

Transferring Innovation Across Groups in Organizations: Evidence from the Field and the Laboratory

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Presentation Today

- Brief overview of Research on Knowledge Transfer
- Empirical Projects
 - Field Study: Knowledge transfer in franchise organizations (with Eric Darr and Dennis Epple)
 - Laboratory Study: Effect of social identity on knowledge transfer (with Aimee Kane and John Levine)

Definitions of Innovation

- West and Farr (1990, p. 9)
 - “The intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society.”
- Van de Ven, Polley Garud and Venkataraman (1999, p. 9).
 - “Whereas invention is the creation of a new idea, innovation is more encompassing and includes the process of developing and implementing a new idea.”
 - “The idea may be a recombination of old ideas, a scheme that challenges the present order, a formula or a unique approach that is perceived as new by the individuals involved.”
- Innovation in organizations involves creating new ideas and implementing or adopting them throughout the organization

Knowledge Transfer Across Groups in Organizations

- Process of moving innovations from one organizational group to another
- Process through which one group is affected by the experience of another

Learning Curves in Manufacturing

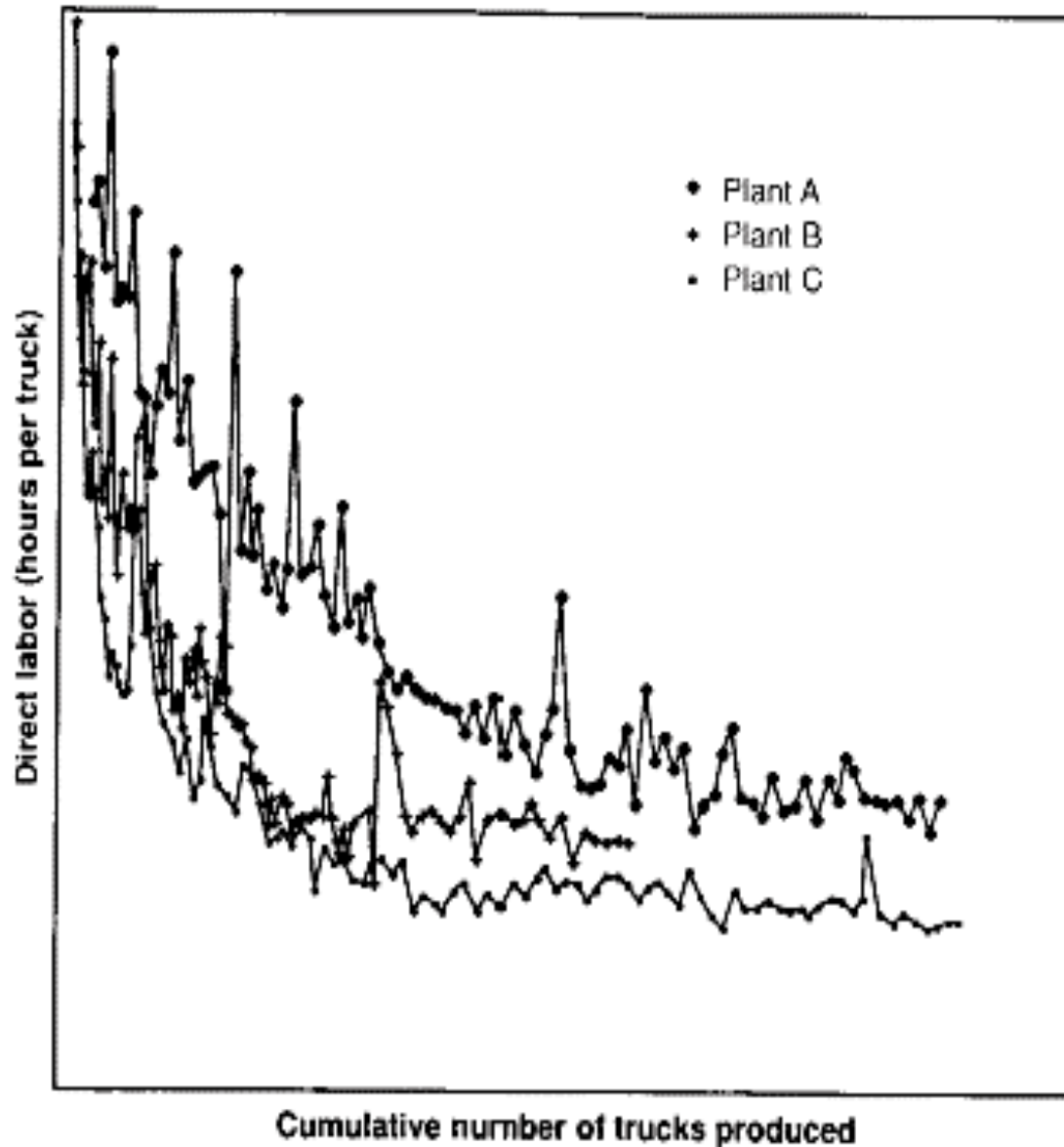


Fig. 3. Relation between direct labor hours per truck and cumulative number produced for three truck plants. Units omitted.

