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CAN ROUTINES BE INHERITED? A MICROFOUNDATIONAL APPROACH TO SPINOFFS

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1. Introduction

Evolutionary accounts of the theory of the firm chiefly relies on the concept of organizational routines (hereafter just routines). Routines give stability, reduce cognitive loads, improve efficiency and flexibility of organizations. Even if routines have been widely studied and much has been accomplished in our understanding of their microfoundations and dynamics (Feldman et al., 2016), there is one aspect that has been missing in the debate, that is the transmission or inheritance of routines from an existing organization to a new organization.

Nelson and Winter (1982) likened routines to genes that carry out inertial structures of information about persistent features of the organization. Even if the authors do not directly address the inheritance of routines from existing to new organizations, a stream of literature about spinoffs, i.e. new ventures founded by ex-employees in the same industries of their parent, explicitly assumes that routines' inheritance represents the platform of their emergence (Klepper and Slepper, 2005; Klepper, 2009; Agarwal et al., 2004). As the argument goes, spinoffs inherit routines from the parent companies similarly to a newly born that inherits the genes from her parents. The founders are the conduit of the inheritance as they are exposed to parents' routines and then replicate them to the new venture. Routines' inheritance or replication supposedly explains the evidence about the higher performance of spinoffs, specifically those that come from successful parents, relative to other startups (Dahl and Reichstein, 2007; Eriksson and Kuhn, 2006; Klepper, 2009; Furlan and Grandinetti, 2016).

Despite the evidence produced by the literature on spinoffs, many studies on organizational behavior stress the inertial and context-specific nature of organizational routines. Even for an existing organization, trying to replicate its routines internally is a daunting task. Indeed, tensions between replicating and adapting the routine to the new contextual conditions always exist. When routines are removed from their original context they can be meaningless, it can be difficult to understand what is essential about the routines and what is peripheral, there can be problems in transferring tacit knowledge and routines can be incompatible with the new contexts (Becker,

2004). This difficulty in transferring routines is aggravated by the fact that a routine always involve multiple actors and a collection of understandings of different individuals with different point of views and different positions within the organization (Feldman and Pentland, 2003). The aggregation process, that is necessary for the replication, is not even remotely deterministic, since it is based on social interactions that are causally ambiguous and lead to variable and unlimited results. In sum, the replication of a routine from an existing to a new organization seems highly unlikely.

In this paper we maintain that a microfoundational view of the routines can help to solve the conundrum between the apparent impossibility to inherit routines by spinoffs and the empirical evidence of its existence. Particularly, we are aimed at identifying the internal features that make a routine a possible candidate to be inherited. Assuming Feldman and Pentland's (2003) distinction between the ostensive and performative aspects of routines, and relying on theory of symbolic interactionism advanced by Dionysiou and Tsoukas (2013), we maintain that these features are related to the sharing of participant schemata (included in the ostensive) in relation to the action dispositions that are embedded in the procedural memory of the participants.

2. Building blocks: routines, replication, inheritance

In an extensive literature review of routines carried out after twenty years from the seminal contribution of Nelson and Winter (1982), Becker (2004) notices that scholars have not always had the same idea of what routines are. However, after the more recent and influential wok by Feldman and Pentland (2003), it has become quite common referring to routines as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (p. 94). We adopt the same definition in this paper.

For the sake of our analysis, we focus our attention to those zero-level, daily routine operations (as opposed to higher-order routines or dynamic capabilities) that require a strict adherence to rigidly designed processes or, in other words, to a sequence of interdependent events. As Felin et al. (2012) point out, examples of these routines are found in organizations that need to execute activities in a highly reliable manner (nuclear power stations, chemical plants, hospitals, etc.) or that require efficient replications across multiple units (franchises in fast food or casual dining restaurants). Even though such types of routines involve standard ways of operating, their deployment may allow for managerial discretion. As a result, action pattern that repeats can

potentially vary from one performance to the next (Feldman et al., 2016). However, these routines are less subject to context-specific and stickiness problems (Baker, 2004) making possible their transferability to new contexts (Winter and Szulanski, 2001; Szulanski and Jensen, 2004).

Our focus revolves around the possibility for a spinoff to replicate, or more precisely inherit, routines from the parent firm. Unfortunately, both concepts of routines' replication and inheritance have not been uniquely defined in the literature. When Nelson and Winter (1982) talk about replication of routines they refer to the case of establishing a new plant identical to the original and employing the same routines. Along the same line, for Winter and Szulanski (2001) a replication process is the creation of similar outlets that deliver a product or perform a service, the so called "McDonalds approach". Nelson and Winter (1982) distinguish between replication and imitation: the former happens within the boundaries of the organization, the latter is an inter-organizational process. In a review on evolutionary theories, Breslin (2008) defines both processes as replication or even retention a term introduced by Campbell (1965) in his theory about socio-cultural evolution. Also Hodgson and Knudsen (2010) refer to both processes as replication but they use the terms replication and inheritance interchangeably. Later on, Hodgson (2013) clarifies that the term inheritance is more appropriate for spinoffs, following the stream opened by Klepper (Klepper, 2001; Klepper and Sleeper, 2005) that considers spinoffs a form of knowledge or routine inheritance.

