevant actions taken in an organization, for example, by different departments that work toward implementing a given strategic program (Jarzabkowski & Balogun, 2009). Trying to understand such processes will again raise different questions: the culture and sub-cultures of the different units might play a significant role (Kellogg, 2011), the interdependence between these departments might vary (Lawrence & Lorsch, 1967) and questions of goal alignment and goal conflict might come into play (Gilbert, 2006; Salvato & Rerup, 2018).

The Relevance of the Distributedness of Action Across Locations

The degree to which an action is distributed across locations has significant implications for performing and patterning. When performing an action only takes place at a single location it is much more likely to be based on a shared understanding of situational contingencies. The close proximity of actors also allows for increased efficiency, collaboration, and cohesion among team members. For instance, a surgical team can effectively coordinate their actions and respond to changes in a patient's condition quickly, leading to better outcomes (Faraj & Xiao, 2006). In this context, face-to-face communication and non-verbal cues, such as body language, facial expressions, and gestures, play a significant role in establishing mutual understanding and coordinating actions, facilitating patterning processes and thereby contributing to a coherent pattern of action (LeBaron et al., 2016).

Performing and patterning of actions that take place across multiple locations is again different. Achieving a shared understanding and consistent patterning of actions can be difficult due to factors like differences in time zones, cultural norms,

and communication styles. As it is well established, geographic dispersion places significant constraints on the social functioning of a group (Cramton & Webber, 2005, p. 759). People who are physically distant, for instance, communicate less often than people who are proximate (Conrath, 1973; Cramton, 2001; Gullahorn, 1952). This affects the coordination among the actors as more distance generally leads to less diffusion of task related information (Keller & Holland, 1983; O'Leary & Cummings, 2007), generates more conflict (Hinds & Bailey, 2003), and can spark very different dynamics of knowledge creation (Baralou & Tsoukas, 2015) to name just some of the most prevalent effects. In these cases, actors need to rely more on digital communication tools, such as video conferencing, instant messaging, and collaborative software platforms, to share information and coordinate their efforts. Developing clear communication protocols, providing regular updates, and establishing a shared understanding of goals and expectations can help overcome some of the challenges associated with performing and patterning actions across multiple locations (Lee et al., 2020).

The Relevance of the Duration of Action

Besides the number of actors involved and the geographic location, temporal differences also raise very distinct problems and challenges for performing and patterning of actions. When actions can be performed within a short duration, such as minutes or hours, like "receiving a customer order" (Dittrich et al., 2016), actors face a significantly lower degree of uncertainty compared to longer-duration actions like "executing a roadmap" (Howard-Grenville, 2005), which may take months or even years to be accomplished. Several factors contribute to this increased uncertainty. First, the external environment may change (Davis et al., 2009), necessitating adjustments to the initial plans or strategies. For example, market conditions may shift, new competitors may emerge, or technological advancements may render existing processes obsolete. Second, the availability of actors may change over time (Shen & Cannella, 2002). Employees may leave the organization, take on new roles, or face competing priorities, making it challenging to maintain continuity and coherence in the patterning of actions. In addition, the longer the duration of action, the more difficult it becomes to maintain motivation, engagement, and focus among team members. Third, longer-duration actions may require more complex coordination and communication efforts to be performed. This complexity may increase the likelihood of misunderstandings, delays, or conflicts among actors, leading to disruptions in performing and patterning actions.

The Relevance of Coherence

Establishing granularity based on the number of actors, the distributedness across locations, and the duration is not only important for comparing different routine dynamic studies, but also for the internal coherence of a study. Our key point here is that for re-constructing patterns it is fundamental that what is patterned together, that is, the actions, is coherent in the sense of granularity (see also Pentland, 2003). Amalgamating actions of different granularities into the same

pattern mixes quite different challenges of performing and patterning and hence does not allow to meaningfully analyze the dynamics of the pattern.