Reprinted from Argote, L., & Epple, D. (1990). Learning curves in manufacturing, *Science*, 247, 920-924.

Knowledge Transfer Research

- Does knowledge transfer within and between organizational units?
- What factors facilitate or impede transfer in organizations?
- What are the mechanisms through which knowledge transfer occurs?
 - Darr, Argote & Epple, 1995
 - Zander & Kogut, 1995
 - Powell, Koput & Smith-Doerr, 1996
 - Szulanski, 1996
 - Baum & Ingram, 1998
 - Almeida & Kogut, 1999
 - Argote, 1999
 - Hansen, 1999
 - Argote & Ingram, 2000
 - Stasser, Vaughan & Stewart, 2000
 - Lapre & van Wassenhove, 2001
 - Reagans & McEvily, 2003
 - Thomas-Hunt, Ogden & Neale, 2003
 - Song, Almeida & Wu, 2003
 - Kane, Argote & Levine, 2005

Field Study of Knowledge Transfer

**The Acquisition, Transfer, and
Depreciation of Learning in
Service Organizations:
Productivity in Franchises.**

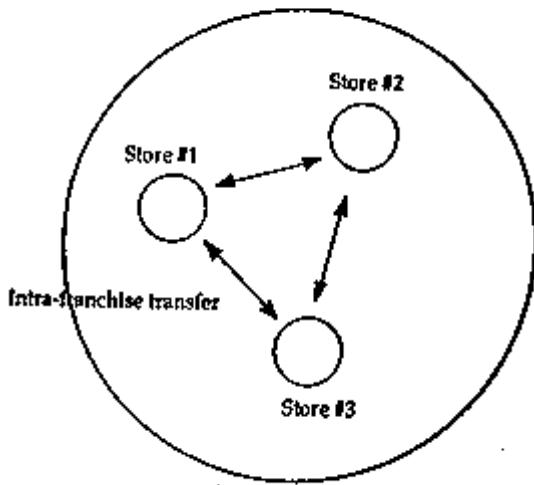
Eric Darr

Linda Argote
Carnegie Mellon University

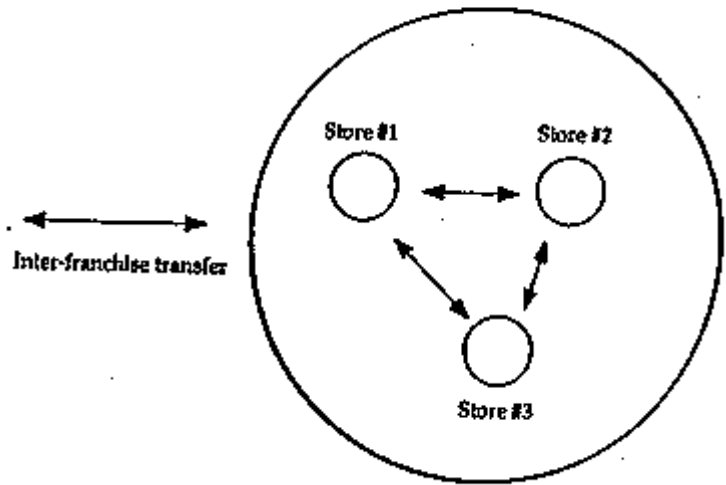
Dennis Epple
Carnegie Mellon University

Management Science,
November 1999

Pizza Franchisee # 1



Pizza Franchisee # 2



Field Study: Knowledge Transfer in Fast Food Franchises (Darr, Argote & Epple)

- Franchises-ideal setting to study transfer
- Replication of routines
- Survey of Manufacturing, 1998:
 - Ford sent a task force to McDonald's to learn how McDonald's transfers knowledge on a global scale

Knowledge Transfer in Franchises

- Sample
 - 36 pizza stores from 10 different franchise organizations
- Data
 - Weekly data for 1 ½ years at each store
- Analysis Approach
 - Productions functions
 - Assess extent to which stores learn from
 - Own experience
 - Experience of other stores in the same franchise
 - Experience of stores in other franchise
- Controls for economies of scale, product mix, calendar time, etc.

