Not So Social Networks: Does Solitude Make Us Creative?

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Abstract

This paper seeks for novel social networks explanans of individual creative performance. Building upon emerging interdisciplinary theory of social networks and personality, this study introduces a new dimension and potential driver of creative performance as embodied by preference for solitude. By entwining intrinsic and extrinsic factors, we claim that individual preference for solitude is beneficial in creative professions, and that this association is enhanced by accurate perception of intra-firm networks. We test our hypotheses on preliminary sample of primary data obtained from a small of interior design company. For independent variables, we investigate respondents personality traits and sculpt cognitive networks of company employees in order to analyse the extent to which they are accurate. Preparatory results show that individual creative performance is indeed positively associated with preference for solitude and accurate network perception, proving the importance of complimentary explanations of network mechanisms. The paper has the potential to contribute to emerging field of social networks and personality, cognitive networks and creativity studies.
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Abstract

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Keywords: social network analysis, cognitive social structures, creative performance, personality, preference for solitude

JEL-Classification: L84; L20
Introduction

Personality explanans of network mechanisms have been on the rise since early 2000s, when first attempts to bridge these two streams of research took place (Kilduff and Tsai, 2003). Lately, this body of knowledge has been enriched with notable works of Fang et al. (2015), Landis (2016), Tasselli and Kilduff (2018), shedding light on mechanisms of interplay of inner and outer characteristics. This emerging field is interdisciplinary in nature, since it unites social network analysis, personality studies and organisational behaviour. While quite a sufficient number of studies use personality variables to explain job performance and overall career success (see Fang et al., 2015 for review), less attention has been paid to creative performance assessment.

On creativity side, there is a sufficient amount of studies focusing on the impact of personality traits on creativity (e.g., Fang ey al., 2015). Often these studies keep coming up with contradicting results. For example, while some studies demonstrate that extraversion triggers creativity, other studies prove that it is actually introversion that makes people creative (see Feist, 2006, for review).

Creative performance, that is conceptualized as genetation of products, ideas, and so forth, produced at the individual level (Oldham and Cummings, 1996, p.608) is firmly rooted into the social environment. In management literature, it is majorly expected that the ability to effectively use social capital is one of the sure paths to better creative performance in the organisation (e.g., Amabile et al, 2005). Viewed through social networks lens, the ability to effectively use social capital represented by a powerful network position, is a sure path to a better creative performance, as it guarantees better ideas (Burt, 2004, Perry-Smith and Mannucci, 2017), and soothes idea acceptance (Kijkuit and Van den Ende, 2007).

Interestingly, not only networking itself, but also the thought of networking can enhance creative performance. The ability to accurately perceive intra-organisation network structure and ones
position in it implies the understanding of overall interaction patterns that, in turn, means that network agent knows to whom to address for relevant non-redundant information, and via whom to promote her ideas. Empirical evidence clearly implies that accurate network perception is a source of power in organisations (Krackhardt, 1990), and even in the case of low-power position, network knowledge results in better performance (Simpson et al., 2011).

While research in organizational behavior and interpersonal network literature claim the aforementioned, literature in psychology has another point to make. Personality studies remind us that creative tasks are not all alike, and for different kinds of those, various personality traits and communication patterns are beneficial. In this vein, personality traits that can benefit one sort of creative tasks, hinder the others. It is not rare that highly talented creative people are in some way prone to mental illnesses (Kaufman, 2001) or extreme introversion (Feist, 2006), which inevitably makes them poorly socialised. This implies lower network contacts and probably a very insignificant network position. These findings, however, are difficult to transfer to the context of intra-organisational network, as the basic unit of analysis is the individual, regardless the social environment. Therefore perhaps not surprisingly, there is no established field of psychology research connecting cognitive network and personality in the context of organisation.

The obvious dissent in decent streams of research indicates that some component connecting them is missing. Therefore we seek for the potential explanations of such contradiction by bridging personality with ability to cognise interactional patterns and creative performance in organisational environment.

In order to do that, we introduce another personality dimension to management field. Preference for solitude (PfS) is conceptualised as «desire do be alone in order to become engaged in an activity that has intrinsic appeal» (Marcoen and Goossens, 1993, p.198). Voluntary chosen solitude is an
appropriate condition for enlightenment, known for unfolding creative potential, and helping to find
the clarity of thought (e.g., Long et al, 2003; Nguyen et al., 2018). In a way, solitude as a setting and
PfS as behavioral predisposition have always been essential to the lone genius type (e.g.,
Schumpeter, 1942; Storr, 1988). In the context of organization, such lone geniuses are usually those
workers who produce innovative outputs independently, without much external stimuli or active
networking (Shaffer et al., 2016).

