Micro-Business Hierarchies, Strategic Intangible Resources & Performance

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An existing gap in the literature on founding-leaders and small business growth is, "What happens to strategically important socially-created resources and performance as a micro-firm grows?" Using agent based modeling, we examine the development of such a resource, CONTEXT-FOR-LEARNING, and a performance potential across the first hierarchical structural change. The model that mimics a solo work group (2 levels: individual and group) and that which has two work groups (4 levels: individual, group, leadership team, and organization). Most of our hypotheses were confirmed but one interesting difference was that some marginal conditions that supported maintaining a socially-created resource resulted in worse performance levels.

INTRODUCTION

Many small businesses (Huselid, 2003; Moutray, 2006) contribute significantly to national economies (Scase, 1995). For example, 97% of U.S. firms in 2005 are micro-businesses with less than 20 employees (Moutray, 2006). These firms generate 50% of the non-farm GNP and 60-80% of the net jobs over the past 10 years. From a resource-based view (RBV), there is limited literature when we consider research on the micro-businesses' development, use of intangible resources and their link to performance potential (Runyan, Huddleston & Swinney, 2007). Many contextual matters are recognized to moderate the effect of various resources on the profits of small firms (Newbert, Kirchhoff & Walsh, 2007; Bierly & Daly, 2007). It has been suggested that it is the configuration of resources that makes a difference in their use (Black & Boal, 1994) and that for small businesses that culture or norms are critical (Drummond & Stone, 2007). In general, there have been theoretical articles calling for the examination of the link between configurations of resources comprising an intangible strategic resource and performance for over a decade (Kang, Morris & Snell, 2007; Black & Boal, 1994).

This paper addresses these gaps. Micro-businesses use intangible resources as competition points just as do larger firms (Hyvonen & Touminen, 2006). We will examine the impact of different micro-business organizational structures on the creation of a strategically important intangible firm resource and attendant chances in performance potential. We focus on the very small firm or the micro business entity under two structural conditions, the solo work group structure and the slightly larger firm with two work groups. We will examine the impact on the work groups of social context homophily. Further, we examine what happens to a work group's performance and creation of the intangible firm capability in a

hierarchical structure. This hierarchical structure includes a new sister work group that is either alike the initial work group (homogenous condition) or is very unlike the original work group (heterogeneous condition). We examine the impact of supervisors that are either alike the founding-leader (homogenous condition) or different from the founding-leader (heterogeneous condition). Finally, we examine the development of the performance potential for each of these conditions.

We first review the literature on the founding-leader of the small organization for the set of skills needed to be involved (Phillips & Hunt, 1992; Vecchio, 2003) along with structural implications. We then present our methodological approach which is agent based modeling. We identify a single work group simulation from literature (Black et al, 2006) and summarize it. Next, we detail the developmental changes that that occur when, structurally, a leader moves from a direct supervisory position to an indirect one and under conditions of homogeneous or heterogeneous work groups and leadership skill sets. We then present our hypotheses and run our virtual experiments. We finish with our results and conclusions.

FOUNDING-LEADER AND ORGANIZATIONAL STRUCTURE

There has been little literature that focused on the founding entrepreneur who also manages the firm that he or she founded. Some call this person a founding manager and others a founding-leader. For ease of reading in this paper, we will use founding-leader. Some of the literature compares the founding-leader to non-founding-leaders (Green & Chick, 1998; Forbes, 2005; Holmes & Schmitz, 1996; Walsh & Anderson, 1995). Other literature identifies traditional leadership styles found based on large organizations to be useful when considering the founding-leader (Allinson, Chell & Hayes, 2000; Schlosser & Todorovic, 2006; Vecchio, 2003).

The literature on founding-leaders being compared to non-founding-leaders did not necessarily examine leadership qualities but many other topics including leadership turnover and tenure, confidence levels, problem solving styles and so forth. Turnover in small firms was higher when there was a non-founding-leader (Holmes & Schmitz, 1996). In comparing founding-leaders with non-founding-leaders, Forbes (2005) found that internet and web based founding-leaders (and this could be a firm of just the entrepreneur) listed in the New York phone directory had higher levels of overconfidence when compared to non-founding-leaders of these same types of businesses. Founding-leaders were found to have more innovative problem solving styles than non-founding-leaders (Walsh & Anderson, 1995). Founding-leaders were found to have higher levels of entrepreneurial self-efficacy than non-founding-leaders (Chen, et al., 1998).

In those studies, which included the founding-leader as a viable manager, a charismatic leadership style was found to be important at least initially to help employees bond to the new organization (Schlosser & Todorovic, 2006). This orientation includes the sharing by the founding-leader of a vision that benefits all not just the leader (Rowold & Heinitz, 2007). Indeed, entrepreneurs and small business managers alike have been found to be highly confident and optimistic (Palich & Bagby, 1995). Vecchio (2003) has proposed that differing skills and aptitudes may be required of the entrepreneur-leader-manager at different stages of a firm's life cycle. For example, more entrepreneurial attributes are needed during the early stages (evaluating an opportunity, developing the firm's structure, determining needed resources, acquiring needed resources) than during the later stages (managing the business and harvesting the business) (Stevenson, Roberts & Grousback, 1985).

From this summary, it is evident that a widely held assumption is that the leadership theories developed in other contexts apply to the context of the small business after the initial start up phase. There is a critical point in the growth of the firm when an entrepreneur with a task motivation may not be prepared nor desire to be involved with the increased need for managerial and leadership skills. Furthermore, in the case of the founding-leader, these two different attitudes (entrepreneurial and managerial) may have to operate simultaneously and paradoxically. This supports our earlier determination of a gap in the literature, which addresses the cusp when an organization grows from having one work group to two work groups and the founding-leader now has a much more complex set of

managerial duties. Given the papacy of work in this area and following the recommendations of Vecchio (2003), we turn to the hierarchical leadership literature.

Hierarchical Leadership

Leadership theories are ripe for contribution to the entrepreneurship literature (Vecchio, 2003). Zaratiegui & Rabade found the founding-leader needs to have both the skills of an entrepreneur and of a manager (Zaratiegui & Rabade, 2005). It therefore seems reasonable that the founding-leader would need strategic operational leadership skills (Gardner & Schermerhorn, 1992) which requires both directive and operational leadership skills or both leadership skills and managerial skills (Bedeian & Hunt, 2006). Therefore, if founding-leaders need both leadership and managerial skills, we can turn to the competing values framework (Quinn, Faerman, Thompson, & McGrath, 2003) to obtain a list of skills needed for an effective founding-leader. These skill sets include those needed for taking on the roles of being a mentor, facilitator, innovator, broker, director, producer, monitor, and coordinator (Quinn, et al., 2003).

Organizational Structure Context Effects

The literature suggests that many entrepreneurs, after the start up phase, may actually harm their organization (Willard, Krueger & Feeser, 1992) or even leave it (Boeker & Karichalil, 2002; Holmes & Schmitz, 1996). It was suggested that this negative effect on their organizations by entrepreneurs was the result of poor managerial skills (Boeker & Karachalil, 2002) or by a motivation orientation that was geared towards tasks versus hierarchy (Miner, 1990). There is more managerial complexity (Boeker & Karachalil, 2002) in a hierarchical structure than in a flat structure since the number of people engaged in the social construction of intangible resources increases.

Intangible resources are a foundation of competitive advantage (Barney, 1991; Black & Boal, 1994). They are the result of the interaction of human and social capital (Weisinger & Black, 2006) and thus very sensitive to the specific set of people involved in their creation. Therefore, a structural change from one work group (entrepreneur-followers) to three work groups (entrepreneur-two supervisors, two supervisor-work groups) will affect intangible resource creation.