Coefficients Estimates for Models Predicting Cost/Unit^a

Table 1 Estimated Coefficients for Models Predicting Unit Cost^a

	(1)	(2)	(3)	(4)	(5)
Store-specific Learning (b_1)	-0.117‡ (0.019)	-0.098‡ (0.020)	-0.097‡ (0.020)	-0.104‡ (0.019)	-0.106‡ (0.022)
Transfer between commonly owned stores (b_2)	-0.104‡ (0.016)	-0.066‡ (0.019)	-0.064† (0.020)	-0.059† (0.022)	-0.094* (0.047)
Transfer between differently owned stores (b_3)	-0.015* (0.007)	-0.008 (0.010)	-0.009 (0.010)	-0.004 (0.010)	-0.001 (0.011)
Calendar Time (b_4)		0.003† (0.001)	0.003† (0.001)	0.004† (0.002)	0.002† (0.0008)
Current Pizza Count (b_5)		-0.0003‡ (0.1E-04)	-0.0003‡ (0.1E-04)	-0.0003‡ (0.1E-04)	-0.0004‡ (0.9E-05)
Square of Current Pizza Count (b_6)		0.6E-07‡ (0.4E-08)	0.5E-07‡ (0.4E-08)	0.5E-07‡ (0.4E-08)	0.9E-07‡ (0.4E-08)
Square of Store-Specific Learning (b_7)			0.009 (0.007)	0.009 (0.008)	0.003 (0.009)
Percentage Pan Pizza (b_8)			0.021 (0.017)	0.022 (0.021)	0.052 (0.048)
Depreciation of Knowledge (λ)				0.80‡ (0.046)	0.83‡ (0.042)
Autocorrelation Coefficient	0.569‡ (0.017)	0.581‡ (0.014)	0.589‡ (0.015)	0.512‡ (0.022)	0.492‡ (0.024)
R^2	0.237	0.557	0.565	0.593	0.653

^a Standard errors are shown in parentheses.

* $p < 0.05$, and † $p < 0.01$, and ‡ $p < 0.001$.

Knowledge Transfer Results: Franchise Study

- Stores learn from own direct experience
 - Unit cost of production
 - Service timeliness
- Knowledge transferred across stores in same franchise
- Stores that are part of multi-store network are more productive than single stores

Laboratory Study of Knowledge Transfer

Knowledge Transfer Between Groups via Personnel Rotation: Effects of Social Identity and Knowledge Quality

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Mechanism for Transferring Knowledge: Personnel Rotation

- A manager at Sematech, stressed the importance of personnel movement:
 - *“We have documents, document databases, an intranet Web, groupware, you name it. But the assignees and the face-to-face meetings we have are by far the most important channels for transferring knowledge to member firms”* (Davenport & Prusak, 1998, p. 90).
- Personnel movement became necessary to transfer knowledge between a Boston Harbor tunnel project and a similar project in New Zealand:
 - *“The tunnelers in New Zealand developed innovative improvements ... they tried sending memos and descriptions, creating diagrams and manuals, even hiring consultants to give talks to the Boston crews...Eventually, though they had to fly tunnelers from Wellington to Boston and let the two groups of workers spend time together because nothing else worked”* (Davenport & Prusak, 1998, p. 99).