Our interest in this study is to link personality dimension with cognitive one, aiming to investigate
whether there is an interplay among those, and what does it have to do with individual creativity.
The research question of the paper is the following: how do network perception and PfS, entwined,
affect creative performance? Answering this question is important because it shows how seemingly
undesirable personality trait in the context of intra-organisational network can have considerable
positively outcomes in terms of creative performance.

In order to answer the research question comprehensively, we appeal to cultural and creative
industries. This study relies on primary data extracted from a small interior design company where
all employees are well acquainted and collaborate on the daily basis. On the one hand, such setting
makes accurate mental reconstruction of whole network attainable. The complexity of work output,
its materiality and artistry, on the other hand, are essential antecedents to workplace solitude.

The findings demonstrate that both accuracy of network perception and PfS, as two uncorrelated
factors, indeed predict creative performance, PfS being a more powerful as creative performance
driver.

The paper proceeds as follows. In the next section, we overview interdisciplinary theoretical
background on social networks, cognitive social structures and PfS fields and suggest three
hypotheses. Further, we describe methods and selected measures. Lastly, we provide results and
discuss the findings.

**Cognitive network accuracy as creativity driver**

Social networks have gained prominence in social sciences as powerful metaphor to represent
relations among agents at various levels, initially borrowing graph theory from mathematics and
enriching its structural features with social, psychological and other content characteristics (Kildiff
and Tsai, 2003). This approach allows to represent any social structure as a map consisting of nodes
— people — and ties — their connections. And while actual network map portraits relations strictly
authentically, at individual level, representations of network tend to deviate. In this vein, it is
important to distinguish two sorts of networks, one being objective and real, and the other being
subjective and virtual. Mental graphs that each agent reconstructs based upon their personal
perceptions are known as cognitive social structures, or cognitive networks (see Brands, 2013, for
review). Perhaps not surprisingly, due to heterogeneous reasons, completely accurate representation
of a network, even a small one, is rare. In the literature up to date, there is a lot of evidence that
people are prone to reality distortion. Biases in network representations have been studied quite
explicitly, describing most common ones, such as overestimation of self-centrality (Johnson and
Orbach, 2002), sympathy transitivity (Kumbasar et al., 1994), extent of small-worldliness (Kilduff
et al., 2008).

While such individual perceptions specificities may remain majorly unnoticed by agents on intra-
organizational level, their consequences are not. In fact, cognitive networks trigger piebald causal
mechanisms in social structures, and aftermath of those remains quite understudied.

Those management studies that have addressed the issue came up with interesting findings,
claiming, for example, that accurate network perception is related to brokerage opportunities (Burt,
2004) and activates their positive effects on performance (Burt and Ronchi, 2007), it also appears a source of power in organizations (Krackhardt, 1990), tool for innovative activities promotion (Obstfeld, 2005), and a store of appropriate work-related behavioural patterns (Kilduff and Oh, 2006). Summing up, it can easily be seen that accurate network perception is majorly associated with diverse yet ultimately positive outcomes.

We expect that when extended to organisational creativity dimension, aforementioned tendency will keep up. In a closed network such as intra-organisation one, knowledge is distributed unevenly and often clusters in corresponding subgraphs that may be horizontal, as in case of departments, or geographic locations, and vertical, as for certain hierarchical level of employees.

In this context, accurate network perception helps to reveal the location of preferable knowledge basins (Aral and Van Alstyne, 2011). From such basins, one reaches topical, relevant, novel or privileged work-related information. Professional domain-specific knowledge of that kind is essential component of creativity (Amabile, 1988), since it urges deliberate pondering process that results in creative performance enhancement (George, 2007). Not only it sparks the conscious thought, originating creativity continuum, but also provides one with efficient networking tools to promote and enhance ideas at further stages of their development (Perry-Smith and Manucci, 2017).

Creativity literature stresses that creativity is partially triggered by social contexts and networking, proving positive impacts of such aspects as presence of inspiring and encouraging supervisors, creativity prompts (George, 2007), and support of colleagues (Amabile, 1998), that are easier to gain when one knows where to search for them.

