

Promoting social ties across technical cultures: the barrier of homophily

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Literature in management often assumes that managing people from various technical cultures is a way to achieve good human resource combination in order to secure competitive advantages. As an example, successful knowledge-intensive organizations are often pictured as very good at mixing people with distinct knowledge and technical cultures. A number of scholars has also discussed the positive impact of functional or technical diversity in teams [e.g.: BAN 89, WAT 93, JEH 99, PEL 99, KIL 04, JAC 04].

According to such literature, diversity does not create benefits *in itself*. Reagans et al. showed two conflicting effects [REA 04]. When team members are not similar, they will be able to gather more resources, improving so team performance. In the mean time, the more dissimilar they are, the less easy for them is coordination within the team, reducing so team performance. Therefore, the challenge is not only to find people from various technical cultures, it is also to “mix” them and favour interpersonal communication.

Similarly, following the rise of social capital as a key concept in management, several authors insist that enjoying a portfolio of social ties with high technical diversity leads to creativity and innovation, since people with heterogeneous networks might act as knowledge brokers and build new knowledge combinations [NAH 98, HAR 02, PER 03, ROD 04].

According to all these authors, interpersonal interaction between technically distinct people is quite unequivocally beneficial and needs to be promoted. Yet, for any social network scholar, such promotion appears to contradict the classical homophily principle. The theory of homophily states that human beings feel closer to people similar to them. According to this principle, the very reason why confronting dissimilar people is beneficial, is also the reason why it sounds very difficult, if not impossible.

The paper intends to test this assumption. It focuses on individual behaviour, more precisely on individual reaction toward different others. To test technical homophily, we assume that A’s reaction

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toward B's technical difference results in a more or less intense feeling of emotional closeness toward B.

1 Theoretical Background

1.1 *Baseline and inbreeding homophily*

To our view, the theory of homophily [MCP 87, SUI 97, MCP 01, RUE 02] offers a good framework to improve our understanding of reactions toward different others (see [MCP 01] for review).

As stated by [MCP 87], *choice homophily* is much different from *induced homophily*. *Choice homophily* means that people tend to choose and prefer people similar to them. *Induced homophily* means that people tend to meet and know people similar to them, not as the result of a choice, but as the result of a social, professional or physical context. In organizations, both *choice* and *induced homophily* exist.

In order to refine their *choice/induced* classification of homophily, [MCP 01] made it clear that part of *induced* homophily is the result of *baseline homophily*: some homophilous ties exist just because of the specific demography of the potential pool of ties in ego's environment. Such pool sometimes provides only poor opportunities to meet dissimilar others, whatever personal preferences are. Consider an organization with 60% male and 40% female workers. If a given male worker has 60% male alters in his network, there is homophily. But in that case homophily is very probably *baseline homophily*: his organization offers a bigger pool of male contacts than female contacts; therefore, completely random births of ties lead quite logically to a majority of male contacts. Now, if his personal network has 80% male workers, homophily is clearly above what we could expect from the description of the whole pool of potential ties, revealing so what McPherson et al. term *inbreeding homophily*. This can be due to *choice homophily*: male workers do prefer interacting with same-sex contacts. But it might also be due to what Blau called *consolidation* [see MCP 01]: similarity on gender as a correlate of homophily based on another dimension. The gender homophily could be no gender-based *choice homophily*, but a correlate of homophily based on occupational status (i.e. people preferring contacts with people of similar status if males hold the big majority of all prestigious positions).

Both types of homophilies result from very distinct organizational processes. For our research issue, oriented toward understanding how probable knowledge transfer is between two people belonging to the same organization, it seems crucial to capture inbreeding homophily processes (baseline homophily has nothing to do with the individual perception of diversity).

1.2 *Focusing on inbreeding homophily*

In extra-professional life, *inbreeding homophily* might rule a significant part of social ties births, since people enjoy there quite unconstrained possibilities to select alters. On the contrary, work-life

offers strong preconditions for baseline homophily. You do not choose most of the people you work with.

Indeed, a big part of personal ties are chiefly “inherited” from a hierarchical or organizational position: should ties births show strong patterns of homophily, this could be baseline homophily as well as inbreeding homophily without any possibility to capture the difference. One tactic to overcome this problem is to take into account the pool of potential ties, and to compare ego’s actual personal network heterogeneity with the personal network heterogeneity that we would expect from the opportunity set created by the pool (e.g.: if they are 70% dissimilar others within the firm and if ego’s personal network is only made of 20% dissimilar others, this might reveal *inbreeding homophily*). Yet, this requires exhaustive data on all social ties ego could potentially build within his or her organization.