Take the example of three actions from firefighting work: connect a fire hose to a hydrant; extinguish a fire; plan firefighting stations. All these actions differ with regard to granularity. Connecting a fire hose to a hydrant is accomplished by two firefighters who are at the same location and takes between one and two minutes. Extinguishing a fire, however, is accomplished by a group of 10–12 firefighters who are operating at different locations of the incident and need to communicate via radio and it takes between 10 and 600 minutes to perform the action. Planning firefighting stations is accomplished by a large group of decision makers, it takes place at different locations and takes months to years to be finalized. Describing these three actions as being part of the same pattern of "firefighting" leads to significant problems if we want to analyze and understand the dynamics of such a pattern. First, in connecting a firehose to a hydrant, firefighters contribute to a larger pattern of firefighting, but their immediate action is following other, fine-grained actions to which they respond. Here coordination requires that the fire hose is ready, the hydrant is in close proximity and the hose can be carried to the incident. Between those actions, very distinct dynamics unfold given different situations, the availability of firefighters, their skills, and so on. The larger pattern of firefighting follows very different dynamics since it requires the coordination of multiple teams across different locations. The planning of firefighting stations requires the coordination of political interests, the resourcing of funds, the availability of space, and so on, which again unfolds with very distinct dynamics which are potentially beyond the scope of individual actors. Hence, taking patterns as units of analysis requires that the actions that make up this pattern have similar grain sizes. Otherwise, one would see and compare very different ways of interaction and interdependence without being mindful of these differences.

However, it is important to note that we do not insinuate that one cannot zoom in and out (Nicolini, 2009) working with different granularities in the same research project. Quite the contrary. Depending on the research question, it might be necessary to first establish patterns that are based on fine-grained actions and then zoom out to analyze the dynamics that might arise between those patterns (Kremser & Sydow, 2022). This means that one study might very well use different granularities to understand how the dynamics of smaller patterns influence and drive larger patterns and vice versa. However, researchers should always be mindful of these differences and reflect on the consequences of using different granularities during their analysis.

CONSIDERING GRANULARITY OF ACTIONS IN THE RESEARCH PROCESS

In the following, we sketch-out a four-step procedure that is meant to support scholars in their efforts to establish and reflect on the granularity of actions. This procedure provides a practicable and pragmatic way to address the above-mentioned challenges. It is important to note that for explorative and qualitative-interpretive

research designs, which are the basis for many routine dynamics studies (Dittrich, 2021), and here especially at the beginning of one's research, it might be quite difficult, even detrimental, to go through all steps of this process. Instead, it is more likely that the granularity one uses to reconstruct actions will change and evolve just as the research question does.

Depending on the stage of the research project, therefore, different steps of our procedure may become more relevant. For example, it will very likely not be useful (or possible) to already cluster actions into routines at the very beginning of a research project when one starts the observation. However, it might still be helpful to reflect on the granularity of actions that fit best with the (initial version of the) research question. This can help clarify one's interests as well as guide first data collection efforts. If and when in the process of collecting data and doing some preliminary analysis the research question evolves, it will again be useful to reflect on the implications this might have for establishing the appropriate granularity of actions. As the research project matures and the research question becomes clearer, it will also become more important to have a better understanding of why and how one has chosen to identify routines in one's research.

Therefore, while, to remain reader-friendly, we chose to report this approach here as a stepwise procedure, it will often turn out to be a more iterative back and forth between these steps. The general idea is to establish an appropriate grain size in light of the research question, to identify actions accordingly, and then cluster these actions into distinct patterns, that is, routines.

Establishing Granularity

The first step is meant to address the two most basic concepts in routine dynamics studies: Situated action (unit of observation) and patterns of action (unit of analysis). Researchers should generally ensure that the granularity of the unit of observation fits the granularity of the unit of analysis. If the analysis focuses on interaction dynamics between individual actors, a fine-grained unit of observation would allow researchers to identify the performing and patterning challenges that will arise for these individual actors. Hence, observing fine-grained actions allows us to study the enabling and inhibiting conditions and context for individual actions and the way these actions are coordinated into patterns of interaction that emerge between specific individual actors.

If the unit of analysis, however, focuses on the patterning of groups, that is, how groups jointly enact patterns by coordinating ad hoc, a medium grain size is appropriate. This allows us to study how hetero- or homogenous groups or teams interact, we can see what enables and constrains their (collective) actions and how they coordinate these actions into patterns on the fly. This, however, limits our ability to study how individual actors align their actions with their group members, what makes an individual actor come forward with one action and suppress another, and so on.