Social Identity and Categorization Theories

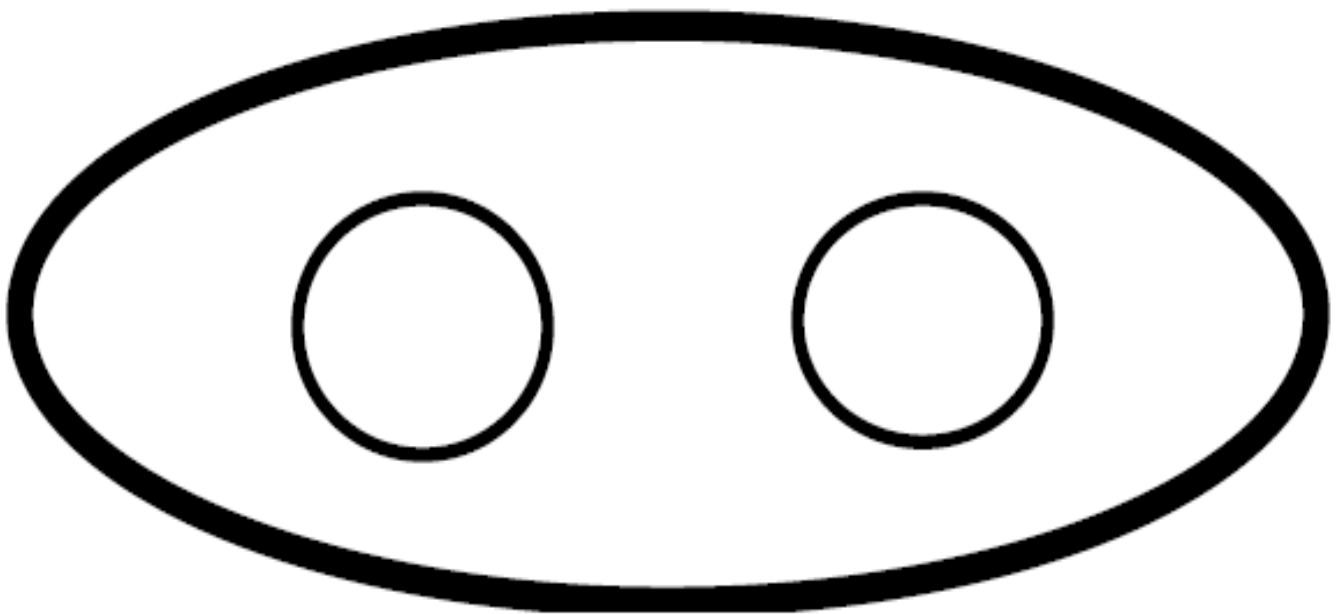
- Social Identity (sense of belonging to a social aggregate) is derived primarily from group memberships
- Group members view their own group and its members more positively than other groups and their members
 - Brewer (1979)
 - Rabbie (1982)
 - Tajfel & Turner (1986)
 - Ashforth & Mael (1989)
 - Kramer (1991)
 - Mael & Tetrick (1992)
 - Gaertner & Dovidio (2000)
 - Gaertner & Insko (2000)

Effects of Ingroup Favoritism

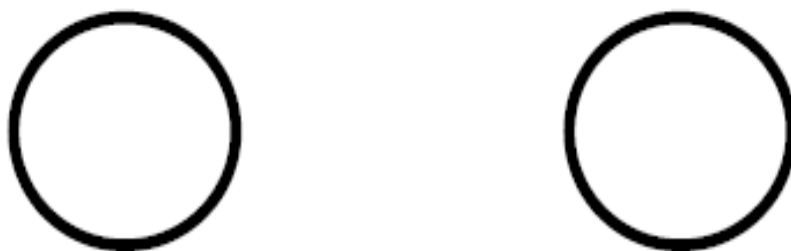
- Evaluation of group members
 - Ingroup members are seen as more honest, trustworthy, loyal, similar and cooperative than outgroup members
 - Outgroup members are often perceived in more negative, stereotypical, and homogeneous, terms than ingroup members
- Evaluations of group's products and/or processes
 - Ingroup's products and processes are evaluated more favorably than outgroup's products and processes
 - Overestimate the positive behaviors of own group and underestimate positive behaviors of outgroup
- Behavioral Effects
 - Rewards are allocated more often to maximize the relative gain in favor of the ingroup versus the outgroup

Visual Representation of Experimental Conditions

Superordinate Condition
(Two Assembly Lines in One Organization)



Subordinate Condition (Two
Assembly Lines)