Accurate network perception is therefore beneficial to individual creative performance in many ways, according to the following mechanism. Firstly, at early stages on creativity continuum (Perry-Smith and Manucci, 2017), it helps creator to understand who might possess the needed
knowledge, and via whom such information enters the organization at the first place. Such understanding equips the creator with a bunch of positive extrinsic stimuli, helps to sort out and structure the information, and also simplifies the access to knowledge basins. Further, on the stage of idea development, accurate network perception navigates the network agent to those who might share similar vision and who can provide the creator with the needed support, be it emotional or practical. At the stage of idea championing, accurate perception helps find network members who can positively respond and help promote the idea, increase the chances of its acceptance by others.

We therefore suggest that the accurate perception of the network is advantageous and is positively related to individual creative performance, as it is stated in the following hypothesis:

**Hypothesis 1**: accuracy of employee’s advice network is positively associated with their creative performance.

**PfS as creativity fount**

A number of recent studies aimed to expand our knowledge of networks by combining it with psychological theories. We now know that personality affects network position in many ways, affecting strength of ties, network size, centrality, brokerage and structural holes (Landis, 2016). Intertwining of two seemingly opposite dimensions can in fact provide a comprehensive explanation of individual performance by focusing both on structural contextual characteristics and psychological ones, in other words, the inner and the outer. In support of this logic, Fang et al. (2015) provide meta-analytical evidence that network position mediates the relationship between the Big Five personality traits, self-monitoring and career success.
In this vein, another interesting aspect is the relation of individual characteristics with cognitive social structures. Personality is indeed closely twisted with network perception, since both notions are rooted deeply in psychology. The research has bridged cognitive networks with such personality traits as self-monitoring, need for achievement, need for affiliation and need for closure (Brands, 2013; Flynn et al., 2006; Casciaro, 1998). Taken together, personality and network perception can explain sufficient variation in individual performance, in our case, creative, by showing how various sorts of personality shape networks, perceive them and benefit from them.

Sufficient number of studies highlight the importance of personality traits as creativity prerequisites. Research explains it in terms of Big Five personality traits: extraversion, openness to experience, agreeableness, neuroticism and conscientiousness (Zare and Flinchbaugh, 2018), ambitiousness (Feist, 2006), intrinsic motivation (George, 2007), intuition (Wolfradt and Pretz, 2001) and many other. But the concept of solitude has not yet made its way to social networks literature, and therefore PfS as personality trait is a newcomer that yet has a lot to say.

Solitude is known for its controversial standing in the field of social psychology. On one hand, it is often associated with highly negative effects, such as depression, boredom and loneliness and sometimes is attributed to consequences of those (Larson, 1990). Historically, coercive solitude has been applied as punishment (Suedfeld, 1974). In this vein, one can masterfully derive that being alone is an undesirable condition that one should never desire.

But on the other hand, however, solitude leads to a number of positive outcomes. Storr (1988) has provided numerous examples of religious leaders, famous writers and other historical figures belonging to various historical epochs who experienced solitude — on their free will or under compulsion — and benefited from it. For example, Fyodor Dostoevsky has developed three ideas for novels during the short period of time at the very beginning of his imprisonment when he was
not allowed to read and write (Storr, 1988, p.58). These ideas and experiences have later became the basis and plot of «The House of the Dead», and further several ideas from this one were extrapolated to one of his most celebrated novels, «Crime and Punishment» that has unprecedented cultural influence. But would Dostoyevsky discover his inner genius if he never experienced confinement? Would he be able to devote enough time to mentally decompose events of his life and then merge them up in a completely different way, to see them from another angle, — and to write about it in a way that he did?

Not scared off by the mainstream dark image, Long et al. (2003) list functions of solitude, mostly positive, naming problem solving, inner peace, self-discovery, and creativity. While the first three functions set overall favourable psychological environment for productivity, the latter one is the very focus of the current paper. Paradoxically, even in a study on how creators should exploit their social network in their creative journey, Perry Smith and Mannucci (2017) recognise a role for abstraction from the context peculiar to solitude when they claim that at early stage of the development of an idea, respective cognitive flexibility is crucial. In a study addressing team creative performance of Putman and Paulus (2009), this same idea gains empirical approval. It was demonstrated that groups members of which have not interacted during idea generation stage, outperformed those who did.