We do think there is another method to empirically make a distinction between *baseline* and *inbreeding* homophily. Part of your network ties are “inherited” and do not tell anything about your preferences toward similarity or dissimilarity; but for any given set of existing ties, should they be either chosen or inherited, what will clearly depend on your personal preferences and perceptions is the level of emotional closeness you feel (which is an approximation of the classical notion of tie strength, see [MAR 84]). If people tend to feel higher emotional closeness toward similar others, this should reveal only inbreeding homophily.

Another argument supports our approach: the birth of a tie between two very different people is far from being a sufficient condition for knowledge transfer to take place. On the contrary, tie strength has been shown to favour knowledge transfer [e.g. HAN 01, REA 03, UZZ 03] and, therefore, testing homophily as the impact of technical dissimilarity on emotional closeness allows investigating whether technical homophily is a barrier to knowledge transfer across technical cultures boundaries.

2 Hypothesis

While most of homophily studies focus on extra professional ties, several papers investigate homophily in the workplace [IBA 92, IBA 95, MEH 98, MOL 03, BAC 05]. They focus on ethnicity and gender as the key dimensions of similarity. Part of these studies aim at explaining how belonging to minority groups (mainly African Americans or female, depending on the study) leads to weak or strong propensity to build homophilous ties.

Though they do not deal with technical culture as the key dimension of homophily, they offer several arguments to support the assumption of technical homophily. First, as other cultural

similarities, technical similarity provides a common set of values and knowledge that favours the feeling of mutual understanding, leading so to high emotional closeness. Second, similarity makes it easier for someone to predict alter's behaviour [IBA 92: 423]. This might reduce the behavioural uncertainty that could threaten the tie. Third, emotional closeness can also be the result of the perception that ego's and similar others' interests overlap much more than with any other dissimilar people. This is particularly the case for the dimension we deal with, since technical cultures often compete in a conflicting way for organizational resources (whereas confrontations between, say, men and women within organizations, seem to be less visible and conscious). Considering the notion of technical distance as the opposite of technical similarity, technical homophily can be tested with the following hypothesis:

H1 – Dyadic technical distance will lower perceived emotional closeness

Yet, the role of technical distance is probably highly dependent on interaction frequency. For very frequent interactions, it is highly probable that similarity on technical culture will lose its power to explain emotional closeness. The reason is that frequent interactions allow a specific common framework to emerge, lowering so the risk of dissonance due to technical differences. Consider for example the second argument supporting technical homophily (i.e. technical similarity allows behavioural predictability). When you daily interact with someone, you have the opportunity to learn from his or her behaviour and, therefore, it is quite easier for you to predict his or her behaviour: you will not need to rely on similarity or dissimilarity on technical culture to make behavioural expectations, since you will enjoy "first-hand" information about alter's behaviour.

In other words, for alters you meet very frequently, you will have fifty reasons other than technical similarity to feel emotionally close (or to feel emotionally distant). On the contrary, when ties are very infrequent, reasons to feel emotionally close are few and, most of all, they can be rooted neither in the experience of a day-to-day relationship nor in fine-grained information about alter's personal characteristics (values, attitudes, etc.). In such a situation, technical similarity will be one of the only information you have in order to make a judgement about alter, and technical homophily will be stronger.

H2 – The frequency of interaction will moderate the relationship between dyadic technical distance and perceived emotional closeness. Dyadic technical distance will lower perceived emotional closeness strongly for ties with low interaction frequency and weakly for high frequency interaction.

3 Data and methods

3.1 Data collection

The sample was drawn by e-mailing alumni of several French schools. Data was collected through an online questionnaire [BOU 06]. We used name generators to help respondents think about regular contacts in various situations (adapted from [BUR 92, POD 97]). There were 730 respondents and this data collection process resulted in 3453 observations (i.e. respondents cited 4,73 contacts on average). Respondents appear to work in various industries and to hold various functional positions. For each alter, respondents were asked to tell where they first met:

- a. personal sources (extra-professional friendship, family, etc.) : 71 ties in the sample,
- b. student life : 73 ties in the sample,
- c. a former professional position : 573 ties in the sample,
- d. the current professional position : 2736 ties in the sample.

Ties of a, b or c types are all former ties. We do think that a, b or c type ties might introduce high risk of reverse causality (emotional closeness breeding interaction frequency). For d type ties, correlation between closeness and frequency probably reflects much more the impact of frequency on closeness than the reverse. Thus, a, b and c type ties were excluded from the sample.

