The organization of social learning in firms: Should it be formal or informal?

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Area of Study (1/2)

In every companies, there is an observable heterogeneity between workers: **firm tenure heterogeneity**

↳ workers already on the job have firm experience and hold firm-specific competences whereas the newcomers do not

This kind of heterogeneity is inefficient but transitory if the newcomers could get the competences

Area of Study (2/2)

The acquisition of competences could be done through a learning process:

Individual Learning

Acquisition of competences "on the job"

Length and probably incomplete process

Social Learning

Learning by observing the behaviour of others
(usual definition)

Learning by interacting with the others = competences transmission
(definition used in the paper)

The goal of the paper

To investigate the organization of competences transmission in firms

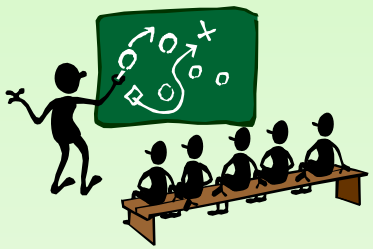
⬇

Firm-specific competences (to avoid outsourcing of the analysis)

Organization of competences transmission = Workers' organization

2 kinds of the workers' organization are studied:

A formal learning process

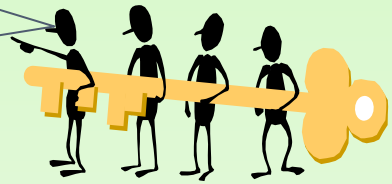


Mentorship

vs.

Teamwork

An informal learning process



Theoretical background (1/2)

Organization of social learning within firms

Garicano (2000)

"A knowledge-based hierarchy is a natural way to organize the acquisition of knowledge"

↳ some workers are specialized in production tasks and others in the resolution of difficult problems and competences transmission (experts)

Garicano and Hubbard (2005) (extension with heterogeneous learning costs)

↳ a hierarchical organization is optimal when workers and experts of the same type (according to their learning costs) are matched.

The organization of social learning is solved by the knowledge based hierarchy but the question of incentives is not addressed

Theoretical background (2/2)

Mentorship

Laband and Lentz (1995)

→ induces the acquisition of human capital

→ reduces the firm turnover

Athey, Avery and Zemsky (2000)

→ impacts on the diversity of the workforce

Arai, Billot and Lafranchi (2001)

→ improves the promotion process

Teamwork

Hamilton, Nickerson and Owan (2004)

→ induces social interactions: mutual monitoring, peer pressure and "mutual learning"

Mentorship and Teamwork are not studied in the literature as workers' organization able to facilitate competences transmission

Basic Structure of the Model

Basic Structure of the Model (1/2)

Basic assumptions on agents' heterogeneity

Heterogeneity of firm tenure

↳ 2 categories of workers:

Seniors
who **hold** firm-specific competences

Heterogeneous ability to transmit their specific competences

↳ heterogeneous cost of transmission effort denoted α_i which is not observable by other agents than *i* and the manager but the average ability to transmit $\bar{\alpha}$ is known

Juniors
who **do not** hold firm-specific competences

Heterogeneous level of skills

↳ Juniors do not have the same level of general competences

Basic Structure of the Model (2/2)

Basic assumptions on the learning processes

- **Individual learning process**

→ It is the learning process "by default"

→ Juniors could learn on their own some firm-specific competences at an average rate $\overline{\gamma}$

- **Two social learning processes: Mentorship and Teamwork**

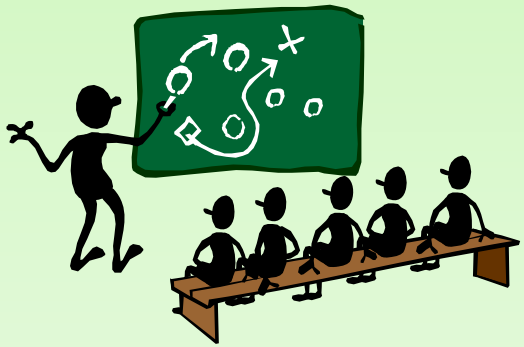
→ They are implemented by the manager

→ They have the same finite time horizon

→ All juniors enter in the social learning process but only a part of seniors

↳ There are *j* juniors, *s* seniors and *S* training seniors

Mentorship Learning Process



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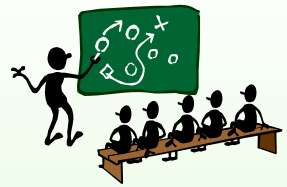
Mentorship features



Mentorship = Formal learning process

➡ It consists in organizing courses within the firm where seniors explain technical, organizational or cultural routines of the firm to juniors