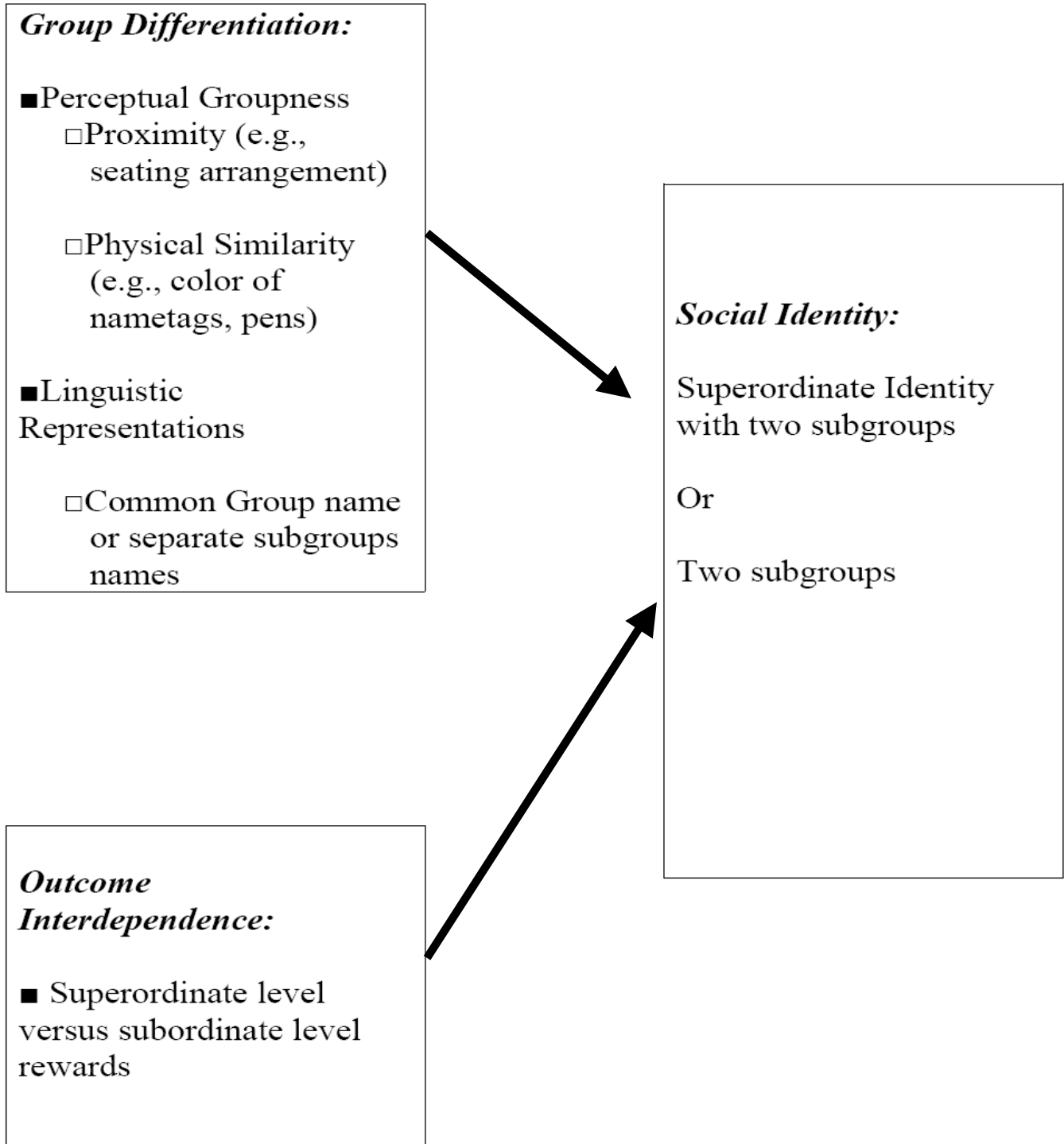
Background Research Relevant for Interaction Prediction

- Previous findings from individual persuasion research
 - Individuals analyze information more thoroughly when it is contributed by an ingroup than an outgroup member
 - Van Krippenberg (1999)
 - Individuals more likely to adopt ingroup positions supported with high quality arguments while individuals unlikely to adopt outgroup positions, regardless of the quality of their arguments.
 - Mackie, Worth & Asunsion (1990)
 - Van Krippenberg (1999)

Theoretical Predictions: Interaction

- Social identity by Knowledge Quality
 - When a recipient group and a rotating member share a superordinate identity, knowledge transfer will occur when the rotating member possesses a superior routine but not when the rotating member possesses an inferior routine. By contrast, when the recipient group and the rotating member do not share a superordinate identity, knowledge will be less likely to occur for either superior or inferior routines.

Experimental Manipulation



Adapted from "Across Cultural Divides: The Value of a Superordinate Identity," by S.L. Gaertner, J.A. Nier, C.M. Ward & B.S. Banker, 1999. In D.A. Prentice & D.T. Miller (Eds.) Cultural divides: Understanding and overcoming conflict, pp. 173- 212. Copyright Russell Sage Foundation, New York, NY.

Method

- Participants (144)
 - Randomly assigned
 - Three person same-gender groups
- Task
 - Produce Origami sailboats
 - Interdependent-specialized roles (randomly assigned)
- Training
 - Half groups trained in (slightly) superior production routine
 - Half groups trained in inferior production routine
- Reward
 - Best performing group (organization) of the semester wins reward of \$30 (\$60)

Variables

- **Dependent Variables**
 - Whether knowledge transfers from rotating member to new group (adoption of rotating member's production routine)
 - Performance
- **Independent Variables**
 - Between-subject factors
 - Social Identity (Superordinate vs. Subordinate)
 - Quality of Routine of Rotating Member (Superior vs. Inferior)
 - Within-subject factor
 - Trials (2 periods)
- **Identity Manipulation**
 - Group Differentiation (common name, seating, color of nametag)
 - Interdependent at group or organization level

Manipulation Checks

Group Identification Scale	Mean Score		Cronbach's Alpha	T-Statistic Superordinate vs. Subordinate
	Superordinate	Subordinate		
	5.11	4.54	0.84	3.52 (p< .001)