When you change from a one-work group structure to a hierarchical structure, primary social influence sources change. Positional influence still result in a work group leader's having a strong influence on the work group; however, when the function of the work group changes from productivity to managerial, peer-influence categories change. Specifically, peer influences are based on differing sources. Since, by a halo effect, performance levels of the work groups influence perceptions, it is logical to expect that supervisory leaders will influence each other according to their associated work group's relative performance level. Thus, we expect that, if a leader leads a low performing group, his or her influence with other leaders is lower than the leader who heads a high performing group. This performance influence then affects the level of intangible resources.

We can graph developmental paths or performance trajectories when we consider, across time, the skill levels of individuals, levels of strategic resources or performance. We might anticipate that such paths would indicate decline in skills or performance since the founding-leader turnover literature suggests that might be the case (Holmes & Schmitz, 1996). However, more founding-leaders do not sell or dismantle their organizations than do (Moutray, 2006). This implies that there might be growth in skills or performance. Of course, by including learning, one needs to also include the idea of forgetting when a skill has not be in use for a while(de Holan & Phillips, 2004; Kriegesmann, Kley & Schwering, 2005).

HYPOTHESES

We propose that the successful long-term founding-leader will need relatively high skill levels in all of the competing values framework (CVF) roles (Quinn et al, 2003), and thus have an effective leader CVF profile. We assert that this set of skills and behaviors will be critical to enable the founding-leader to make a successful transition from being the only strategic operational leader into having supervisors report to him or her. For our purposes, a successful transition means that a strategic intangible resource of

the firm is maintained or grows. This implies that a founding-leader with a low skill set associated with the CVF profile would not have a successful transition or that the intangible resource level declines.

Because we are looking at the growth pattern of an intangible resource that is socially constructed, we need to take into account the sets of followers and new supervisory leaders. To allow differences to be readily identifiable, we will consider conditions of homogeneity and heterogeneity for the work group and supervisors. This means that the new sister work group will either be like the original work group or not and that the supervisors will either be alike the leader or not. In this manuscript, the entire set of individuals involved in the groups will individually either be alike or not.

For ease of discussion, we will refer to a founding-leader with an effective CVF Profile as an Effective Founding-leader while a founding-leader with an ineffective CVF Profile is an Ineffective Founding-leader. To manage the number of conditions, we will constrain the Leader's level of a socially created resource to be the same as the group that the leader is leading. We will refer to a leader-work group that socially creates a high level of a strategic resource as a High Resource Group (and vice versa). We will have the Founding-leader and initial group to both be either high or low.

Experimental conditions act for the virtual experiments of an agent-based model in the same way that experimental conditions set the boundaries for lab experiments. In agent-based models, the experimental conditions can be variations on the set of agents involved in the same relationship structure, variations in the relationship structure or both. Our manuscript begins with variations in relationship structures. We then move to varying the set of agents involved. Unlike lab experiments, we can literally have the same set of agents be involved in a series of experiments without the contamination of memory (i.e. our experimental agents remember only within a simulation run).

To begin this virtual experimentation, we identify an agent-based model of a socially created resource from existing literature to use as a base simulation. While such models are being found more frequently in the literature, one, from *The Leadership Quarterly* by Black and associates (Black, et al, 2006), meets our basic requirements of including a range of leader and manager behaviors and the inclusion of a number of followers in the development of a CONTEXT-FOR-LEARNING.

Base Experimental Conditions

Our first agent-based model structure has the same structure as the base simulation. That is there is one work group with the entrepreneur-leader. Recall that we limit the combinations of leaders and follower groups to the two extremes as detailed above. Thus;

> *Experimental Condition 1*. Effective Entrepreneur-Leader and a High Resource Group
> *Experimental Condition 2*. Ineffective Entrepreneur-Leader and a Low Resource Group

Refined Experimental Conditions

The two base conditions are expanded to the simple hierarchy of two work groups with supervisors and the entrepreneur-leader now in a founding-leader role. Following the earlier described naming convention, Table 1 shows the set of refined experimental conditions. Table 1 clearly shows the organization structural change distinction for both initial experimental conditions.

Along with the differences in organizational structure, come performance and leadership implications. Following earlier work, we will use as the basis for comparison the developmental path of the CONTEXT-FOR-LEARNING (CFL PATH). Each path will have an initial level determined by the composition of the group. The developmental path is graphed across iterations. Paths with steep slopes will be considered growing fast and those with flatter slopes will be considered as growing slow. Paths with negative slopes are declining. Faster and higher paths will be considered as "***good***" or "***better***". Flat paths will be considered as "***maintaining***." Paths which decline will be considered as "***bad***" or "***worse***". Paths which mirror comparison paths or are very similar will be considered "the same". We will use this terminology as we extend the base simulation and the logic used in creating the CFL PATH and examine a "Performance PATH". Performance here refers to the group's performance. Replicating earlier work (Black et al., 2006; Black, Oliver & Paris, 2008), we propose the following:

Hypothesis 1A The CFL PATH for Experimental Condition 1 will be **better** than the CFL PATH for Experimental Condition 2.
Hypothesis 1B The Performance PATH for Experimental Condition 1 will be **better** than the Performance PATH for Experimental Condition 2.

TABLE 1
EXPERIMENTAL CONDITIONS

Experimental Condition		Founding-leader	1st Group CFL Levels	Supervisor Leader	2nd Group CFL Levels
1		Effective	High		
1	1	Effective	High	Effective	High
1	2	Effective	High	Effective	Low
1	3	Effective	High	Ineffective	High
1	4	Effective	High	Ineffective	Low
2		Ineffective	Low		
2	1	Ineffective	Low	Ineffective	Low
2	2	Ineffective	Low	Ineffective	High
2	3	Ineffective	Low	Effective	Low
2	4	Ineffective	Low	Effective	High

Moving to the refined experimental conditions, we turn to manipulating the set of agents involved at the new hierarchical level. We believe that those conditions where the founding-leader has an effective CVF profile and the supervisors have effective CVF profiles to result in continued growth of the intangible resource. However, because of the sensitivity of intangible resources to individuals, we expect when both levels of leadership are not high (i.e. Founding-leader is but Supervisor Leader is not), that, at the best, the strategic intangible resource will only be maintained. Because of the influence of the Founding-leader, we expect any experimental condition where the Founding-leader has low values to result in overall intangible resource decline. This results in the following hypotheses:

Hypothesis 2A. The CFL PATH for Experimental Condition 1.1 is **good**.
Hypothesis 2B. The CFL PATH for Experimental Condition 1.2 is **good**.
Hypothesis 2C. The CFL PATH for Experimental Condition. 1.3 only **maintains**.
Hypothesis 2D. The CFL PATH for Experimental Condition 1.4 only **maintains**.
Hypothesis 2E. The CFL PATH for Experimental Condition 2.1 is **bad**.
Hypothesis 2F. The CFL PATH for Experimental Condition 2.2 is **bad**.
Hypothesis 2G. The CFL PATH for Experimental Condition 2.3 is **bad**.
Hypothesis 2H. The CFL PATH for Experimental Condition 2.4 is **bad**.

Black and Boal (1997) found a positive correlation between performance and the presence of high levels of a CONTEXT-FOR-LEARNING. We expect, therefore, that the Performance PATH will mirror the CFL PATH.

Hypothesis 3A. The Performance PATH for Experimental Condition 1.1 is **good**.
Hypothesis 3B. The Performance PATH for Experimental Condition 1.2 is **good**.
Hypothesis 3C The Performance PATH for Experimental Condition 1.3 only **maintains**.
Hypothesis 3D. The Performance PATH for Experimental Condition 1.4 only **maintains**.
Hypothesis 3E. The Performance PATH for Experimental Condition 2.1 is **bad**.
Hypothesis 3F. The Performance PATH for Experimental Condition 2.2 is **bad**.
Hypothesis 3G. The Performance PATH for Experimental Condition 2.3 is **bad**.

*Hypothesis 3*H. The Performance PATH for Experimental Condition 2.4 is ***bad***.