3.2 *Dependent variable (emotional closeness) and independent variables*

Respondents were supposed to fill in name interpreters. For each contact, (or alter) respondent was supposed to assess the level of *perceived emotional closeness* [see BUR 92], from “very distant” to “very close”. For each contact, respondent was supposed to assess the level of technical distance. *Technical distance* is the distance perceived by the respondent between (a) her or his field of knowledge and know-how and (b) alters’ field of knowledge and know-how [ROD 04].

In a X-Y causal relationship, the moderating effect of Z can be captured by including in the regression the interaction term $X*Z$ [JAC 03]. According to H2, interaction frequency is a moderating variable of the technical distance / emotional closeness relationship. For each contact (or alter), respondent was supposed to assess frequency through a Likert scale: “once a day”, “once a week”, “once a month”, “once a year or less” (adapted from [BUR 92]). Yet, to allow easy interpretation of results, two dummy variables were built from interaction frequency. As a result, two interaction terms were computed: *technical distance * very low frequency* and *technical distance * very high frequency*.

As already stated, emotional closeness has been shown to be tightly coupled to interaction frequency [MAR 84]. Interaction frequency provides many occasions for emotional closeness to emerge. As a result, part of the statistical relationship between technical distance and emotional closeness might be due to the fact that people with technical dissimilarity often lack occasions to interact and, thus, to develop emotional closeness. Therefore, the negative effect of technical distance

on emotional closeness could simply be a correlate of interaction frequency. To avoid such mis-specification regarding causal relationships, we introduced interaction frequency as a control variable.

Just as the effect of technical distance might be a correlate of interaction frequency, it might also be a correlate of other dissimilarities between respondent and his or her contact. Therefore, we considered both *organizational distance* and *hierarchical distance*. These distances are not key to the research issue, but they describe the organizational-side (both vertical and horizontal) of the dyad's context. Indeed, the technical-side of dyad's context could simply be a correlate of organizational-side context, leading so to mis-specification of the regression model. As an example, the effect of technical distance could simply be due to the fact that technical culture boundaries and organizational boundaries overlap.

We also controlled for traditional variables describing respondents: age, gender and organisational tenure.

4 Results

Technical homophily (defined as the propensity to feel emotionally close to people that have fields of knowledge and know-how similar to yours) was tested through OLS regressions.

Model 1 provides results including only control variables describing respondent. Organizational tenure is the only variable that appears to be significant. All following models include variables describing the dyadic tie. Model 2 shows very strong negative effect of hierarchical distance (the higher hierarchical distance with alter, the lesser perceived emotional closeness) and much smaller negative effect of organizational distance. As shown in Model 3, introduction of technical distance seriously reduces the impact of organizational distance, suggesting that the latter is a correlate of technical distance. Such result seems to provide support for H1.

Model 4 includes interaction frequency, through dummy variables. As expected, for ties with high interaction frequency, emotional closeness is high and for low interaction frequency, emotional closeness is low. The impact of technical distance is only slightly affected, suggesting that technical distance is not just a correlate of interaction frequency, and providing additional support to H1.

Model 5 provides support for H2, showing a significant moderating effect of interaction frequency on the technical distance / emotional closeness relationship. Relying on unstandardized coefficients, figure 1 offers a synthetic view of the moderating effect. For very high frequency (ties with daily interaction), the slope capturing the impact of technical distance is almost zero. For very infrequent interaction, slope is strongly negative. For medium interaction frequency (ties with interaction between once a week and once a month), there is a medium negative impact.

In a few words, model 5 shows that technical homophily within organizations is a phenomenon limited to contacts ego does not meet frequently (and almost not operating for people with whom ego daily interacts). That is not to say that people respondents meet frequently are more emotionally close

(indeed, this is true, but already taken into account in model 4): you can hate people with whom you have daily interactions, e.g. for task-related purpose. The results are: if you hate such people, it is not due to technical distance, but to something else. On the contrary, for people you hate but don't interact with frequently, it will more probably be due to dissimilarity in technical culture.

We do think that these results tell much about how diversity is perceived within organizations at the individual level. In a professional context, when occasions to interact with alter are rare, ego tends to rely on his or her professional identity. On the contrary, when ties are made of daily interactions, ego will root his or her judgement toward alter, either in the experience of the relationship with alter (e.g. how hardworking he or she is, etc.) or in fine-grained information about alter's personal characteristics (attitudes, beliefs, etc.).