I identified with the group



Members did not need to cooperate to complete group tasks (Reverse scored)



I was glad to belong to this group



The group accomplished things that no single member could have



I think the group worked well together



I saw myself as an important part of the group



All members needed to contribute to achieve the goals of the group



I did not consider the group to be important (reverse scored)



I felt strong ties to this group



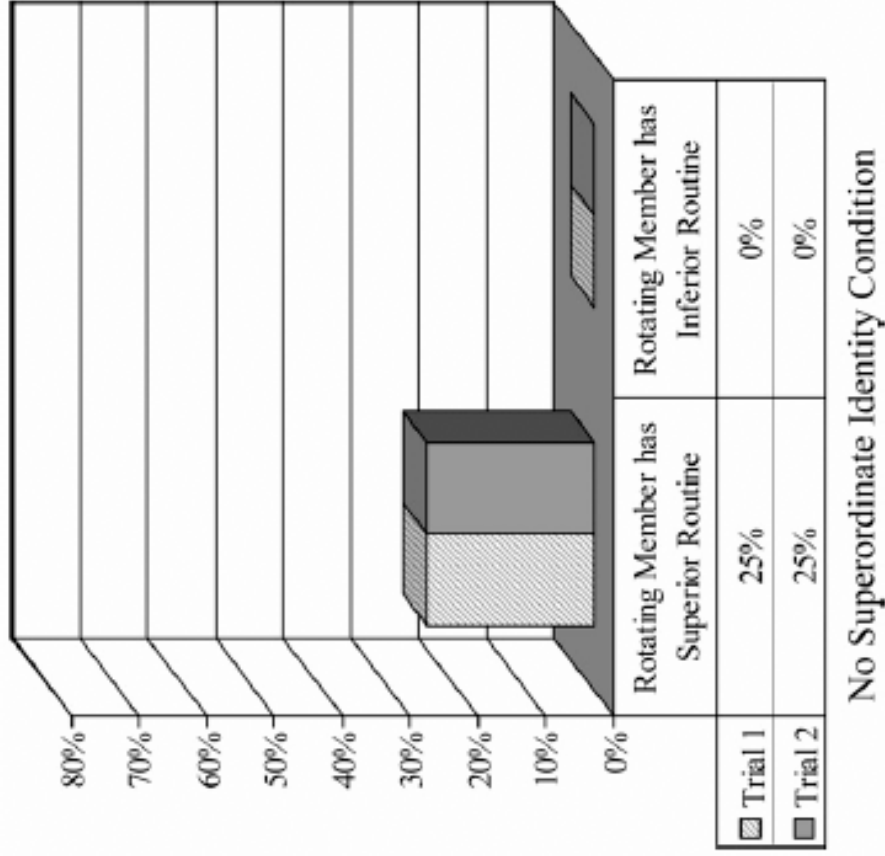
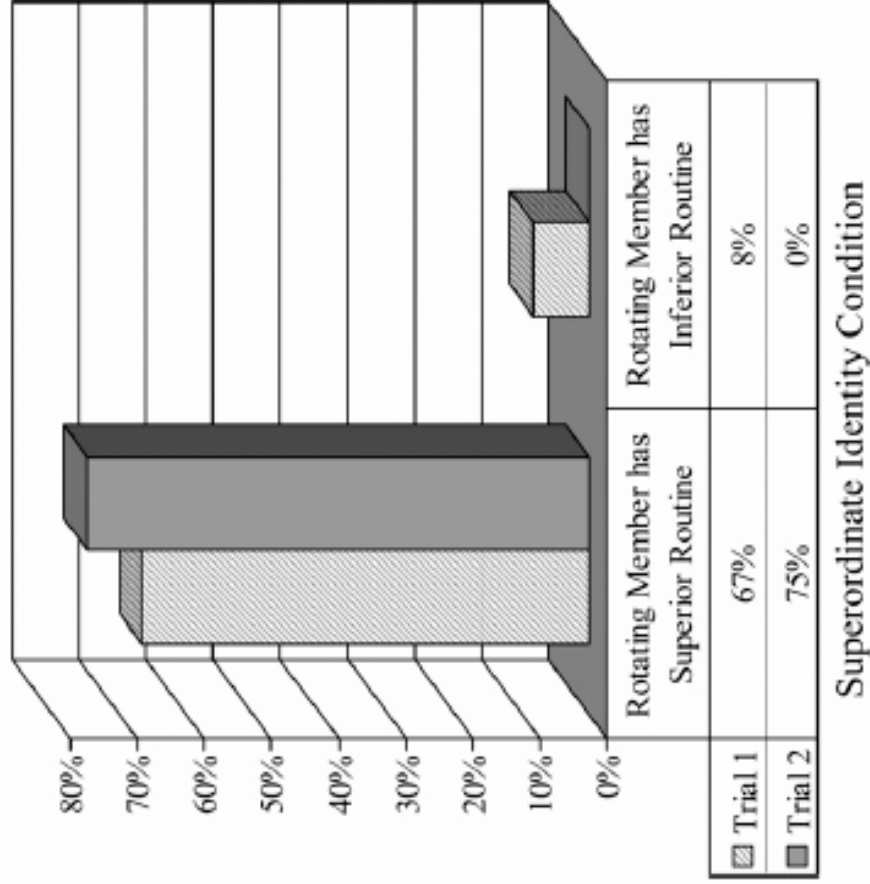
Members didn't have to rely on one another to complete group tasks (Reverse scored)