In our last set of hypotheses, we compare the results from the Founding-leader and the solo workgroup with the Founding-leader and the hierarchy of workgroups. Following the same logic used in the base simulation (Black et al., 2006), we expect that the individual influences the emergent group values. Thus, if the individual is different from a particular group, the individual will deemphasize the impact of that other "different" group. If there is similarity, the individual will simply accept the influences. We expect this acceptance effect to be most pronounced when there is similarity across all groups, leaders, and, by extension, the organization. We suggest that having one of these different will not affect this effect. When all other groups are different from the focal group, we expect movement in the direction of the differing group. We expect the following to occur when we compare the base simulation with the extended simulation:

> *Hypothesis 4A*. The CFL PATH for Experimental Condition 1.1 will be ***better*** than the CFL PATH for Experimental Condition 1.
> *Hypothesis 4B*. The CFL PATH for Experimental Condition 1.2 will be ***the same as*** the CFL PATH for Experimental Condition 1.
> *Hypothesis 4C*. The CFL PATH for Experimental Condition 1.3 will be ***the same as*** the CFL PATH for Experimental Condition 1.
> *Hypothesis 4D*. The CFL PATH for Experimental Condition 1.4 will be ***worse*** than the CFL PATH for Experimental Condition 1.
> *Hypothesis 4E*. The CFL PATH for Experimental Condition 2.1 will be ***worse*** than the CFL PATH for Experimental Condition 2.
> *Hypothesis 4F*. The CFL PATH for Experimental Condition 2.2 will be ***the same as*** the CFL PATH for Experimental Condition 2.
> *Hypothesis 4G*. The CFL PATH for Experimental Condition 2.3 will be ***the same as*** the CFL PATH for Experimental Condition 2.
> *Hypothesis 4H*. The CFL PATH for Experimental Condition 2.4 will ***better*** than the CFL PATH for Experimental Condition 2.

## METHODOLOGY

Agent Based Modeling
An agent-based model used in social science research requires three explicit confirmations. These include: 1) identifying agent characteristics, 2) identifying the dimensions of relationships among the agents and 3) identifying the goals that govern their co-evolution (Lewin, Parker, & Birute, 1998). Co-evolution means the mutual adaptation and changes found among members of a system and their relationships and is one of the dynamic elements of agent based modeling. Matching these up with our phenomena of interest, Founding-leaders in the context of the growth of their organizations from one work group to multiple workgroups is relatively easy. 1) Agents are the entrepreneur, any employees individual and as a group. That is, they are the individuals with the needed perceptions and skills for the creation of an intangible resource and performing the production tasks and, if in a hierarchical position of being a leader, they also have the characteristics of the leader as described above. If the agents are the collective (i.e. a work group, the leadership team or the entire organization), then the group has the collective understanding of the necessary components for the intangible resource and an associated performance level that emerges from its group members. 2) There are influence relationships among the agents and across levels that govern their interactions and influence flows. 3) The goals of the agents are to do their production work and to interact and create the intangible resource. People can and do learn from these experiences which is the non-linear portion of the model and it is this quality which changes the model from a complicated one to a complex one. Having assessed these needed criteria, we conclude

that the base simulation from literature, our research question and virtual experiment conditions fit the needed criteria and it is reasonable to use this simulation approach (Davis, Eisenhardt & Bingham, 2007).

The Base Simulation Model

This base simulation (see Figure 1; Black, Oliver & Paris, 2008) had three types of agents: followers, leader, and workgroup. The followers and workgroup were characterized by a profile of the CONTEXT-FOR-LEARNING components of Discipline, Stretch, Trust and Support (Black et al., 2006). The emergence of a group level version of the CONTEXT-FOR-LEARNING required that there be influence relationships between followers, as well as, between the leader and followers. The followers' influence relationships were based on the personal power dimension of expertise. The leader's influence was strictly through position power. Like March's work (1991), individuals did not directly influence each other but influence flowed up to the group and down from the group back to the individuals. Unlike March (1991), the individuals did directly influence themselves through experiential learning. There was also an influence from the leader to the followers (when the follower's noticed that the leader was acting). The leader, in addition to the CONTEXT-FOR-LEARNING profile, also had a competing values framework profile. The leader learned too. Alternatively, when no learning had occurred for three iterations, followers and leaders alike would begin to forget at the same rate that they learned (Black, Oliver & Paris, 2008). The implicit goals of the simulation were for the maximization of the group CONTEXT-FOR-LEARNING and for the leader's competing values framework profile. There were no direct performance measures in the base simulation.

FIGURE 1
SIMPLIFIED REPRESENTATION OF CFL MODEL RELATIONSHIPS
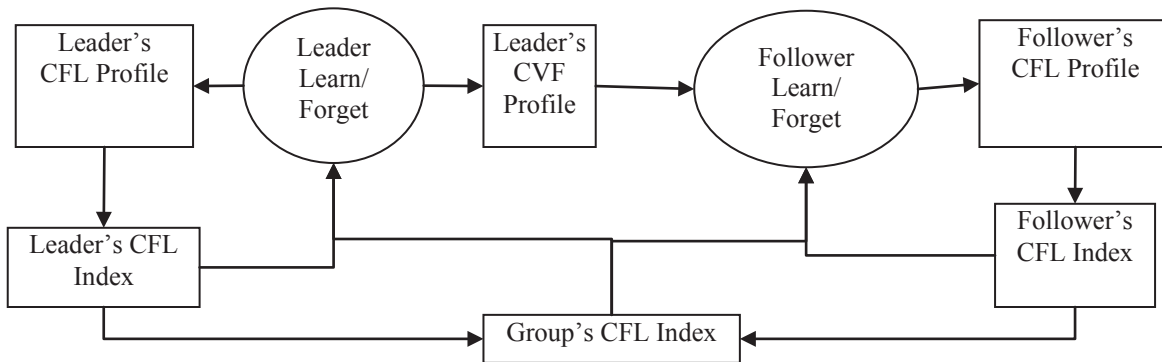
(Adapted from Black, Oliver, & Paris, 2008)

The extension of this simulation requires us to move this two-level simulation (individual-group) to a four-level simulation (individual-group-leadership team-organization). Like Miller and colleagues' extension of exploitation and exploration (Miller, Zhao & Calantone, 2006), we need to add components to the simulation that allow for the approximation of influence distance. To maintain consistency, when we add a second work group, a leadership team, and an overall organization group, we will follow the same logics presented by Black and associates. However, this means extending the model to include a direct performance measure, and additional direct leader influences.

The Extension

We extend the base simulation to include four levels of hierarchy. The extension adds a second work group, a leadership team, and an organization group. Additionally, a performance metric is added. We begin this section by discussing the organizational structural changes and their impact on influence patterns. We then address performance and its use as an influence source for the leaders of the associated workgroup.

Organization Structure and Influence Patterns

As we chose to move from one work group to two work groups we decided to retain the earlier logic of relative independence from direct influences. Thus, the two work groups have no direct influence on each other. March (1991) also used this format in his modeling on exploration and exploitation behaviors. This lack of interdependence mimics the recognition by Siggelkow and Rivkin (2006) that such independence may facilitate the positive benefits of exploration behaviors. Although this simulation does not model the exploration/exploitation learning patterns but rather the contextual support for learning, we choose to continue the base model's lack of direct influence at the individual agent level except for the influence of a leader on a follower. There are, however, indirect influences between the two work groups. Their leaders are influenced by their membership in the leadership team and they in turn directly influence their followers. Furthermore, the followers are influenced by their membership in the overall organization. In Figure 2, the influence of the group back on group members is indicated by the box around group members. The supervisory leaders (L1 & L2) are shown placed in two boxes, thus two groups impact them. For ease of reading, leaders directly influence the rest of the group members contained within the group influence box. Thus, the Founding-leader directly influences the Supervisor Leader of work group 1 (L1) and the Supervisor Leader of work group 2 (L2). The Supervisor Leader of work group 1 (L1) directly influences all of the followers in work group 1 (F#G1) and so forth.