To get rid of ambiguities present in the literature, we find useful to adopt the definition of routine replication proposed by Szulanski and Jensen (2004, p. 349): "Replicating a routine involves the creation of another routine that is similar to the original routine in significant respects". Even if this definition derives from a study on the efforts of intra-organizational replication conducted by Rank Xerox in the early 1990s, it fits three different forms of routine replication. First, intra-organizational replication that Nelson and Winter (1982) simply call replication referring to the situation where an organization grows by replicating parts of itself[1]. Second, replication via imitation that involves two existing organizations that take the role of imitatee and imitator, respectively. Third, replication via spinoff studied by Klepper and colleagues. In this case the

[1] In this intra-organizational replication we include parent or corporate spinoffs, when a company sets up a legally separate organization (Helfat and Lieberman 2002).

replication process is carried out by an individual (or a group of individuals) that leaves an established organization (the parent firm) and founds a new one (the spinoff).

The three forms of replications can be classified using two dimensions (figure 1): the fact that they involve one or two organizations; and the direction of replication that can be vertical for intra-organizational replication and spinoffs and horizontal in the case of imitation. In the two forms of vertical replication, that have counterparts in the biological reproduction, it makes sense to talk about routines' inheritance. With regards to both forms, the inheritance process can involve one or a set of routines. Our analysis is limited to the replication-inheritance via spinoffs (hereafter just inheritance) of a single routine.

[Figure 1 - around here]

3. The conundrum of routines' inheritance

The reference author for the spinoff literature is Steven Klepper. In his first work on the subject, Klepper (2001) maintains that results of empirical studies on spinoffs can be adequately interpreted from an evolutionary perspective that considers spinoffs a form of reproduction through which new ventures inherit from parent company the routines. Klepper explicitly refers to the evolutionary theory of Nelson and Winter (1982) that is based on the analogy of routines as genes. The two evolutionary economists develop this "genetic" view starting from the concept of standard operating procedures advanced by Cyert and March (1963) in their behavioral theory of the firm.

The key concept of the evolutionary theory developed by Nelson and Winter (1982) is the analogy between genes and routines that coincide with standard operating procedures of Cyert and March (Augier and March, 2008; Gavetti et al., 2012). This analogy allows the authors to identify that stability factor without which an evolutionary theory cannot exist. As the argument goes, if routines of the organization are genes, then they determine the behaviors of the organization (as instruction sets) and they are replicable.

Regarding the first point, routinization leads the firms to store knowledge that guide their behavior and drive their future behaviors according to the routines they have used advantageously in the past. Routines are the memory of the organization similarly to what Levitt and March (1988) claim in their famous essay on organizational learning.

On the point of replication, as defined in section 2, the analysis of Nelson and Winter identifies two forms of routine replication. The first corresponds to the case of establishing a new plant identical to the original one and employing the same routines. In this form of vertical replication the existing routine serves as a template for the new one analogously to what happens in biology with genes. However, organizational copying is decisively more difficult than biological copying since knowledge stored in the organizational routines is, at least partially, tacit. Even more difficult, but still possible, is the imitative or horizontal replication where the source routine that one wants to copy is not available as a template. Nevertheless, the difficulties related to the replication can be reduced in different ways. For example, Nelson and Winter argue that imitation will be more likely if the imitator hires away from the imitatee those employees that are directly involved in the source routine or better those "that the imitatee would reasonably want to transfer to a new plant in an attempt to replicate the existing one" (p. 124). Even if Nelson and Winter widely address the topic of replication, they do not mention spinoffs as a specific form of vertical replication because their attention is focused on the internal growth of firms rather than on their reproduction.

The analogy routines-genes is used also by Hodgson and Knudsen in their ambitious attempt of building a framework able to interpret the evolution both in nature and in human society epitomized as "generalized Darwinism". Routines are defined as stored knowledge that allow to instruct organizational behaviors. From the distinction between routines (genotype) and behaviors (phenotype) derives the fact that it is impossible to replicate behaviors from an organization to another but only knowledge that drives them (Hodgson and Knudsen, 2004). The replication is the process through which the routine is copied. The copy routine will never be an exact replication of the source routine but the replica can be very similarity to the original. In general, Hodgson and Knudsen (2010) talk about replication and inheritance interchangeably but, in a more recent work, Hodgson (2013) distinguishes between the diffusion of routines from organization to organization (imitation) and their inheritance through spinoffs adding that faithful copying of routines through imitation is often more difficult than through spinoffs.

All in all, Nelson and Winter, and subsequently Hodgson and Knudsen, identify in routines the key concept of their theories of organizational evolution. Contributions of these authors converge on the point of replication: routines, whose structure is cognitive, are replicable even if the replication process is quite difficult.