	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	Beta	B	Beta	B	Beta	B	Beta	B	Beta
Constant	2,700		3,313		3,358		2,921		2,977	
Respondent										
Tenure	0,008	0,069*	0,007	0,059*	0,006	0,052 ⁺	0,008	0,064*	0,008	0,063*
Age	-0,003	-0,031	0,000	-0,004	0,000	0,001	0,001	0,012	0,001	0,01
Gender (male)	0,033	0,019	0,060	0,034 ⁺	0,045	0,025	0,071	0,041*	0,071	0,041*
Hierarchical position	0,013	0,013	-0,184	-0,194***	-0,177	-0,188***	-0,152	-0,161***	-0,149	-0,158***
Dyadic tie										
Orga. distance			-0,086	-0,085***	-0,037	-0,036 ⁺	0,045	0,045*	0,041	0,041*
Hierarchical distance			-0,289	-0,414***	-0,285	-0,408***	-0,233	-0,333***	-0,232	-0,332***
Technical distance					-0,058	-0,106***	-0,049	-0,09***	-0,065	-0,119***
Very high frequency (every day)							0,354	0,205***	0,209	0,121***
Very low frequency (every year)							-0,490	-0,156***	-0,255	-0,081*
Technical distance * Very high frequency									0,058	0,102**
Technical distance * Very low frequency									-0,070	-0,083*
N	2674		2674		2674		2674		2674	
Model F statistics	2,52*		77,844***		71,332***		86,596***		72,886***	
Adjusted R ²	0,002		0,147		0,156		0,224		0,228	
R ² change	0,004*		0,145***		0,009***		0,069***		0,005***	

Table 1 - Regression of perceived emotional closeness (+ : $p < 0,1$; * : $p < 0,05$; ** : $p < 0,01$; *** : $p < 0,001$)

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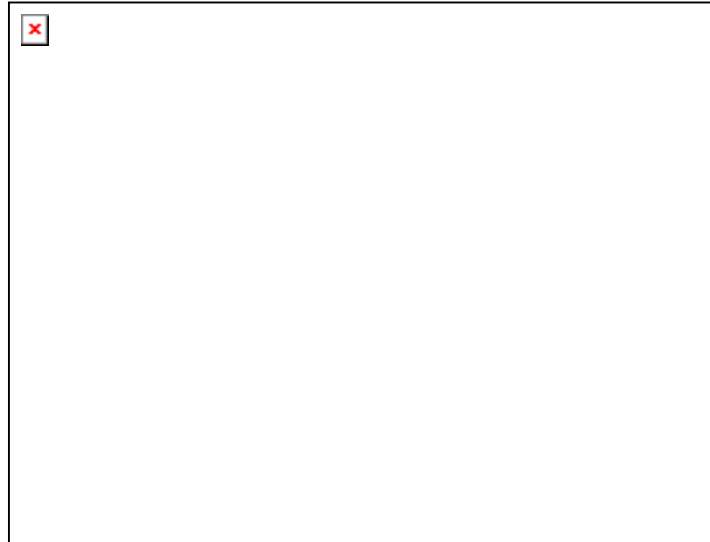


Figure 1 – *Interaction effect between frequency and technical distance*

5 Discussion

Literature in management often calls for a promotion of social ties within organisations as a way to integrate “harmoniously” knowledge diversity. This paper does not aim at discussing whether organizations should promote social ties between technically distinct people, but whether they *could* do it, provided the psychosocial processes driving social ties dynamics.

Our results show that the homophily principle appears to act as a barrier to the emergence of emotional closeness. The more alter represents a distinct technical culture, the lesser ego perceives emotional closeness in the tie (and, probably, the more difficult it will be to transfer knowledge from one to the other, [HAN 01, REA 03, UZZ 03]). In the mean time, our results show that such technical homophily within organizations prevails for social ties that are infrequent. When social ties in the organization are frequent (e.g. people

you have to work daily for task-interdependencies reasons), technical homophily disappears.

As a more general result the paper claims that diversity management scholars, rather than considering diversity management through its collective output, should consider individual behaviours and perceptions. Indeed, the possibility to “manage” diversity depends on individual reaction toward otherness, requiring so a micro-analytical approach.

Of course, this paper has some limitations. First, while we controlled for personal characteristics such as respondent’s age, gender and tenure, we could not include measures of dyadic differences on age, gender and tenure. Indeed, as already stated, one additional name interpreter (for instance: “for each listed contact, what is his or her gender?”) increases the number of total items by the number of contacts listed. Respondents entered 4,73 contacts on average, adding 4 name interpreters (for instance measuring alter’s age, gender, tenure and educational background) would have increased the total items number by 18,9 (4*4,73) on average. Second, our data is cross-sectional and does not allow capturing the dynamic dimension of homophily. Though interaction frequency was used as a proxy for the total amount of interaction between ego and alter, the best way to test technical homophily with no risk of reverse causality is to study a panel of social ties during several years.

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