Expertise and Performance

In the base simulation, individuals influenced peers through personal expertise contributions related to their productivity task. At a collective level, expertise is translated to the concept of performance related to productivity or operational performance. When there is a move to a hierarchical relationship, the next level up from a work group is the Leadership Team. Within the Leadership Team, the group members are actually Supervisory Leaders of a particular work group. Thus, the productivity level is not based on the individual leader but rather on the production of the work group that the leader heads up.

FIGURE 2
INFLUENCES IMPACTING THE EMERGENCE OF
THE HIERARCHICAL ORGANIZATION CONTEXT-FOR-LEARNING PROFILE
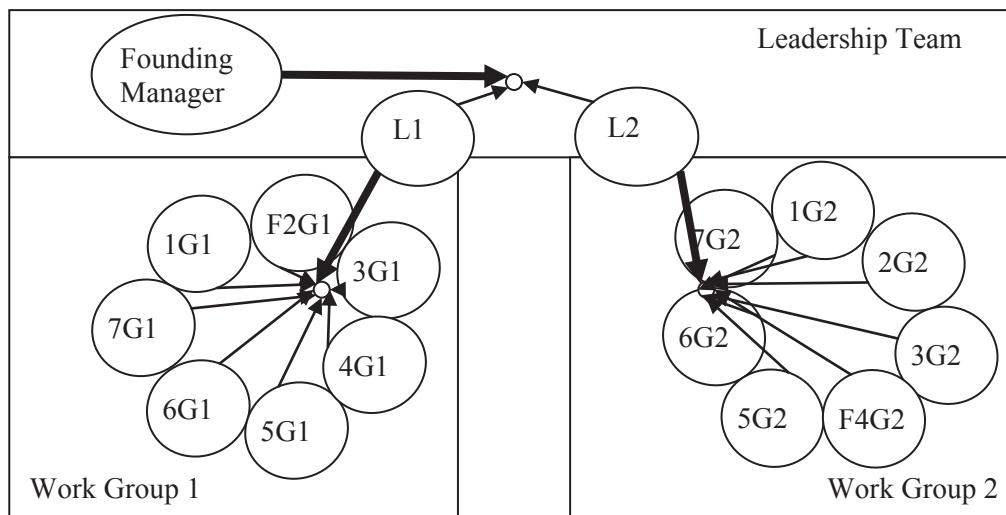
Strategic operational leadership requires both directive and operational leadership (Gardner & Schermerhorn, 1992). Directive means providing a unifying and inspiration "vision" and sense of "purpose" for the organization (House & Aditya, 1997). Directive leadership, then, is similar to the definition of strategic leadership by Boal & Hooijberg (2001). Operational Leadership means creating an environment where work teams can reach high performance. Gardner and Schermerhorn (1992) provide a performance formula "Performance = Ability X Support X Effort" where Ability includes the aptitudes and skills through which a person's performance potential is developed (i.e. for this simulation, it is the personal expertise level of the individual). Support is the provision to individuals of what they need to do the job (i.e. the base simulation has a construct, "support", which is directly related to supervisory and team support in accomplishing work). Effort is the willingness to perform or to work hard (Ilgen & Klein, 1988) (i.e. the base simulation has the construct, "stretch", which indicates that an individual is willing to go the extra mile). Thus, performance is operationalized by the formula "Performance = Expertise X Support X Stretch". Performance is calculated at each level.

Group Size and Composition

The groups for this manuscript are synthetically generated. We randomly generate values for each group member that meets the criteria needed for the virtual experiment. We keep group sizes the same as found in the base simulation: seven followers and one leader (Black et al., 2006). Thus, the solo group has one leader and 7 followers. The hierarchical group has two work groups each composed of one leader and 7 followers and one founding- Leader for a total of 15 members.

High Resource Groups are composed of individuals whose scores on the CONTEXT-FOR-LEARNING scales have a minimum level of 5 or higher. Low Resource Groups are composed of individuals whose scores on the CONTEXT-FOR-LEARNING scales are 3 or lower. Remember, for the solo group experiments, that the leader has the same CONTEXT-FOR-LEARNING parameters as the group that they lead. Furthermore, the leader's values for the competing values framework meet the pattern of an effective and ineffective profile following the pattern suggest by Yin (2003) and used by Black and her associates (Black et al., 2006). The effective profile competing values profile chosen is that of the aggressive achiever (Quinn et al., 2003). The ineffective profile chosen is that of the extreme unproductive (Quinn et al., 2003).

Running the Simulation

Work groups and leaders are generated before the virtual experiment to meet experimental conditions. These same initial values are used in all simulation runs of the virtual experiment. Following Black and her associates (2006), each virtual experiment has 100 runs of an experimental condition and is represented averaged across all runs and graphed in a line (i.e. the developmental paths). These developmental paths are then compared to determine if the hypotheses are supported or not.

RESULTS

Hypothesis 1

Figure 3 displays developmental paths as hypothesized in Hypothesis 1A and matching the work done by Black and associates. The CFL PATH of the Effective Founding-Leader paired with a High Resource Group (thin solid line) both begins higher and reaches plateau at the top of the graph in fewer iterations than the CFL PATH of the Ineffective Founding-Leader and a Low Resource Group (thin short-dash line). For the rest of the virtual experiments, these same values for the Founding-Leaders are used and the same High and Low Resource Groups are used for Group 1 in the hierarchical models. Because the two graphs meet the conditions for Hypothesis 1A, Hypothesis 1A is supported.

Hypothesis 1B plots the new performance measure for each group in a Performance PATH. This hypothesis mirrored the CFL PATH hypothesis. In examining Figure 3, it is evident that the CFL PATH for Condition 1 (bold long-dash line) is always higher than that for Condition 2 (bold long-dash short-dash line). Note that the Performance PATHS are very different from each other and from the

FIGURE 3
HYPOTHESIS 1A AND 1B: EFFECTIVE VS INEFFECTIVE LEADERS
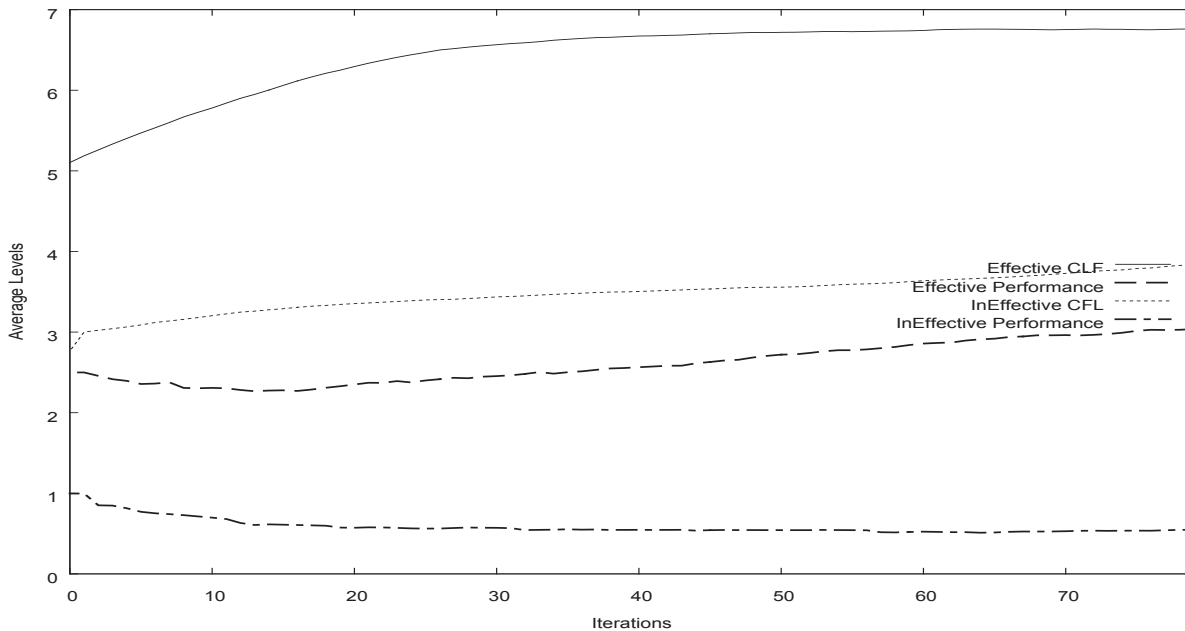
Hypothesis 2: Hierarchical Developmental CFL Paths

Hypotheses 2A through 2D concern the CFL PATHS for the experimental conditions that have an Effective Founding-leader and an initial High Resource Group while adding different types of leaders and groups while Hypotheses 2E through 2H concern the developmental CFL PATHS for the experimental conditions that have an Ineffective Founding-leader and an initial Low Resource Group while adding the different combinations of leaders and groups. We find the results in Figure 4.