➡ Those who teach cannot work anymore

➡ To rationalize the learning process, the firm should designate only one senior: a "mentor"

This designation is crucial

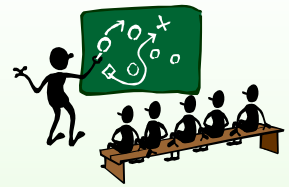
Seniors are heterogeneous in their ability to transmit

This designation is complex

The manager is not able to observe the seniors' ability to transmit

A tournament could be used to determine the best trainer

A specific tournament



Seniors have to be evaluated on their ability to transmit their competences

An illustration:

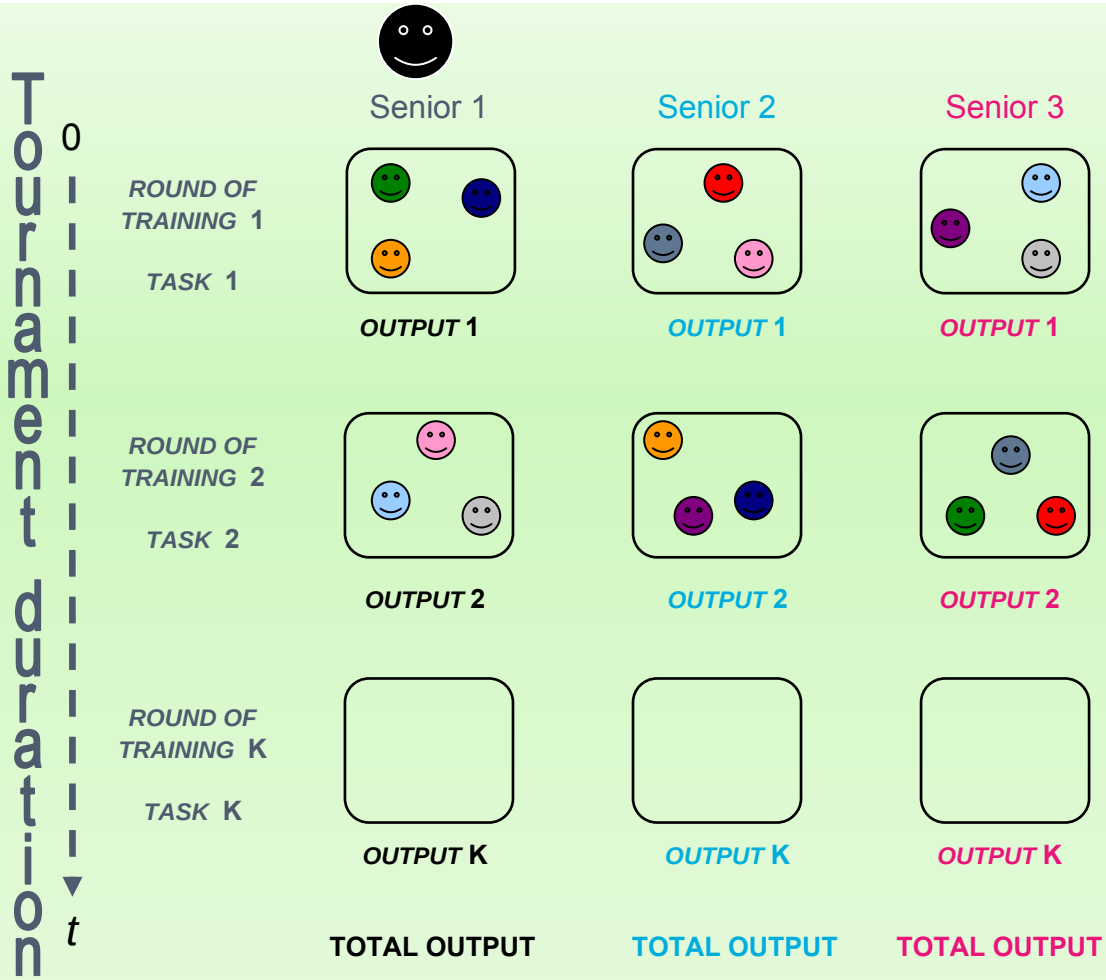
Participants of the tournament:

3 training seniors:

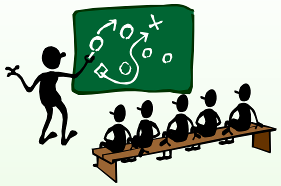
9 juniors:

At the end of the tournament:

If TOTAL OUTPUT > sup[TOTAL OUTPUT, TOTAL OUTPUT],  is designated mentor



The sequence of events



Time 0: The decisions of the manager

The manager chooses simultaneously the optimal values of:

the bonus multiplier w_M

the tournament duration t

- The mentor transmits his competences to all the juniors of the firm in respect to the level of effort already determined in time 1

Time 1: Tournament

- ...e manager does not know ... identity of the m... makes an expectation on the mentor's level of ef... ...d $F(e_M)$
- The manager d...ines simultaneously ... values of the bo... ...r and the ...rnam... in order to maxi... ...rship prof...
- If the expecte... ...ship profit ... greater than the reservation one, the tournament takes place.