Studying performing and patterning of coarse-grained actions means we are interested in the work of larger groups (i.e., departments or even organizations) that expand over long periods of time, is dispersed across different geographical

locations, and consequently, relies also on programmed modes of coordinating. A coarse-grained unit of observation allows us to see how large groups, departments, or even organizations behave as they perform their work over longer observation intervals. At the same time, however, it reduces our ability to include the challenges of performing and patterning confronted by individual actors or small groups.

The appropriate granularity of our observations is therefore guided by the research question and the phenomena of interest. As we have pointed out, it is important that the granularity of the unit of observation fits the unit of analysis. Fitting the granularity of the unit of observation to the unit of analysis is important to ensure that our study is actually able to (un-)cover what we want to see. As researchers we need to be mindful to establish what we "want to be able to say something about at the end of the study" (Patton, 2014, p. 400), even if, and maybe even because, this changes as the research progresses.

Identifying Action(s)

Once the aspired granularity for the study has been established, researchers need to identify actions accordingly. At this point, it seems important to remind ourselves that identifying and delineating actions is neither straightforward nor self-evident. It requires the researcher to reflect on their analytical focus. Reconstructing fine-grained actions refers us to actions that one individual can accomplish for themselves "without further ado" (Schatzki, 2008, p. 122). This requires observing the actions of an individual actor and identifying the boundaries of each action carried out by that actor.

To identify these boundaries, it may be helpful to look for behavioral chunks in situations where an actor typically has to scan their surroundings for additional information about what other routine participants are doing. Also, the moment when an actor typically has to bring in additional resources or artifacts to be able to move on can serve the same purpose. In addition, longer interruptions or breaks and changes in location are useful indicators for cut-off points that enable the researcher to analytically decompose the continuous stream of activity of an individual actor into discrete chunks of action. Furthermore, "hand-offs" (Pentland et al., 2017) between individuals could be indications of the boundary of an individual action. As has been outlined above, the span of projection that constitutes the boundary of an individual action, varies substantially across actors and over time. Experts might have a broader span compared to novices. Researchers thus need to be very close to the actor to actually find out her individual span of projection, preferably via interviews and observations.

A medium-grained unit of observation refers us to collective actions that a small group of actors can accomplish by only relying on ad hoc forms of collaboration. To identify actions of this granularity it will again be useful to look for hand-offs; in this case between groups. Oftentimes, hand-offs between groups involve partial results (Kremser & Schreyögg, 2016), or boundary objects (Spee et al., 2016). Again, longer interruptions or breaks within the remaining chunks of interaction are a good indicator for additional cut-off points that separate

collective actions of the same group from each other. Alternatively, one could also look for points in a typical performance where it *would* be possible for the group to have a long interruption without having to start all over again. For example, interrupting a meeting – understood as a collective action of a small group – for multiple days would probably make it necessary for the group to start all over when they meet again. It would thus serve as a proxy for delineating a boundary around a medium-grained action. The researcher might want to look for longer interruptions and/or hand-offs between groups or teams which are an indicator of the limits of ad hoc forms of coordination.

Finally, identifying coarse-grained actions, where each action requires some amount of up-front planning for multiple groups to be able to accomplish a joint outcome, requires researchers to look for different boundaries. Useful indicators for such boundaries are formally or informally prescribed outcomes of collective actions that are expected from other groups involved in the same performance. Researchers could, for example, look for those moments where plans that are necessary to accomplish the subsequent action are negotiated and/or communicated. Also, the moments when intermediate outcomes of a performance are being reviewed before the next action is being performed are indicators of analytically useful cutoff points in decomposing empirical data into coarse-grained actions. In general, it will be useful to look for those moments during the performance where the collective actors re-negotiate and specify their mutual expectations regarding the outcomes of a specific coarse-grained action.

Clustering Actions into Routines

After having established the granularity, and delineated the boundaries of actions, the next step is to cluster these identified actions into meaningful patterns, that is, routines. In this regard, the existing literature refers to operational tasks (Rerup & Feldman, 2011), purposes (Pentland & Feldman, 2007), programmed interfaces (Kremser & Schreyögg, 2016), spaces (Bucher & Langley, 2016), and performative boundaries (Kremser et al., 2019) as potential starting points for identifying routine boundaries. A comprehensive discussion of the pros and cons of these different approaches is outside the scope of this paper. For us, it is sufficient to establish that scholars need to identify single routines as sufficiently distinct units of analysis (see also Pentland & Feldman, 2005).