Since the ‘90s a vast literature specifically addressing routines has formed. This literature has extended the concept of routine to a broader typology than standard operating procedures and, at the same time, has deepened the nature of routines identifying several factors that confer to routines a high degree of stickiness. Becker (2004) discusses five of these factors:

- routines are embedded in an organizational context, specific to this context and rich in tacit knowledge therefore they can become largely meaningless when they are "separated" from the context where they originated (Szulanski and Winter, 2002);
- routines are collective entities or better processes based on the active role of individuals (or participants) and are formed, enacted and changed through recurrent interaction among multiple actors; continuous interplay between collective and individual level makes them difficult to study (Cohen and Bacdayan, 1994);
- even if they are recurrent patterns of interaction, routines continuously change (Feldman, 2000); generally they change through small steps brought about by participants in a path-dependent and organization-specific way;
- even if routines can be codified, as in the case of standard operating procedures, they always require interpretation and this makes them heterogonous across time and space (Narduzzo et al., 2000);
- routines are understood as cognitive regularities or behavioral patterns (Feldman and Pentland; 2003), and these dimensions are inextricably intertwined making them specific to a certain group of people in a certain organizational context.

These five factors confer to routines a high degree of stickiness making the replication of routines a very difficult task. The highly contextual nature of routines reduces the probability of exact replication to zero (Becker, 2005; Pentland and Feldman, 2005). Moreover, as already noticed by Nelson and Winter (1982), the intra-organizational replication differs from the other two forms of replication for the presence and availability of a template (i.e. a working example). The availability of a template facilitates the job of the replicator and increases the chances to obtain a good copy of the routine. Using the words of Szulanski and Jensen (2004, p. 349), "in replicating the routine the firm possessing the working example can directly observe the routine in action and use it as a reference during the replication process". Obviously, the condition of having a template is not present neither in the replication via imitation nor in replication via spinoff. This makes evident the fact that, as noticed by Friesl and Larty (2013), there are a number of studies

on the intra-organizational replication of routines, while studies on the other two forms of replication appear scarce at the least.

All in all, the whole body of research on routines and their replicability is at odds with the theory of knowledge inheritance advanced by Klepper (2001). This theory chiefly relies on the contribution of Nelson and Winter (1982) and interprets spinoffs as form of replication through inheritance. As we see before, studies on organizational nature and dynamics of routines consider this form of replication highly unlikely. Klepper and his fellow researchers provide convincing empirically evidence in a considerable number of industries about the existence of routines inheritance (Klepper, 2001; Klepper and Sleeper, 2005; Agarwal et al., 2004; Dahl and Reichstein, 2007; Eriksson and Kuhn 2006; Klepper and Anderson, 2013; Furlan 2016), although this evidence only indirectly proves the inheritance process. Empirical findings rest on two main stylized facts (Klepper, 2009). First, spinoffs' performance is better than the performance of any other types of entrants. Second, leading incumbents have higher spinoff rates and the performance of these spinoffs is better than the performance of spinoffs coming from less successful firms. In other words, spinoffs inherit routines from their parents and the better the parent the better the routines they inherit. However, even if spinoffs' literature demonstrates the competitive "resistance" of the progeny, scholars do not deny, or even discuss, the inherent difficulties of the replication process (Klepper, 2009; Furlan and Grandinetti, 2016). They simply assume the inheritance and use the empirical evidence synthetized above as the proof of this assumption. As Agarwal et al (2004) maintains "genealogical knowledge links do exist between parent and progeny organizations". Interestingly enough, Agarwal and colleagues show that founders of spinoffs are better in transferring industry knowledge than employees that move from one firm to another.

Empirical evidence on spinoffs seems to prove the heritability of routines while literature on routines leads to believe that this event is highly unlikely. This evident conundrum calls for a reframing of routines inheritance from a conceptual and a theoretical standpoint. This is the objective of the next two sections.

4. The process of inheritance: a microfoundational view

From the literature review of the previous section we conclude that the replication of a routine into a new firm is a difficult task. Even for an existing organization, trying to replicate its

routines internally is a daunting task. Indeed, tensions between replicating and adapting the routine to the new contextual conditions always exist, the so called replication dilemma (Winter and Szulanski, 2001; D'Adderio, 2014). The replication between two different organizations (i.e. imitation or spinoffs) is even more difficult since the replicatee normally does not have access to the template to directly observe the functioning routine.

A microfoundational view of the routines can help to solve the conundrum between the apparent impossibility to inherit routines by spinoffs and the empirical evidence of its existence. A microfoundational lens will allow us to analyze the constituent parts of the inheritance process isolating the conditions under which this process is more likely to happen.

But before delving into the constituent parts and discuss the conditions that facilitated the routines' inheritance, we need to define the inheritance process using a microfoundational approach. Microfoundations are a theoretical explanation of a phenomenon located at level N at time t (N_t). In its simplest version, a base-line microfoundation for level N_t lies at level N-1 at time t-1 predating phenomenon at level N (Felin et al., 2012).

In our case, what we seek to explain the routines of the spinoff at time t (where t is a conventional date, after the foundation of the spinoff, when the spinoff is fully operational). We seek to explain the creation of these routines tracing their history back to the parent firm where the founder of the spinoff used to work. In other words, we are aimed at explaining if (and how) starting from an organization (the parent firm), we can arrive to the routines of another organization (the spinoff) after some time from the foundation of the latter.