- Items 1, 3, 5, 6, 8 and 9 were adapted from Hinkel et al. (1989) and measure the affective component of group identification.
- Items 2, 4, 7, and 10 were adapted from Arrow-Carini (1999) and measure the behavioral component of group identification.
- Each item was answered on a seven-point scale ranging from "strongly disagree" to "strongly agree."

Results: Knowledge Transfer

- Significant ($p < .01$) main effect for social identity: Knowledge more likely to transfer in the superordinate than in the no superordinate condition
- Significant ($p < .001$) main effect for knowledge quality: Groups more likely to adopt superior than inferior routines
- Significant interaction between social identity and knowledge quality ($p < .01$): knowledge was more likely to transfer when the rotating member possessed superior knowledge and shared a superordinate identity than in the other three conditions
- Effect of trial or interaction of trial with other variables did not approach significance
- Some evidence adoption more stable in superordinate condition

Figure 1:
Percent of Groups in which Knowledge Transferred as a Function of Social Identity,
Routine Quality and Trial



Summary of Mediation Analyses

	Regression Coefficients and Standard Errors (in parentheses)		
	Model 1	Model 2	Model 3
	Knowledge Transfer (KT)	Perceptions of Superordinate Identity (SI)	Knowledge Transfer (KT)
Model	$KT = a + B_1 IC + B_2 KQ + B_3 IC * KQ$	$SI = a + B_4 SI + B_5 KQ + B_6 SI * KQ$	$KT = a + B_7 IC + B_8 SI + B_9 KQ + B_{10} IC * KQ + B_{11} SI * KQ$
Intercept	0.25 *** (.04)	4.84 *** (.08)	0.25 *** (.04)
Identity condition (IC)	0.25 ** (.08)	0.56 ** (.16)	0.17 + (.09)
Perceptions of Superordinate Identity (SI)			0.17 * (.08)
Knowledge Quality (KQ)	0.46 *** (.08)	0.01 (.16)	0.46 *** (.08)
Identity Condition x Knowledge Quality (IC*KQ)	0.42 * (.17)	-0.18 (.33)	0.26 (.18)
Perceptions of Superordinate Identity x Knowledge Quality (SI*KQ)			0.33 * (.15)
F	15.00 ***	4.08 **	11.81 ***
R ²	0.51	0.22	0.58
N	48	48	48

+ p < .10 * p < .05 ** p < .01 *** p < .001

Contribution

- Knowledge transfer
 - Previous studies have discussed the importance of relationships
 - Our study investigates particular properties of relationships
 - Our study provides platform for investigating the effect of other factors affecting knowledge transfer
- Social identity
 - New outcome: knowledge transfer
 - Group level of analysis
 - Dual identity context
 - Find a shared identity leads to greater transfer of innovations