Hence when a creator encounters temporal solitude, she escapes «the noise» and disturbing factors that smother ever slipping away creative ideas. For workers of cultural and creative industries such ideas are key inputs to the very outcome of their work, performance and overall professional success. Solitude brings deeper concentration and facilitates the thought by the means of temporal abstraction from the context and its ignorance.
Previous research has demonstrated that creativity is rooted deeply on such personal capacities and abilities as creative thinking skills, intelligence, intrinsic motivation, passion, out-of-the-box approach, curiosity and other (e.g., Amabile, 1998, 2005; Sternberg, 2006; George, 2008). Beyond doubt, such powerful drivers of creativity can shape one’s success. But even a lucky person possessing all of these outstanding qualities would still need to facilitate their natural abilities and to understand how to apply them correctly. This process takes pondering and, we suppose, solitude.

Nevertheless exuberant solitude appears much less beneficial for creativity. From personality perspective, too high PfS borderlines with neuroticism (Burger, 1995), that has been meta-analytically found to be negatively related to creativity (Zare and Flinchbaugh, 2018); and may be a signal of extreme introversion that has been found to be negatively related to creativity in social fields (Feist, 2006). These personality traits also constrain effective networking by loosening network position (Fang et al., 2015), resulting in deprivation of well-studied opportunities provided by networking (e.g., Perry-Smith, 2006, Kilduff and Brass, 2010).

By abstention from interaction with network members, one misses out necessary informational and emotional support that can only be obtained extrinsically. By not communicating with others, and, more precisely, by not asking for advices from colleagues, the person reduces the amount of potentially relevant information. In creative professions that deal with variegated information such behaviour is risky, as it constrains knowledge spillovers and reduces absorptive capacity.

On the contrary, efficient use of a given social structure also help to optimize the information possessed in terms of gaining the access, increasing the efficiency of timing and pursuing legitimacy and to increase an overall inflow of diverse information streams that affect the work outcome (Burt, 2004). The ability to juice the network to the full is also fundamental at later stager of creative process, since once the idea is generated, it needs to be elaborated with support of other
people, and after that, this idea has to be effectively championed or sold to the interested party by reaching influence and legitimacy, as the idea needs to be pushed forward and promoted (Perry-Smith and Mannucci, 2017). In this regard, social contacts sufficiently enrich the creator, while the lack of those brings in a sufficient set of constraints. In well-known terms of Podolny (2001), relationships are pipes for resources and information, and a neglecting those does not appear a healthy process within the organisation. Therefore we posit:

Hypothesis 2: the relationship of the PfS that employee encounters and her creative performance takes the form of inverted U-shape.

Orthogonality of PfS and accuracy of network perception

PfS is not a pathless burden to social interaction, as it may seem. In fact, evidence demonstrates that PfS does not cause social isolation (Waskowic and Cramer, 1999). Marshall (1972) supports this argument by showing that individuals with high PfS do not tend to obtain seclusion. She also explains that people who desire solitude under certain circumstances can also tend to be around intimates at other times.

While solitude at its paradigmatic sense means engagement in activities while being alone, such as self-discovery on a solo mountain hike, there are also more social conditions for solitude, such as intimate couple that tries to get away together, or a person who feels alone in the company of strangers (Long and Averill, 2003). Hence solitude does not preclude humans interaction.

Solitude does not prevent the observation of other people either. Recent study of Hill and Zheng (2017) introduces a digital component to this stream of research by demonstrating that people desiring social media are also prone to solitary activities. Despite the fact that social media appears
one of the sources of communication, face-to-face interaction component is missing. Nevertheless it can indeed help one to figure out interaction patterns of others or obtain relevant information about peers, serving as a virtual path to knowledge basins. Yet this kind of social activity often happens in solitariness allowing oneself to concentrate on inner processes and disengage from immediate interactions. In this case, social observation and solitude happen simultaneously and complement one another.

In real life such eavesdropping is happening, too. Supporting aforesaid logic, we explain this mechanism of the interplay of PfS and cognitive network accuracy on the following example.

Let us take office worker Jane. In personality terms, Jane has moderate PfS. She enjoys being by herself, and benefits from such episodes, as they are often productive for her (Burger, 1995). Jane works in the office and observes her colleagues naturally and inevitably. She notices that Dave, when he faces trouble fulfilling his work-related task, seeks for Adam’s advice, and pursues all the needed information from him. Jane therefore derives that, firstly, that there is a link between Adam and Dave in intra-firm advice network, and secondly, that as Adam has expertise and will to help his colleagues out, and she, too, can address him when there is the need for it. This conclusion of Jane, nevertheless, is based on overhearing rather than direct communication.