Training seniors

Identification of the mentor by the manager

Seniors train junior's teams on a specific task independently and simultaneously

Other seniors produce

Juniors teams produce

Time 2: Mentorship

- ...ing senior chooses: his ... of effort during the tournament
- → his fu...re lev... during ... he is

Mentor

Firm-specific competences transmission

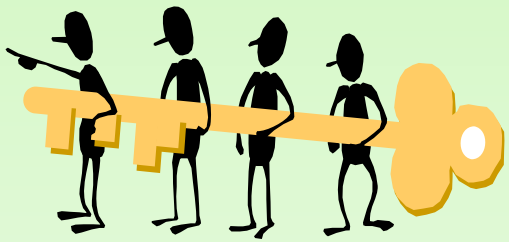
All seniors produce

Juniors produce

- ...eniors transmit the ... competences to ... in respect to the ... they have chosen

- **After time 2:** the manager observes the surplus of output produced and gives the bonus to the mentor

Teamwork Learning Process



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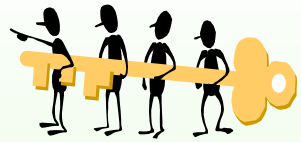
Teamwork features



Teamwork = Informal learning process

➡ It consists in a pragmatic learning within the firm where seniors show how to perform a task to juniors and help them

➡ Those who teach can work at the same time

➡ To facilitate such relationship between juniors and seniors, the firm should form mixed teams

The size of teams is crucial

Positive size effect:
Lower cost of transmission effort

Negative size effect:
Free rider problem

There exists a trade off

The composition of the Team(s)

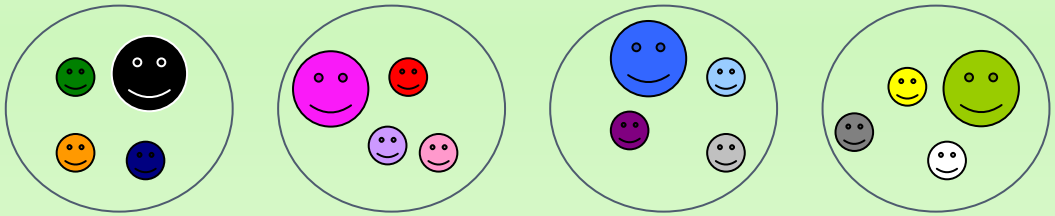
An illustration

4 training seniors:

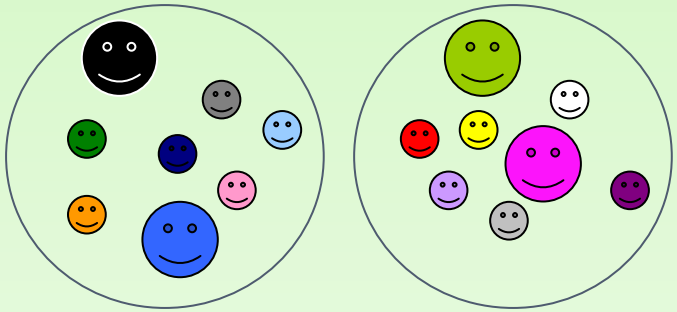
12 juniors:

3 possible configurations:

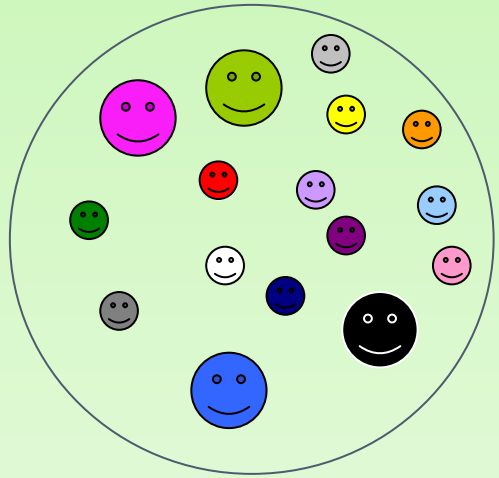
4 teams and 1 senior by team



2 teams and 2 seniors by team



1 team and 4 seniors by team



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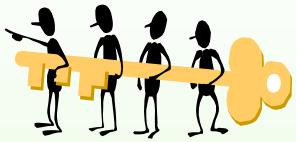