This process involves different times and different levels of analysis:

- *Time t* (Organizational level). At this time there is a functioning spinoff with routines that involve multiple people within its organization.
- *Time t-1* (Individual level). At this time the founder founds the spinoff. There are not functioning routines or, for that matter, a functioning organization. As a matter of fact when the spinoff is founded there are only individuals (the founders) with their individual endowments (Furlan and Grandinetti, 2016).
- *Time t-2* (Organizational level). At this time the founders leave the parent firm. Within the parent firm there are functional routines in which the founders are involved.

At *time t* and at *time t-2* the functioning routines of the spinoff and the parent firm consist of an ostensive and a performative aspect (Pentland and Feldman, 2003). The ostensive aspect

represents the collection of all the understandings of the individuals involved in the routine about the abstract pattern of the routine while the routine performances are the specific actions taken by specific people at specific times when they are engaged in the routine (Feldman and Pentland, 2003). The ostensive aspect of the routine (that we can liken to its genotype) is interpreted by the people involved in the routine and these individual interpretations affect their actions that form, when taken collectively, the performance of the routine (that we can liken to the phenotype of the routine).

For the inheritance process to occur, the ostensive aspect of the routine of the spinoff at time t has to be similar, in relevant respects, to the ostensive aspect of the routine of the parent at time t-2. Ostensive aspect of the spinoff at time t similar to the ostensive aspect of the parent at time t-2 guides performances of the spinoff at time t that are similar to the performances of the parent at time t-2.

Although the ostensive aspect of the routines of the spinoff at time t cannot be directly replicated from the ostensive aspect of the routine of the parent at time t-2, it is possible to identify a link between them through the memory of the founders. Indeed, at time t-1 the founders of the spinoff have memory of the ostensive part of the routines of the parent at time t-2 and this interpretation is a result of their past experience. The inheritance process occurs when the interpretations of the founders are aggregated with the interpretations of the other participants of the spinoff to form an ostensive aspect of the routine of the spinoff at time t that is similar to the ostensive of the parent at time t-2. The starting point of this aggregation process is always the knowledge of the founders embedded in their memories at time time t-1. Figure 2 shows the whole process.

[Figure 2 - around here]

As we know from the literature review, both the ostensive aspect and performative aspect of the routine are context specific (Becker, 2004), i.e. they pertain the context of the parent organization where the routines are adopted. When routines are removed from their original context they can be meaningless, there can be problems to understand what is essential about the routines and what is peripheral, there can be problems in transferring tacit knowledge and routines can be incompatible with the new contexts. This difficulty in transferring the routine is aggravated by the fact that the ostensive aspect of a routine is always a collection of understandings of different

individuals with different point of views and different positions within the organization (Feldman and Pentland, 2003). Also the aggregation process, that is necessary for the replication, is not even remotely deterministic, since it is based on social interactions that are causally ambiguous and lead to variable and unlimited results. The replication of the ostensive aspect seems therefore highly unlikely.

In order to make our framework somehow workable, we need to identify which conditions can facilitate the inheritance process by focusing on the microfoundational parts of this process. We need to unpack the constituent parts of the routines (i.e. ostensive and performative) to identify those elements that can be inherited and isolate what are the internal features of the routines that facilitate their inheritance. In doing this, we focus on the internal working of routines leaving out the influences that particular contexts (e.g. the degree of hostility of the parent towards the spinoff, the business strategy of the spinoff, the power of the founder within the parent, etc) have on the success of the inheritance.

Our approach has two main boundary conditions. First, we assume that the environment of the parent and spinoff is the same and so the problems they are facing. For the spinoffs we are studying (i.e. intra-industry spinoffs that frequently are born geographically close to their parent) this assumption appears not unreasonable. Second, we focus only on the internal features of the routines that make the inheritance possible leaving out the aggregation process that happens at the spinoff. Surely enough, an aggregation process is necessary to transfer the routine from the parent to the spinoff. We leave the implication of our theory on the aggregation process to the discussion section.

5. Opening the black-box of routines' inheritance

In this section we develop a theory that allows us, first, to single out the parts of the routine that can be inherited and, second, the internal features that make routines good candidates to be inherited.

The performative perspective developed by Feldmand and Pentland (Feldman and Pentland, 2003; Pentland and Feldman, 2005, 2008) presents an ontology of routines in which routines are made of two aspects, one related to structure and the other related to agency. Routines are the composition of two collective dimensions that point to the abstract pattern of the interdependent actions (ostensive aspect) and to the actual performances of routines in specific times and places and by specific actors (performative aspect). The routines exist only with both dimensions.

Considering only one dimension means analyzing the routine partially. However, as we will argue, it is not possible that the spinoff inherits the whole routine but it will inherit only the ostensive part of it or, better, the founders' understandings of this aspect.