From the initial definitions of high, Hypothesis 2A has the Condition 1.1 (Effective Founding Manager, High Resource Group, High 2nd Resource Group, Effective Supervisory Leaders) requires a developmental path that begins at 5 or higher and actually approaches the top level of the graph before iteration 80. We see in Figure 4 that the developmental path marked 1.1 (thin solid line) begins above 5 and reaches 7 by about iteration 60. Hypothesis 2A is SUPPORTED.
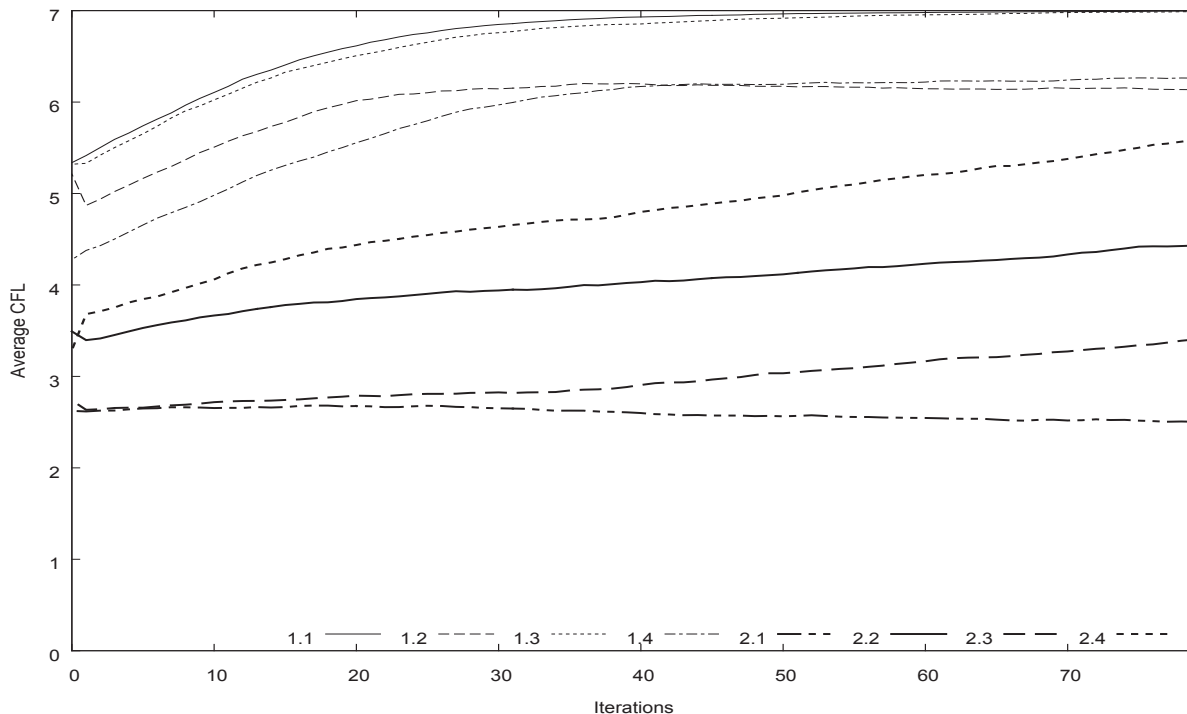
Hypothesis 2B has Experimental Condition 1.2 (Effective Founding Manager, High Resource Group, Low 2nd Resource Group, Effective Supervisory Leaders). In this hypothesis, the PERFORMANCE PATH predictions were to match the general shape of those of Hypothesis 2A for experimental condition 1.1. That is, it has a slope that is positive and approaches the top of the graph. The PERFORMANCE PATH marked 1.2 (thin long-dash line) in Figure 4 starts above 5 has a rapid drop for 2 or 3 iterations then has a positive slope which levels off and plateaus at about 6 around iteration 20. It meets the criteria for good. Thus, there is SUPPORT for Hypothesis 2B.

Experimental Condition 1.3 (Effective Founding Manager, High Resource Group, High 2nd Resource Group, Ineffective Supervisory Leaders) is examined in Hypothesis 2C and requires a CFL PATH which begins between 3 and 5 and which remains between 3 and 5 during the 80 iterations (a maintaining line). From Figure 4 and the line marked 1.3 (thin short-dash line), we see that the CFL PATH actually begins above 5 and had a positive slope which actually is slightly below and mirrors the developmental path of condition 1.1 (a good line). The result is a CFL PATH that met our earlier criteria for being good versus merely maintaining. Thus, there is NO SUPPORT for Hypothesis 2C; THE RESULT IS BETTER THAN ANTICIPATED.

Experimental Condition 1.4 (Effective Founding Manager, High Resource Group, Low 2nd Resource Group, Ineffective Supervisory Leaders) is examined in Hypothesis 2D and requires a CFL PATH which begins between 3 and 5 and which levels out somewhere between 3 and 5 by 80 iterations. From Figure 4

and the line marked 1.4 (thin long-dash short-dash line), we see that the CFL PATH does begin between 3 and 5 and it does have a slower growth pattern which flattens at about iteration 40. This line also has a positive growth and plateaus between 5 and the top of the graph it can be considered a good path. There is NO SUPPORT for Hypothesis 2D; THE RESULT IS BETTER THAN ANTICIPATED.

FIGURE 4
CFL DEVELOPMENTAL PATH

From the initial definitions of bad, Hypothesis 2E has the Condition 2.1 (Ineffective Founding Manager, Low Resource Group, Low 2nd Resource Group, Ineffective Supervisory Leaders). This requires a CFL PATH that begins at 3 or lower and to actually be declining. We see in Figure 4 that the CFL PATH marked 2.1 (bold long-dash short-dash short-dash line) begins slightly below 3, remains at about that level until about iteration 25 and then begins having a negative slope until iteration 80. Hypothesis 2E is WEAKLY SUPPORTED SINCE IT IS A NEGATIVE RELATIVELY LEVEL LINE.

Hypothesis 2F has Experimental Condition 2.2 (Ineffective Founding Manager, Low Resource Group, High 2nd Resource Group, Ineffective Supervisory Leaders). Support for this hypothesis requires the CFL PATH to be the same as those of Hypothesis 2E; thus, it is expected to be bad and therefore that it will begin low and drop. The CFL PATH marked 2.2 in Figure 4 (bold solid line) starts above 3, and has a slow and steady rise to reach above 4 by iteration 80. The affect is a maintaining path with a slight positive upslope. There is NO SUPPORT for Hypothesis 2F; THE RESULT IS BETTER THAN ANTICIPATED.

Experimental Condition 2.3 (Ineffective Founding-leader, Low Resource Group, Low 2nd Resource Group, Effective Supervisory Leaders) is examined in Hypothesis 2G and requires a bad CFL PATH or one which begins below 3 and declines. From Figure 4 and the line marked 2.3 (bold long-dash line), we see that the CFL PATH does begin below 3 but is initially flat and then around iteration 35 has a slight up slope which continues to the end. This line meets the definition of a "maintains" path. Thus there is no support for Hypothesis 2G; THE RESULT IS BETTER THAN ANTICIPATED.