Time 1: The decisions of the manager

The manager chooses simultaneously the optimal values of:

the bonus multiplier w_T

the number of training seniors by team S_T

Time 2: Teamwork and Decisions of the training seniors

➡ The manager expects the team's level of effort

➡ The manager determines simultaneously the optimal values of the bonus multiplier and the number of training seniors by team in order to maximize the teamwork profit

➡ Each training senior :

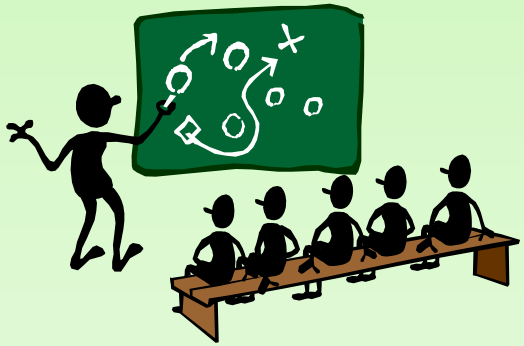
→ expects the seniors' average level of effort because the team's level of effort depends on his own effort and the efforts of his peers

→ determines optimally his level of effort e_i^*

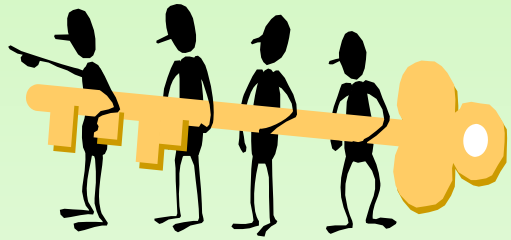
➡ Training seniors transmit their firm-specific competences to the juniors of their team in respect to the level of effort they have chosen

➡ **After time 2:** the manager observes the surplus of output produced and gives the bonus to each team

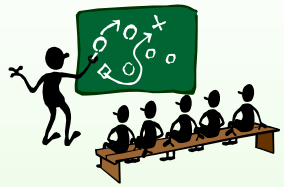
Numerical comparison



vs.



Numerical comparison (1/2)



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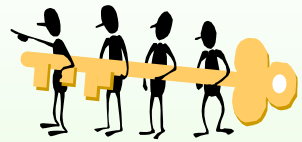


A numerical comparison with Mathematica where:

- The profit function integrates the optimal values of the control variables : $\{w_M^*, t^*\}$ for Mentorship and $\{w_T^*, S_T^*\}$ for Teamwork

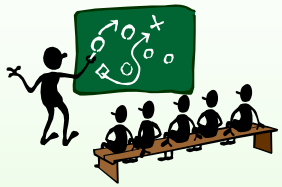
- The optimal choice of the firm among implementing Mentorship, Teamwork or no social learning process appears according to the value of the parameters

- The following parameters have been chosen:

$$W = 50;\ \varepsilon = 0.1;\ r = 0.01;\ s = 80;\ S = 12;$$

$$\underbrace{\bar{\alpha} = 5;}_{\text{“Training supply”}}\ \underbrace{j = 20; \bar{y}_s = 0.65; \bar{y}_j = 0.4; \bar{\gamma}^2 = 0.4; \bar{\gamma}^3 = 0.35; \bar{\gamma}^4 = 0.2}_{\text{“Training demand”}}$$

Numerical comparison (2/2)



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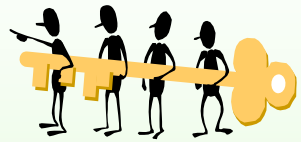

Conclusion on the numerical comparison

Implementing Mentorship is the best strategy if (all things equal):

$\bar{\alpha} < 2.9$ or $\bar{\alpha} > 5$	training seniors have a high cost of transmission in average or a very low one	Training supply is rather low or rather high
$j > 20$	there are many juniors to train	Training demand is important
$\bar{y}_J < 0.4$	firm tenure is high: juniors have many firm-specific competences to acquire	
$\bar{\gamma}^2 < 0.4$ or $\bar{\gamma}^3 < 0.35$	the individual learning process is incomplete	

Conclusion

Results

General model

- Existence of an optimal solution for each social learning process
  - → this solution is unique in the mentorship case
  - → this solution can be unique or not in the teamwork case

Analytical specification of the model and numerical comparison

- Absence of the superiority of a learning process
- Mentorship learning process would be a dominating strategy if:
  - → there is a need for training according to the firm and the workers' characteristics such as firm tenure heterogeneity, the number of new hires to train, the individual learning process efficiency
  - → experimented workers have a low ability to transmit on average or a very high one

THANK YOU!