The ostensive aspect of the routine is the collection of individual understandings of the routines by the participants. These individual understandings serve as a guidance and a point of reference for individual actions. If taken collectively, individual understandings shape the perception of what the routine is and they are embedded in the memory of the participants (Miller et al., 2012; Dionysiou and Tsoukas, 2013). The ostensive aspect of a routine is therefore a stock of knowledge that is socially distributed and is likely to be distributed unevenly. Diverse participants are likely to have different understanding of the same routine depending on their roles and points of view. However, as Feldman and Pentland (2003) put it, "the ostensive aspect of the routine gains in apparent objectivity and concreteness as the views of different participants come into alignment" (p. 101).

The performative aspect of a routine is made of "the actions taken by specific people at specific times when they are engaged in an organizational routine" (Feldman and Pentland, 2003, p. 102). Even if practices and behaviors are taken against a background of rules and expectations (i.e. the ostensive aspect), a specific course of actions is always, to some extent, novel since it has to take into consideration emerging contextual conditions. Even in the presence of habitual and quasi-automatic actions, participants interpret their actions in order to make sense of what they are doing and engage in self-monitoring in order to see what they are doing. As a result of this cognitive effort, they may introduce variations from the ostensive guidance. For these reasons, the performative aspect can best be understood as inherently improvisational since it continuously adapts to ever changing environmental conditions and solves unexpected problems.

The two aspects of the routine are highly interrelated. Individuals draw from their memories to perform the routine. Therefore the ostensive aspect serves as a guidance for specific performances and also provides accountability and a reference for the actions of participants. Vice versa, by performing the routines, individuals learn new problems, introduce new, and possible more effective, courses of actions that can be retained in the ostensive aspect. Through experiential learning, participants can maintain, modify or create new ostensive aspects.

If we relate the performative view of routines advanced by Feldman and Pentland to a microfoundational view of the inheritance process, a paradox emerges. As we explained in the

previous section, the founder (or the founders) exits the parent a time *t-2* and at time *t-1* he or she founds the spinoff. At time *t-1* there is no working organizational routine, just the founders with their individual endowments (Furlan and Grandinetti, 2016). Since a routine is made of an ostensive and a performative aspect that are both collective (in the sense that they go above and beyond single participants), how is it possible to transfer a routine from the parent to the newly born spinoff starting from the individual endowments of the founders?

It is conceptually impossible to inherit the performative aspect of a routine. As explained before, the performative aspect is made of specific actions at specific times and is completely context-specific. The performative aspect is the part that allows variations and adaptability and is made of a set of unrepeatable, interlinked actions that every time the participants enact the routine will change. As such, by definition, the performative aspect of a routine of the parent cannot be inherited by the spinoff.

What about the ostensive aspect? The ostensive aspect is collectively made of the individual understandings of how the routine should be in principle (Feldman and Pentland, 2003). The ostensive aspect of a routine is an abstract pattern but any single agent does not have or possess the overall pattern neither the overall pattern is stored in a central "entity" (Miller et al., 2012). The knowledge about a routine (or better the ostensive aspect of routines) is socially distributed among the individuals who participate in the routine. The relevant knowledge of each individual participating in the routine is encoded in his or her memory (Miller et al., 2012).

Even if the ostensive aspect should not be interpreted as monolithic or as a single and unified entity (it incorporates the subjective understandings that can vary across the organization), it is nevertheless a collective endeavor with structural properties (Feldman and Pentland, 2003; Dionysiou and Tsoukas, 2013). The ostensive aspect goes over and above the subjective viewpoints of interdependent actors. The ostensive aspect should be understood as a collective construct with "structural properties that can exert influence that is independent of the interaction that initially caused the construct to emerge" (Morgeson and Hofmann, 1999). The structural part of the ostensive aspect exists therefore out of time and space and thus can account for the apparent regularity of the routines as "patterns of actions that are repeated virtually in all instances" (Feldman and Pentland, 2003, p. 103). As Parmigiani and Howard-Grenville (2011) argue "routines may be different every time we observe them, yet retain their characteristics routineness that enables us to identify them as essentially the same patterns of action" (p. 422).

The routineness is conferred by the structural part of the ostensive aspect that is not-context specific and can, virtually, be transferred and inherited. As Dionysiou and Tsoukas (2013) show, empirical findings indicate that the ostensive aspect contain participants' understandings that are widely shared within groups participating to the routines. Therefore, the participants' understandings do not simply differ and some sharing of the understandings takes place over time. It is this shared part of the ostensive that represents the structure of the routine that can be transferred or inherited. From a microfoundational view, this part is always encoded in the memory (declarative or procedural) of the participants and represents the endowment of the founders at *time t-1* of the spinoff foundation.
From all the above, the first proposition of our model emerges:

Proposition 1. A source routine cannot be inherited as a whole (i.e. both the ostensive and the performative aspect). The only aspect that can be inherited is the ostensive aspect, specifically the part made of the individual understandings that are shared among the participants of the source routine. These individual understandings are embedded in the memory of the founders of the spinoff and represent the individual endowments that are relevant for the inheritance process.