On the contrary, let us consider Mary. Mary is very social person with low PfS. She worships the opportunity of being around people at the first place, it stimulates and energises her (Burger, 1995). Mary is connected by strong ties to many of her colleagues. Namely, she knows Dave’s dog name and Adam’s favourite rock band, but being busy with her work and social activities, Mary does not pay much attention to interactions amongst each other.

Thus Jane’s accuracy of network perception exceeds the one of Mary, despite Jane’s higher PfS. Nevertheless it could also be that Jane, with her moderate PfS and inward focus, would not pay
much attention to her colleagues in general and consequently would not notice who speaks with whom, leading to network perception biases. Mary, on the other hand, with her low PfS, could be curious and attend to every little detail about her colleagues’ communications, resulting in accurate cognitive map.

In other words, accuracy of network perception is not a function of networking intensity. Instead, it is a thought about social relationships and it is not necessarily dependent on desire to communicate with colleagues or actual frequent communication. In that way, the person can desire solitude and yet have clear vision of interaction patterns within the organisation, and it can be the opposite. Therefore we posit:

*Hypothesis 3: there is no direct relationship between PfS and accuracy of employee's advice network*

**Method**

The study relies on primary data that is to be collected in several steps. First bunch of data was obtained from interior design company called here Paterson. The company is in the premium market. Services provided by Paterson include development of architectural projects of pubic and private premises, interior design of pubic and private premises, selection of furniture, bathroom equipment and textile, design and construction of furniture, tile design, and selling of items represented in the showroom.

The choice of the sample is twofold. Firstly, creative solutions are crucial in premium market. Out-of-the-box way of solving problems and original ideas are of great value when it comes to construction and realisation of massively funded architectural projects.
Secondly, in interior design industry, at the stage of managing the project collaboration is inevitable due to heterogeneity of information that designer needs to be familiar with. For example, an architect needs to consider engineering issues, legal regulations, follow the updates of numerous interior design brands, be aware of what is happening in the market. Moreover, these matters are permanently in flux: changes are happening daily. Considering this, in interior design industry it is barely possible to succeed without networking with colleagues and yet individual creativity is extremely important.

Prior to starting collecting data the author has explained the purpose of the study to the staff at the plenary meeting, guaranteed confidentiality and agreed to share results of the research with Paterson managers. Since Paterson is a Russian company, all questionnaires were translated into Russian with translation–back translation procedure (Brislin et al., 1973).

From twenty-two staff members, seventeen are involved in creative jobs: architects, interior designers, engineers and marketing managers, as their task is to provide a customer with novel, original, practically useful and highly personalised service.

Respondents received emails with links to their personal share folders with questionnaires to fill in. Employees and managers had different functions and tasks in this survey. Each of employees filled in questionnaires including three blocks: PfS scale, roster of intra-firm advice network and demographic questions. Managers, on the other hand, were to evaluate creative performance of their subordinates. It took up to 30 minutes to complete the survey for employees and up to 3 hours for supervisors.

The analysis of data was performed with standard statistical software package for regression analysis. We also used UCINET for basic network measures.
Variables

The dependent variable is the individual creative performance. It was measured with Integrated Creativity scale developed by Oldham and Cummings (1996). We have asked supervisors to rate employees’ creativity with 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). Cronbach’s Alpha was equal to 0.767. The scale assesses employees’ work in terms of its usefulness to the organization. It is widely used in similar studies to measure creative performance (Shalley et al., 2009, Shin et al., 2016).

PfS was measured with scale developed by Burger (1995). This scale consists of twelve pairs of contradicting statements, and for each of the questions respondents were asked to pick one statement that described them best. These are examples of statements indicating a preference for solitude:

1) After spending a few hours surrounded by a lot of people, I am usually eager to get away by myself.

2) I like to vacation in places where there are few people around and a lot of serenity and quiet.

For every answer indicating tendency to be alone rather than accompanied by others respondent receives one point, otherwise zero. Thus higher overall scores are associated with higher extent of preference for solitude. The scale has been explicitly used and validated by scholars in social sciences (e.g., Cramer and Lake, 1998; Ren et al., 2015).

Accuracy of advice network perception was assessed by correlation individual cognitive networks with the real one (Kilduff and Tsai, 2003). Respondents were given a table with names of each employee both on horizontal and vertical axis. Further, they were asked to indicate whether they
thought that people listed in each row would address with work-related advices to people listed in
each column (Soda and Zaheer, 2012). For each employee i, we measured the extent to which their
perceived network overlapped with the actual network.