It is important to note that different granularities will result in different boundaries of routines. Depending on granularity, researchers would identify different boundaries of actions and hence would arrive at different routines. For instance, in observing the same phenomena, a researcher who operates with medium-grained actions might identify one routine whereas a researcher reconstructing fine-grained actions would identify multiple, interdependent routines – which might imply very different dynamics (Kremser & Schreyögg, 2016). This stresses once more the importance of being mindful of granularity and shows that granularity should not be arbitrarily established. The consequences for understanding routines and their dynamics are – as outlined – significant.

Consistency Check

The last step in our procedure to establish granularity in the research process is a consistency check. This is important because inconsistencies in the granularity of actions imply that the researchers would see and compare very different ways of interaction and interdependence without being mindful of these differences. To ensure consistency, researchers have to ensure that all actions that are clustered into one distinct routine are of the same granularity. One routine, for instance, should not contain actions that are carried out by one individual without further ado and actions performed by a group of actors over longer timespans. This could distort the insights into the performing and patterning processes involved. If researchers aim at studying the interdependence of different routines, it is important that the routines that are studied in their independence are all established with a similar grain-size. It is, however, important to point out that the heuristics we have outlined do not constitute a straightforward procedure. Rather, it means continuously and iteratively reflecting on granularity and ensuring a fit throughout the research process. Only this ensures rigorous and comparable results.

REPORTING ON GRANULARITY

After having provided some useful heuristics to establish granularity within the research process, we now shortly outline some recommendations on how granularity could be reported in writing up research on routine dynamics. Reporting on granularity is important for at least two reasons: First, it provides other researchers with a reconstructable chain of evidence (Yin, 2009) from the research question to the proper identification of actions and routines. Second, it is important because it enables routine dynamics scholars to contrast and compare findings across different studies. Reporting on granularity thus helps us in putting findings and contributions into perspective and also highlights important limitations for each of the studies.

From a pragmatic perspective, reporting on granularity should be comprehensive, but does not need to be too extensive. More specifically, we suggest to add information to the methods section, the results section, and in the limitations. In the methods sections, for example, as part of a first description of the case or focal phenomenon, it would be useful to mention why the study has chosen which granularity. Next to that, one sentence that explicitly states the granularity of actions would greatly help others to properly understand how actions have been identified and how they have been clustered into routines. In the results section, we would suggest that researchers report a table that specifies all actions that belong to a particular routine. Ideally, such a table should also specify at least the actor(s) and location(s) of each action. Since the exact duration of each action is often neither easy to establish nor useful in general, we suggest reporting the typical duration of a complete performance for each routine. Finally, and especially for more complex study designs, it would be very useful for the audience to better understand the limitations that come from the chosen granularity. Researchers

should therefore explicitly reflect on the aspects of performing and patterning that they chose to background by means of establishing a specific granularity for their analysis.

CONCLUSION

In this paper, we have argued that granularity is an important dimension for studies of routine dynamics and studies of processes and practices that take action as their core unit of observation. We have outlined that for routine dynamics studies, which focus in their analysis on performing and patterning processes, it appears appropriate to distinguish between at least three granularities. Each foregrounds specific challenges of performing and patterning while at the same time backgrounds others. As we have argued side-stepping the concept of granularity will impede the comparability of studies since different grain-sizes bring different challenges of performing and patterning to the fore. This paper suggests pragmatic ways for establishing the appropriate granularity throughout the research process and gives some recommendations on how to report on granularity in papers.

It is, however, important to point out that our framework does not and cannot propose an objective and always appropriate definition of the unity of an action. In fact, we strongly oppose such an approach. Instead, we argue that routine dynamics studies need to take the concept of action seriously, both conceptually and methodologically. This implies that studies of routine dynamics need to explicitly reflect on and specify the granularity the study is based on. Researchers should be explicit about the reasoning behind the established granularity and should report on it in their studies. Addressing the issue of granularity thus sheds light on an important construct in routine dynamics studies that has long been side-stepped and only implicitly been addressed in the research process.

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