Having identified what is the content of the inheritance, we have to deal with the variety of routines with regard to their ostensive aspect.
First of all, participants frequently cannot simply put into words what they do and why. The most obvious problem is that work processes may span several different jobs and "no single individual may be aware of the overall sequence" (Pentland, 2003, p. 532). Secondly, the ostensive aspect might be codified as a standard operating procedure or it may exist as a taken-for-granted norm with a significant tacit component embedded in the procedural knowledge of the participants (Cohen and Bacdayan, 1994). Finally, the ostensive aspect of the routine may vary also in what actions are considered necessary or appropriate. While for some participants the ostensive aspect may be fairly coherent, for others the image of a routine might be similar to a collage of narratives told from many perspectives rather than representational of a single story (Pentland and Feldman, 2005).
Given the mutually constitutive nature of the performative and ostensive aspects, diversity within one aspect tends to increase diversity in the other. For example, highly contested and non-

consensual ostensive aspects will produce more variation in performances (Pentland and Feldman, 2005). Moreover, the divergence between ostensive and performative can result in the difficulty of writing rules that specify particular behaviors. The role of rules' specificity is particularly important when the routine are to be exported to new environments. Several researchers find that differences in the difficulty to transfer routines are due to the difficulty in specifying particular behaviors by means of rules and standards in different contexts (Darr et al., 1995; Winter and Szulanski, 2001; Szulanski and Jensen, 2004; D'Adderio, 2014).

Given the evidence produced above, we argue that the possibility to inherit a routine increases as the ostensive aspect becomes shared among the participants of the routines. Without any sharing, there hardly exists a routine since the behaviors of individuals will greatly vary over time and conflicts will emerge at every enactment of the routine. Indeed, as Joas (1997) argues, "a shared and binding pattern of reciprocal behavioral expectations is the pre-condition of joint activity" (p. 116). Without this shared pattern of reciprocal expectations about others' responses to one's own actions, we cannot talk about joint or collective activity and, therefore, of routines.

The shared pattern of reciprocal behavioral expectations emerges out of the situated interactions among a group of individuals that, through role taking (i.e. ascertain what the others are doing in order to align their action to their responses) and generation of situated jointly established meanings, develop cognitive schemata of their roles in (and contribution to) the joint activity (Dionysiou and Tsoukas, 2013). These schemata "reduce the experience generated by a particular instance of the joint activity to the commonalities it shares with other similar incidents; the uniqueness is removed" (Dionysiou and Tsoukas, 2013 p. 191). During the interaction, these schemata become, at least partially, shared since individuals are motivated to establish some level of shared understanding to generate those patterns of mutual consistent behavioral expectations about others' responses that are the basis for joint action. These shared expectations will, in turn, facilitate the fitting of individual lines of actions and increase the coordination among participants (Nelson and Winter, 1982; Dionysiou and Tsoukas, 2013). The more a schema is shared, the more it will provide guidance to the actions of individuals since it becomes more organized and elaborate. In other words, the more individuals interact, the more they develop (and share) schemata that become complex and provide new rules (or revise old ones) of conducts that account for an ever increasing portion of uncertainty (Weick, 1979, 1995; Dionysiou and Tsoukas, 2013). Over time, these rules will increasingly guide the performance of

participants and shape their ostensive understandings. To sum up, the more these schemata are developed through situated interactions, the more they become shared among participants and the more they will guide their actions. These schemata become something that the participants recognize as a shared, objective reality (Feldman and Pentland, 2003; Dionysiou and Tsoukas, 2013). In this context the term "shared" refers to individual schemata that are "compatible" or "congruent" among the participants of the routine (Dionysiou and Tsoukas, 2013).

As schemata are shared, the ostensive part of the routine reifies and becomes a candidate to be inherited. Indeed, each participant (regardless the position within the firm) of a routine whose ostensive is highly shared carries in his or her memory the same schemata that are made of mutually consistent interpretations and evaluations of information and reciprocal expectations concerning what actions are appropriate in the face of a variety of situations (Dionysiou and Tsoukas, 2013). These shared schemata become the part of the ostensive that goes above and beyond the individual participants and can be the content of the inheritance process. Therefore, one can identify a degree of fitness of the routine for the inheritance process that is related to the level of sharing of the cognitive schemata of the routine among participants. The proposition follows:

Propositions 2. As cognitive schemata develop and become shared among participants, the ostensive part of the source routine reifies and becomes a candidate to be inherited; in other words, the more the cognitive schemata of the source routine are shared among participants, the higher is the fitness of the source routine for the inheritance process.

The shared schemata provide mutually consistent interpretations and expectations concerning what actions are appropriate for a given situation. These compatible expectations enable the fitting of individual actions into a joint action (Dionysiou and Tsoukas, 2013). As participants interact and develop shared schemata, they also tend to generate action dispositions such as skills and habits that are stored in their procedural memory (Dionysiou and Tsoukas, 2013). By repeatedly performing instances that largely fall within shared schemata, participants develop a set of interlinked quasi-automatic responses that, collectively, represent an ecology of mutually coherent action dispositions. These dispositions enable each participant to respond to a familiar input in an appropriate but unreflective way thus economizing on his/her cognitive resource.