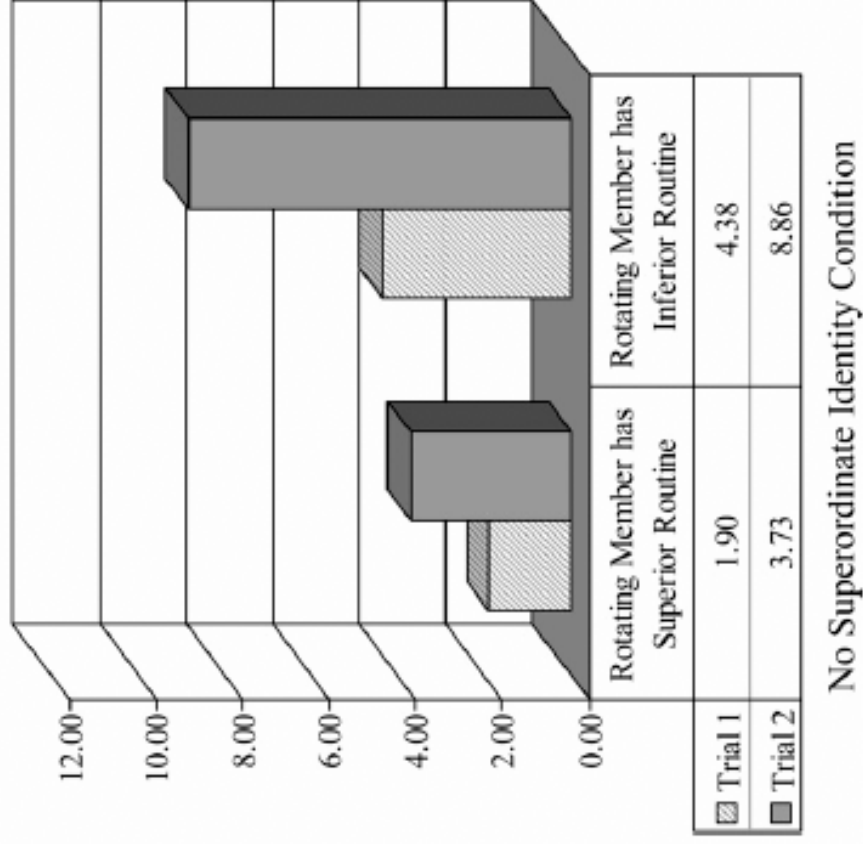
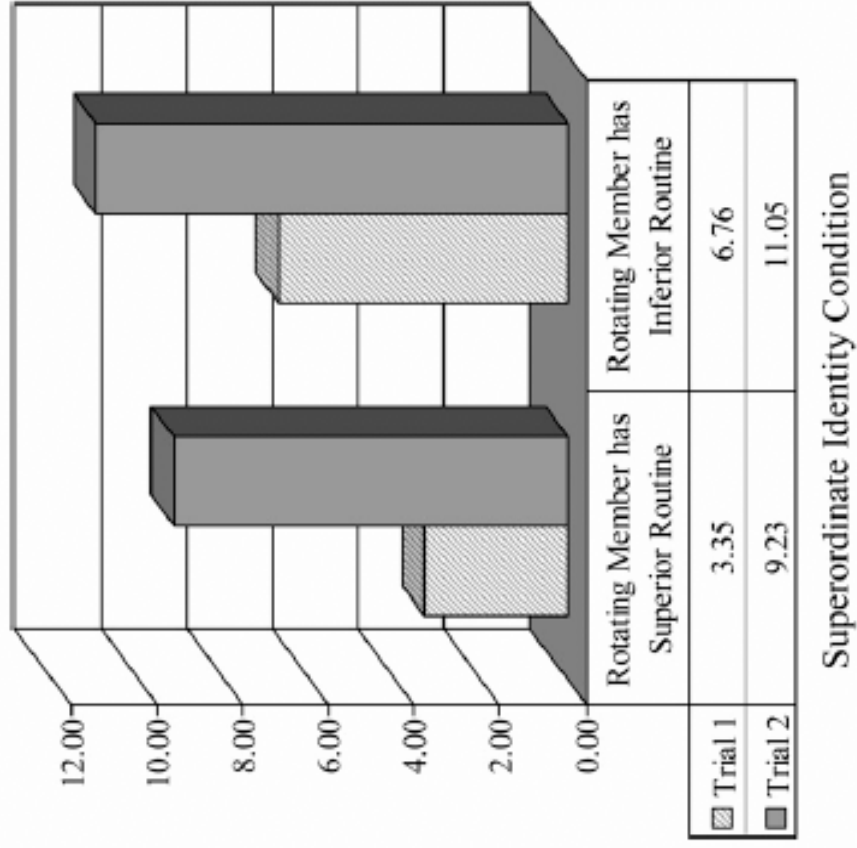
Conclusions

- Social identity affects knowledge transfer and performance
 - Can create an overarching social identity even when subgroups remain intact
- Boundaries have a significant impact on knowledge transfer and innovation in organizations

Results: Performance

- Significant main effect for superordinate identity ($p < .01$)
- Significant main effect for knowledge quality ($p < .001$)
- Significant effect for trial ($p < .001$)
- Significant three-way interaction between social identity, knowledge quality and trial ($p < .01$)

Figure 2:
Group Performance as a Function of Social Identity, Knowledge Quality and Trial



References

- Argote, L. (1999). Organizational learning: Creating, retaining and transferring knowledge. Norwell, MA: Kluwer.
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