Experimental Condition 2.4 (Ineffective Founding-leader, Low Resource Group, High 2nd Resource Group, Effective Supervisory Leaders) is examined in Hypothesis 2H and requires a CFL PATH which begins below 3 and again declines. From Figure 4 and the line marked 2.4 (bold short-dash line), we see that the CFL PATH starts above 3 and has a slow upward path that crosses 5 at about iteration 50

indicating a "maintains" path that movers to being a "good" path. Thus, there is NO SUPPORT for Hypothesis 2H.

Hypothesis 3: Hierarchical Performance Developmental Paths

This set of hypotheses mirrors those for the CFL PATH. Thus, a similar reporting structure is maintained. However, unlike in the developmental CFL PATHS, for PERFORMANCE PATHS, the hypotheses for performance are supported especially in the slopes of the line but they often occur at a lower level than anticipated.

Hypothesis 3A has the Condition 1.1 (Effective Founding Manager, High Resource Group, High 2nd Resource Group, Effective Supervisory Leaders); thus, we would expect it to be a good path and to have a PERFORMANCE PATH (PERF. PATH) that begins at 5 (the initial level of "high") or higher, is positive and ideally reaches the top of the graph before iteration 80. We see in Figure 5 that the PERF. PATH marked 1.1(thin solid line) begins just below 3 which is lower than expected and it never reaches 7. It has an initial drop with a slow and steady upward growth and ends about 5. By iteration 30, this is the highest line, and it does have a positive slope for the most part; but it does not get even within one measure of 7. Because the slope is relatively steep and positive, we conclude that Hypothesis 3A has WEAK SUPPORT.

Hypothesis 3B has the Experimental Condition 1.2 (Effective Founding Manager, High Resource Group, Low 2nd Resource Group, Effective Supervisory Leaders). In this hypothesis, the developmental path predictions were to match those of Hypothesis 3A. However, the PERFORMANCE PATH marked 1.2 in Figure 5 (thin long-dash line) starts just below 3 (in the bad range), begins flat until iteration 10 when its positive slope gains in magnitude across iterations until it ends just above 3. The path has a "good" orientation but is in the "bad" performance level range; however, it continues to approach 7. Thus, we conclude again that there is WEAK SUPPORT for Hypothesis 3B.

FIGURE 5
PERFORMANCE DEVELOPMENTAL PATH
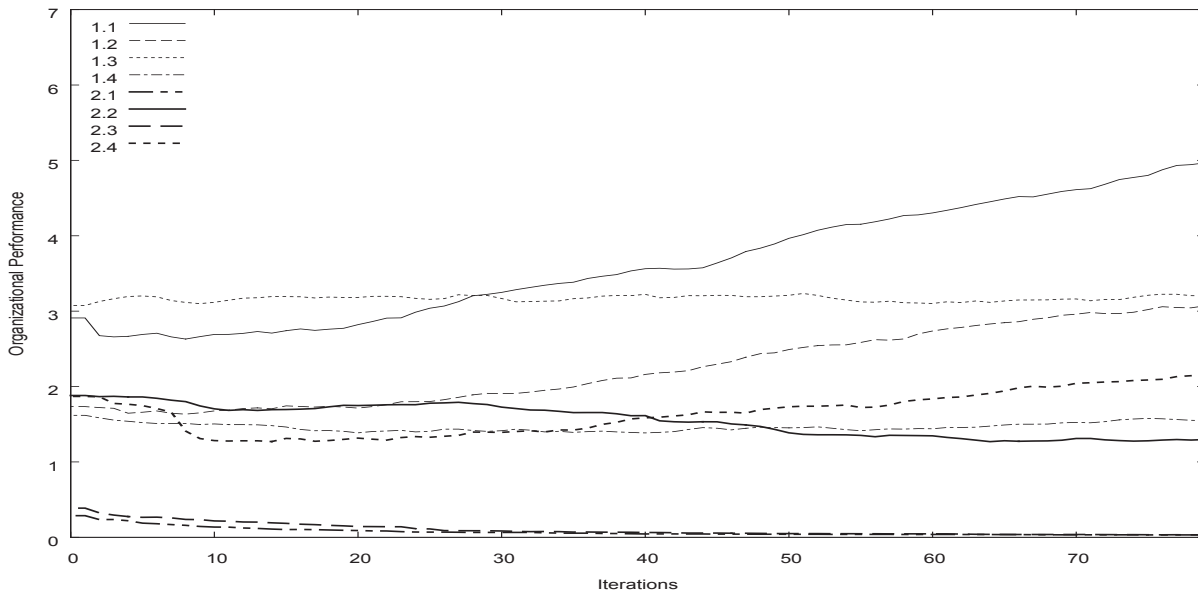
Experimental Condition 1.3 (Effective Founding Manager, High Resource Group, High 2nd Resource Group, Ineffective Supervisory Leaders) is examined in Hypothesis 3C and requires a developmental path which begins between 3 and 5 and which remains between 3 and 5 during the 80 iterations. From Figure 5 and the line marked 1.3 (thin short-dash line), we see that occurs. PERFORMANCE PATH #1.3 has performance levels begins and ends about 3 and thus maintains its levels for the entire set of iterations. Thus, there is SUPPORT for Hypothesis 3C.

Experimental Condition 1.4 (Effective Founding Manager, High Resource Group, Low 2nd Resource Group, Ineffective Supervisory Leaders) is examined in Hypothesis 3D and requires a developmental path which begins between 3 and 5 and which remains between 3 and 5 during the 80 iterations. From Figure 5 and the PERF. PATH marked 1.4 (thin long-dash short-dash line), we see that the PERF. PATH again begins and ends at about the same point but that is in the "bad" range below 2. While lower than anticipated, we find WEAK SUPPORT for Hypothesis 3D.

From the initial definitions of bad, Hypothesis 3E, with Condition 2.1 (Ineffective Founding Manager, Low Resource Group, Low 2nd Resource Group, Ineffective Supervisory Leaders), requires a performance path that begins at 3 or lower and declines. We see in Figure 5 that the PERF. PATH marked 2.1 (bold long-dash short-dash short-dash line) begins just below 2 and bottoms out just past iteration 30 and remains there for the rest of the simulation. Hypothesis 3E has SUPPORT.

Hypothesis 3F has Experimental Condition 2.2 (Ineffective Founding Manager, Low Resource Group, High 2nd Resource Group, Ineffective Supervisory Leaders). In this hypothesis, the performance path predictions were to match those of Hypothesis 3E and be "bad". The Performance path marked 2.2 in Figure 5 (bold solid line), starts below 2 drops to just above 1 by iteration 80. It is a low line with a barely negative slope, thus, there is WEAK SUPPORT for Hypothesis 3F.

Experimental Condition 2.3 (Ineffective Founding Manager, Low Resource Group, Low 2nd Resource Group, Effective Supervisory Leaders) is examined in Hypothesis 3G and requires a performance path which begins below 3 and declines. From Figure 5 and the PERF. PATH marked 2.3 (bold long-dash line), we see that it begins just above 0 and approaches 0 around 30 iterations. Thus, there is SUPPORT for Hypothesis 3G.

Experimental Condition 2.4 (Ineffective Founding Manager, Low Resource Group, High 2nd Resource Group, Effective Supervisory Leaders) is examined in Hypothesis 3H and requires a Performance path which begins below 3 and which declines. From Figure 5 and the line marked 2.4 (bold short-dash line), we see that the Performance path actually begins below 2, drops for a bit then moves to a long slow but upward trek and reaches and passes 2 by 80 iterations. However, given its low values and despite the slow upward slope, we find WEAK SUPPORT for Hypothesis 3H.