These dispositions are retained in the procedural memory of participants that is less subject to decay, less explicitly accessible, and less easy to transfer that the declarative memory (Cohen and Bacdayan, 1994). Even if action dispositions are stored in the individual memory of the routine's participants, if taken collectively, they are part of the ostensive aspect of the routine because they facilitate the coordination among participants thus fundamentally contributing to the successful enactment of the routine.

How does this procedural part of the ostensive aspect play out in the inheritance process? To answer this question we have to flash some light on the relationship between the shared schemata and the action dispositions.

Action dispositions emerge out of repetitive enactment of performances that are guided by the shared schemata (Feldmand and Pentland, 2003; Dionysiou and Tsoukas, 2013). The role of guidance of the shared schemata is necessary to generate those automatisms that drive the responses and actions of the participants thus ensuring coordination. Actions are canalized by the shared schemata and action dispositions emerge as a consequence. Therefore, action dispositions are largely a function of the shared schemata.

Following the above logic, starting with shared schemata stored in his/her declarative memory, any participant in the routine can create the conditions to reproduce an ostensive aspect of the routine that is similar (both in terms of shared schemata and of action dispositions) to the original one. Shared schemata and action dispositions are convergent (Pentland and Feldman, 2005) and any participant in the source routine has the possibility to start a spinoff that will inherit the routine.

However, not all situations are similar to those depicted above. There can be also situations where action dispositions have developed "out of" and "beyond" the shared schemata. Where contexts are complex and adaptation is continuously required, action dispositions may rise out of complex patterns of interdependency between participants and the environment rather than out of a strict adherence to the shared schemata of the routine. In these situations, action dispositions are not a function of the shared schemata. They become something that exceeds the shared schemata since they have grown away from them and become divergent from them.

The divergence between the shared schemata (stored in the participants' declarative memory) and action dispositions (store in the participants' procedural memory) might be related to the fact that process variety tends to be stored in procedural rather than declarative memory (Eichenbaum,

1997). As Pentland (2003) maintains, "knowledge about things is stored in declarative memory and therefore easily subject to recall, while actions are stored in procedural memory and not so easily recalled … the sequences of tasks required to do the work is more likely to be part of procedural memory" (p. 532). For example, the author reports that reference librarians perceive their work to be highly varied compared to the work of travel agents. This perception is based on the content of the work. Reference librarians cover everything from medieval French poetry to recombinant DNA, while travel agents manage three things: air, hotel, rental car. However, by observing their actual behaviors, the authors find that reference librarians actual work is much less varied than that of the travel agents. The variety in the content embedded in the declarative memory of the actors is opposite to the variety in the work embedded in their procedural memory (Feldmand and Pentland, 2005). The divergence between declarative and procedural memory is likely to happen when the routine is perceived to be simple but, in reality, the ostensive aspect is complex and contains different possible variations (or instances) in response to a variety of situations (e.g. different customer needs, different hidden problems, etc). These variations are still part of the ostensive aspect of the routine to the extent that they are encoded in a set of coherent and mutually compatible action dispositions among the routine's participants. For example, a group of assembling operators may automatically adapt the sequence of their actions when they are assembling a product that has some components made of wood instead of the usual plastic. This variation is part of the ostensive aspect of the assembly routine but it is probably not retained in the declarative memory of the operators and, *a fortiori*, in the shared schemata of the routine. If the operators have to narrate or articulate the routine, they will probably lose this particular variation that remains stored only in their procedural memory.

From the inheritance standpoint, the situation where the action dispositions and shared schemata are convergent is different from the one where the two are divergent. While in the former situation, a participant that has developed the shared schemata within the parent firm can replicate the routine at the spinoff, in the second one it is impossible for any participant in the source routine to replicate the routine at the spinoff starting from his/her declarative memory. Since there is divergence between the cognitive schemata and the action dispositions in the source routine, the action dispositions cannot be reproduced from the shared schemata. To inherit the routine, the whole team of participants has to leave the parent to found the spinoff. The team

will bring to the spinoff both the schemata (that are already shared) and the action dispositions stored in the procedural memory of each of the team member.
The two propositions follows:

Proposition 3: *When there is convergence between the shared schemata and the action dispositions, the source routine can be inherited by the spinoff starting from the shared schemata of any participant in the source routine*

Proposition 4. *When there is divergence between the shared schemata and the action dispositions, the source routine can be inherited only if the whole team of participants leaves the parent to found the spinoff.*