Hypothesis 4: Comparing the Solo Level with the Hierarchical Level Models

In this set of hypotheses, the developmental paths from Figure 4 (the hierarchical model) are compared with the developmental paths from Figure 3 (the solo group model). For ease of reading, these are combined in Figure 6.
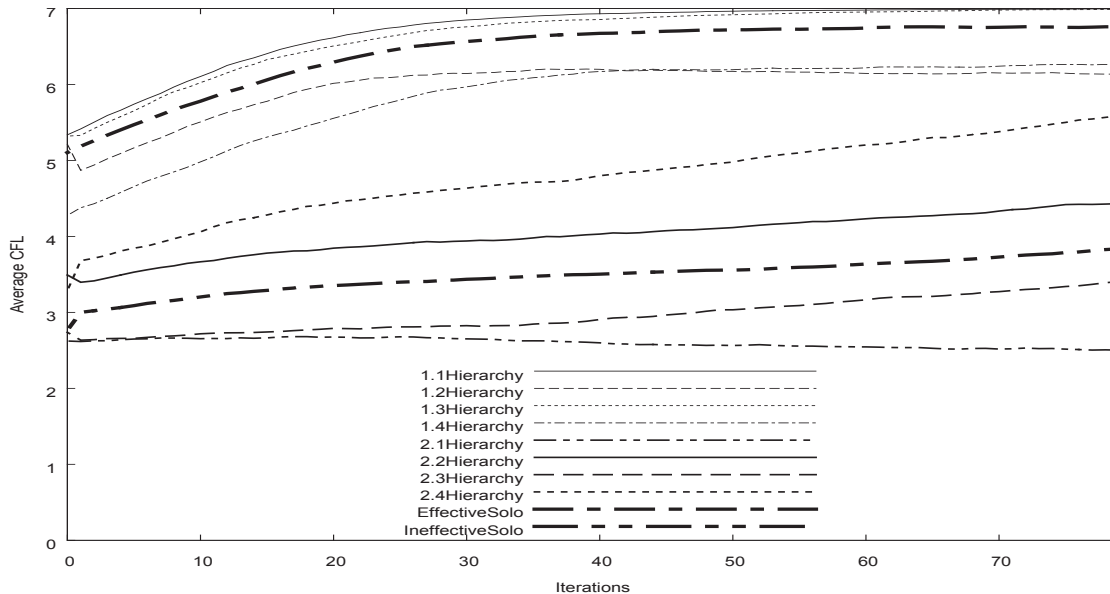
Hypothesis 4A compares the CFL PATH for Experimental Condition 1.1(thin solid line) with that of Condition 1; the Effective solo level(thick long-dash short-dash line). We expected that 1.1 will start higher and end higher than the CFL PATH for Experimental Condition 1. We were correct. The *hierarchical* model's CFL PATH started higher and ended higher than the *solo's* developmental path. Hypothesis 4A has support.

In Hypothesis 4B, the CFL PATH for Experimental Condition 1.2 (Thin long-dash line) was supposed to start and end at about the same level as the CFL PATH for Experimental Condition 1(thick long-dash short-dash line). This was not the case. The development path for the *hierarchical* model started higher and crossed over the *solo* CFL PATH at iteration 4 to be below the *solo* CFL PATH. It roughly parallels the *solo* path but has a very slow declining slope. Hypothesis 4B is not supported.

Hypothesis 4C calls for the CFL PATH for Experimental Condition 1.3 (thin short dash line) to start and end at about the same level as the CFL PATH for Experimental Condition 1 and to be similar to it. This was not the case. The development path for the *hierarchical* model is a better path than the *solo* CFL PATH since it started higher and remained higher. Hypothesis 4C is not supported.

In Hypothesis 4D, the CFL PATH for Experimental Condition 1.4 (thin long-dash short-dash line) was to start below and end lower than the CFL PATH for Experimental Condition 1(thick long-dash short-dash line . This was the case. Thus, Hypothesis 4D is supported. An interesting observation is that this CFL PATH begins below and then crosses to be above the CFL PATH for Hypothesis 4B at about iteration 40.

FIGURE 6
CFL DEVELOPMENTAL PATHS

Hypothesis 4E calls for the CFL PATH for Experimental Condition 2.1(bold long-dash short-dash short-dash line) to start below and end lower/reach the bottom sooner than the CFL PATH for Experimental Condition 2 (thick -dash short-dash short-dash line). While they started at the same point, there was an immediate drop in the *hierarchical* CFL PATH and the *hierarchical* CFL PATH does not reach the bottom but is lower than the *solo* ineffective leader/team CFL path for the rest of the iterations. The CFL path for Experimental Condition 2.1 was a negative sloped line that started and remained above the CFL path for Experimental Condition 2 until iteration 50. It was very close to the CFL path for Experimental Condition 2. Hypothesis 4e is NOT SUPPORTED.

Hypothesis 4F examines the CFL PATH for Experimental Condition 2.2 (Ineffective Founding Manager, Low Resource Group, High 2nd Resource Group, Ineffective Supervisory Leaders) (bold solid line) which should start and end at about the same level as the CFL PATH for Experimental Condition 2 (thick long-dash short-dash short-dash line). This was close to happening but the *hierarchical* CFL PATH was slightly above the solo CFL PATH. The two paths also began at different spots; the *hierarchical* above and the *solo* below 3 and then the *hierarchical* path dropped and began a very slow upward slope. The general thrust was maintaining. The *solo* CFL PATH for Experimental Condition 2 began lower and had an immediate up jump and then basically paralleled the *hierarchical* CFL PATH but was about ½ a level lower. Because both lines are in the center of the graph and both lines are slight upward slopes, we assert that Hypothesis 4F has WEAK SUPPORT.

In Hypothesis 4G, the CFL PATH for Experimental Condition 2.3 (Ineffective Founding-leader, Low Resource Group, Low 2nd Resource Group, Effective Supervisory Leaders) (bold long dash) was to start and end at about the same level as the CFL PATH for Experimental Condition 2 (thick long-dash short-dash short-dash line). This was close to happening but the *hierarchical* CFL PATH approached the solo CFL path from the bottom. The *hierarchical* CFL PATH started close to the *solo* CFL PATH but while the *solo* CFL PATH had an immediate upswing, the *hierarchical* CFL PATH did not. The *hierarchical* CFL PATH remained relatively flat and maintaining until about iteration 40 when its slope became positive and the distance between the two paths began decreasing. This continued to iteration 80. Again because of their grouping in the center of the graph and the general matching of the shape of the paths, we conclude that there is WEAK SUPPORT for Hypothesis 4G.

Finally, Hypothesis 4H, calls for the CFL PATH for Experimental Condition 2.4 (Ineffective Founding Manager, Low Resource Group, High 2nd Resource Group, Effective Supervisory Leaders) (bold short-

dash line) to start higher and end higher than the CFL PATH for Experimental Condition 2. This occurred. The *hierarchical* CFL PATH started above and remained above the *solo* CFL PATH. It actually approaches the developmental paths of the effective leader that were examined in Hypotheses 4A – 4D. Hypothesis 4H has SUPPORT.

Table 1 shows all of the hypotheses, proposed paths, realized paths, and the results of the hypothesis examinations. Not all hypotheses were supported.

DISCUSSION, LIMITATIONS AND CONCLUSION

Several interesting issues arose during this set of virtual experiments with a hierarchical model. We successfully duplicated the earlier work of Black and associates (2008) in Hypothesis 1A. It extended that model by also examining performance levels of the work groups in Hypothesis 1B. It then extended the model to look at hierarchical implications for the development of a strategically important intangible resource. We will discuss the hypotheses in a hypothesis set by hypothesis set fashion. We begin with Hypothesis 1 and then address them in numerical order.

The first set of hypotheses (1A-B) was supported but there were some interesting effects. The CFL of the solo models match that of the base simulation indicating that we duplicated the conditions of Black and colleagues model in our efforts. Performance levels are significantly lower than the Context-for-Learning for the high resource group with an Effective Founding-Leader. For the Ineffective Founding-leader and the low resource group, the value for performance sank to extremely low levels. Now because the Low Group's performance was consistently lower than the high group, these sets of conditions meet expectations for the two solo models. Notice; however, the great difference between the level of the intangible resource and the level of performance. This implies two things: 1) A higher levels of a Context-for-Learning need to be sustained before performance levels rise significantly; and 2) this implies that performance is much more sensitive to bad leadership than is the intangible resource of a Context-for-Learning. Recall that one of the conditions of the simulation was that performance levels were randomly assigned in the initial development of the agent's qualities while the groups were formed explicitly to be homogenously either with relatively high levels of CFL or relatively low levels of CFL.

The second set of hypotheses (2A-H) showed the CFL paths for the hierarchical models. Recall that we examined sets of agents with polarized characteristics: Effective versus Ineffective, High CFL versus Low CFL and so forth. It was interesting to note that the development of CFL either matched our hypothesis or was better than that hypothesis when the founding-leader had effective management skills. However, when there was an Ineffective Founding-Leader, it took having both Work Group leaders being effective and at least one group to be effective before the developmental path improved to being close to that of an Effective Leader no matter the combination of leaders and work groups. WE do grant that having either effective supervisors or at least one effective team did create paths that reached the mid-level maintain category. In general, any of the agent changes for the Effective Founding-Leader organization causes a setback (lover initial resource level) but the setback appears to be reversible with enough time. So, once a hierarchy is present, if the founding leader was not an effective manager, both supervising leaders and at least half of the workgroups needs to have a high level of a Context-for-Learning to offset that handicap.

In the third set (3A-H), we examined the growth in performance (assuming that the only determinate was the skill sets of the employees). Performance grew in a similar fashion to the proposed CFL developmental paths but it began at a much lower level. In addition, performance is much more sensitive to group and leader palpitations than is CFL. There were three clusters of performance groups. The lowest level contained those hierarchical structures where both workgroups were of a low CFL. The highest level contained those hierarchical structures where both groups were of a high CFL. The middle group contained the mixed group structures. Only one of these mixed group structures was able to approach the level of having "good" performance (i.e. above a 5 on a 7 point scale); that group had effective supervisors. For ineffective founding-leaders, the initial differences found with the solo work team organization was exasperated with the movement to a hierarchical structure. This implies that micro-

hierarchical firms whose founding leader doesn't have an effective managerial and leadership style won't be able to use organizational structure changes to overcome low performance. They can't "grow" out of poor performance.

TABLE 1
SUMMARY OF HYPOTHESES, PROPOSED PATHS,
REALIZED PATHS, AND RESULTS

Hypotheses	Experimental Condition	Path	Proposed Condition	Result (*Bold & Italic = Different from Proposed*)	Comparison Experimental condition	Comparison PATH	Hypothesis Supported? (Not bold & lower case = weak support)
1A	1	CFL	Better	Better	2	CFL	**Yes**
1B	1	PERF.	Better	Better	2	Perf.	**Yes**
2A	1.1	CFL	Good	Good			**Yes**
2B	1.2	CFL	Good	Good			**Yes**
2C	1.3	CFL	Maintain	***Good/ Better***			**No**
2D	1.4	CFL	Maintain	***Good/ Better***			**No**
2E	2.1	CFL	Bad	Bad			Yes
2F	2.2	CFL	Bad	***Maintain***			**No**
2G	2.3	CFL	Bad	***Maintain***			**No**
2H	2.4	CFL	Bad	***Maintain to Good***			**No**
3A	1.1	PERF.	Good	Good			Yes
3B	1.2	PERF.	Good	Good			Yes
3C	1.3	PERF.	Maintain	Maintain			**Yes**
3D	1.4	PERF.	Maintain	Maintain			Yes
3E	2.1	PERF.	Bad	Bad			**Yes**
3F	2.2	PERF.	Bad	Bad			**Yes**
3G	2.3	PERF.	Bad	Bad			**Yes**
3H	2.4	PERF.	Bad	Bad			Yes
4A	1.1	CFL	Better	Better	1	CFL	**Yes**
4B	1.2	CFL	Same	***Worse***	1	CFL	No
4C	1.3	CFL	Same	***Better***	1	CFL	No
4D	1.4	CFL	Worse	Worse	1	CFL	**Yes**
4E	2.1	CFL	Worse	***Same***	2	CFL	No
4F	2.2	CFL	Same	Same	2	CFL	Yes
4G	2.3	CFL	Same	Same	2	CFL	Yes
4H	2.4	CFL	Better	Better	2	CFL	**Yes**

The last set (4a-h) examined the development of the Context-for-Learning when a leader would move from a solo work group to a hierarchical organizational structure. Fifty percent of the High resource configurations and 75% of the Low resource configurations resulted in delayed or declining CFL path levels than could be obtained by the solo work group. Some of the enhanced results was with the Effective Founding-Leader where, if the leader got into place a second work group with the same high

levels of Context-for-Learning and effective work group leaders, the result was better CFL development. The second exception was with the Ineffective Founding-Leader. If the Ineffective Founding-Leader brought in a couple of effective work group leaders and was able to get an effective work group as well, then the results were better than what could have been obtained by the solo work group. This applied to the development of the CFL. Given the earlier results suggesting that sustained high levels of CFL were needed before performance improved, this implies that given sufficient time and funds, these small firms could ultimately improve their performance.

Limitations

This manuscript reports on the implications for the development of a strategic intangible resource, the Context-for-Learning in a Solo (one-workgroup) versus a Hierarchical (two-workgroup) setting. There were different trajectories of growth for both CFL and Performance that depended upon the skills and attitudes of people involved. While the original simulation is based on empirical work and the extensions are based on empirical work, this theoretical model shows some of the complexity system implications. As with any modeling effort, the other side (model-to-field-to-model) of the loop can be seen as a future extension of this work. It would also result in the field test or verification of the model.

Like any experiment, the researcher should take care when attempting to general to a larger population outside of the conditions found in the experiment. Furthermore, this model indicates *what could* happen <u>not</u> *what will* happen. In that sense, it provides a sense of feasibility to emerge regarding our current theories. As might be expected, people with poor skill levels and poor attitudes drive both performance and strategic intangible resource levels down. Performance drops faster than CFL and rises slower.

As mentioned earlier, this modeling effort merely tracked two paths given widely disparate levels or profiles of leader behaviors, yet there is some literature, which indicates that their subordinates (Quinn et al., 1991) view those leaders with behavioral complexity as more effective. This may positively affect things like the rate at which people pay attention and the effectiveness of leader directed learning. Future models should include the impact of behavioral complexity on subordinates. There are those who believe that early stages of organizations move more quickly to productive status when the Founding-Leader is also charismatic. It would be interesting to track the development of these two types of leadership styles along with CFL and performance.

Conclusion

There has been little work to date that has addressed the transition time and conditions faced by an entrepreneur as his or her firm grows to the point where a hierarchical-oriented Founding-Leader is needed. This manuscript looks at the impact of organizational structural change on the Context-for-Learning and performance between the solo and hierarchical organizations. We found that most configurations of followers and work group leaders tended to delay the development of a Context-for-Learning from the perspective of both the effective and ineffective Founding-Leader. However, having a leadership team with strong skill sets in both leadership behaviors and managerial behaviors (i.e. effective CVF profiles) and at least one work group out of two with strong Context-for-Learning levels, enables small hierarchal firms to attain higher levels of performance and Context-for-Learning.

Entrepreneurs looking to retain a firm beyond the level of a solo work group are well advised to bring on board a management team with significant leadership and managerial skills. However, spending the time to develop a Context-for-Learning may also help in the transition to a new hierarchical structure and its attendant changes in team performance, context-for-learning and behavioral complexity.

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