6. Discussion and conclusion

Our paper contributes primarily to two streams of literature on knowledge inheritance and routines' dynamics. As we highlight in the third section of the paper, these two literatures generate a conundrum when they are applied to spinoffs. On the one hand, Klepper and colleagues empirically demonstrate that spinoffs inherit routines from their parents and this supposedly explains their superior performance. On the other hand, organizational literature on routines dynamics stresses the context-specific nature of routines and the difficulty to transfer them from one context to another.
Our framework bridges the gap between the two literatures highlighting some necessary conditions that make routines' inheritance possible. First of all, a routine as a whole (composed of its ostensive and performative aspect) cannot be inherited. Only the ostensive aspect (specifically the cognitive schemata shared among participants) can be transferred from the parent to the spinoff. The more these schemata are developed through situated interactions and the more they are shared among routines' participants, the more the routine becomes a plausible candidate to be inherited. However, when action dispositions embedded in the procedural memories of the participants are divergent from the shared schemata, the routine can be inherited only if the whole team of participants leaves the parent firm to found the spinoff.
As a consequence it is not always possible for a spinoff to inherit routines. On the contrary, we argue that there are quite narrow conditions that make the inheritance a possibility. This argument

is consistent with the fact that many successful spinoffs are founded by teams of people (rather than lone founders) that used to work for the same firm. These teams carry both the shared schemata and the action dispositions necessary to replicate the routine in the new context of the spinoff. Our framework is also consistent with the findings of some studies showing that in a few industries spinoffs do not perform better that non-spinoffs. For example, investigating the emergence and evolution of the district of Sassuolo, one of the largest and most successful ceramic districts in the world, Cusumano et al (2015) find that spinoffs do not have higher performances than non-spinoffs. It can be argued that the majority of these spinoffs do not inherit routines from their parents because of the lack of the conditions presented in this paper.

Regarding the literature on routines' dynamics, our paper contributes the open debate on routines replication. While several papers study intra-organizational replication (Winter and Sculanski, 2001; D'Adderio, 2014) and few studies deal with inter-organizational replication (Friesl and Larty, 2013), virtually none addresses the problem of routines inheritance between a parent firm and a spinoff. Our microfoundational approach sheds some light on this form of replication that, using existing theories on routines dynamics, is very difficult to address. Our approach builds on the tradition of the recent literature on routines. We start from Feldman and Pentland (2003)'s seminal contribution on the existence of two, dynamically intertwined, aspects of routines, i.e. the ostensive and the performative aspects. We then add the contribution of Dionisiou and Tsoukas (2013) that, by drawing on the theory of symbolic interaction, opens up the black box of the ostensive aspect of routines identifying shared schemata and action dispositions as parts of it.

Our framework focuses on the conditions that allow the inheritance of the source routine. These conditions can be seen as necessary conditions but, by no means, not sufficient to guarantee the inheritance. As a matter of fact, our framework leaves out the aggregation process that happens at the spinoff. Szulanski and Jensen (2004) show that the use of template (i.e. working example) is key to reduce the stickiness of a routine in an effort of replication. Similarly, in her description of a routine transfer of a high-end server from an US-based facility to a UK plant, D'Adderio (2014) shows that the transfer of complex routines is a daunting task that requires the use of different artifacts and communities. The author describes how the use of standard rules, models and inter-site committees helps to maintain alignment between the source routine and the destination routine. Obviously, in the case of a spinoff the founders might not have access to the templates or

they might not be able to use the same artifacts typically used in intra-organizational replications. We believe that this issue is worth of empirical investigation.

Finally, our framework bears fruits to the topic of spinoffs and their innovativeness. As Klepper (2009) maintains, spinoffs are either seen as important players that introduce innovation and contribute to the evolution of industries and clusters or as parasites that feed off their parents and stole their knowledge. Underlying this discussion there is the topic of how ex-employees can exploit the routines they have learned in their previous employment and to what extent they are able to replicate those routines in new contexts.

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Figure 1 - The three forms of routine replication

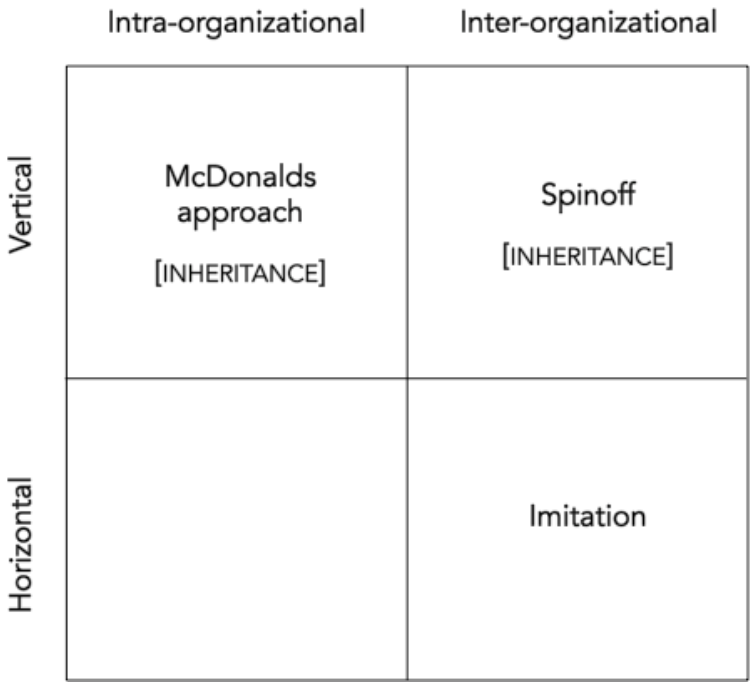

Figure 2: A microfoundational view of the inheritance process