The real network was extracted from individual ones. In each of subjective cognitive networks, we
selected lines and columns indicating who seeks the respondent i’s advices and whom does
respondent i personally asks. Corresponding lines and columns were merged in two matrices, one of
which indicated who each of respondents i asks, and the other demonstrated by whom respondent i
is asked. These two matrices were later averaged.

We used demographic data from questionnaires to constitute control variables for statistical
analysis. The first control is age that has been quite diverse among staff members. Another one is
work experience in the company. Lastly, we control for years of education completed.

<p>| Table 1. Descriptive statistics and correlations |</p>
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min.</th>
<th>Max.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Individual creative performance</td>
<td>4,92</td>
<td>0,750</td>
<td>3,67</td>
<td>6,00</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Preference for solitude</td>
<td>6,12</td>
<td>2,667</td>
<td>0</td>
<td>11</td>
<td>0,573**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Accuracy of cognitive network</td>
<td>0,21</td>
<td>0,170</td>
<td>-0,121</td>
<td>0,381</td>
<td>0,434*</td>
<td>-0,060</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Education</td>
<td>4,59</td>
<td>1,417</td>
<td>0</td>
<td>6</td>
<td>0,085</td>
<td>-0,466*</td>
<td>0,177</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Company experience</td>
<td>5,88</td>
<td>6,478</td>
<td>0</td>
<td>18</td>
<td>0,465*</td>
<td>0,377</td>
<td>0,535**</td>
<td>-0,208</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6 Age</td>
<td>34,17</td>
<td>9,556</td>
<td>22</td>
<td>54</td>
<td>0,405</td>
<td>0,453*</td>
<td>-0,037</td>
<td>-0,340</td>
<td>0,805***</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: N=16
Significance: *p < 0.1, **p < 0.05, ***p < 0.001
Results

Table 1 reports descriptive statistics for six analyzed variables and bivariate correlations amongst variables. There was a strong and totally logical correlation between age and experience in the company. Company experience has also been found to be correlated with creative performance, which could be expected from the common sense, even though not included in the theory. There also exists positive correlation between preference for solitude and age (Marcoen and Goossens, 1993) and negative correlation with education.

<table>
<thead>
<tr>
<th>Dependent variable: individual creative performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Preference for solitude</td>
</tr>
<tr>
<td>Accuracy of cognitive network</td>
</tr>
<tr>
<td>Education (years)</td>
</tr>
<tr>
<td>Company experience</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>R-sq.</td>
</tr>
<tr>
<td>F</td>
</tr>
</tbody>
</table>

Notes: N=16

Significance: *p < 0.1, **p < 0.05, ***p < 0.001

17
From Table 1 it is obvious that PfS is indeed unrelated to the accuracy of cognitive network (r=0.060, sig.=0.820), supporting Hypothesis 3.

Interestingly, despite the small size of the company, the accuracy of advice network perception has not reached values greater than 31%. Employees appeared to be quite good at evaluating their own position in advice network that has interplayed in individual matrix (who asks employee $i$ for an advice in the opinion of employee $i$) and aggregate of matrices of the rest of employees (if each of them asks employee $i$ for an advice).

Mean preference for solitude in the sample is slightly greater than the scale mean (6.00), and is also higher than means of samples of respondents not involved in creative activities (Burger, 1995), that can be attributed to industry specificity, as it requires high extent of abstraction.

Table 2 contains results of regression analysis of three hypotheses. *Model 1 and Model 3* test hypotheses without control variables, while in *Model 2 and Model 4* we control for age, years education completed and years of experience in the company.

Hypothesis 1 suggested the positive relation between accuracy of employee’s advice network and their creative performance. This hypothesis holds, as cognitive network’s mild effect on creativity was supported by the data in Model 1 ($\beta = 0.434, p < 0.081$), although it was not supported in Model 2 ($\beta = 0.351, p < 0.320$). Figure 1 demonstrates the structure of the real network, that can be described as dense, lacking structural holes and highly distributed.

Hypothesis 2 that proposes that preference for solitude has positive effect on individual performance in creative professions for low to moderate amounts of solitude, and then negative effect for moderate to high amounts of solitude, therefore forming an inverted U-shaped curve, was only partially supported. Instead, in Model 3 and Model 4 the data has shown that the relation between extent of solitude and creative performance is positive and significant. Our finding is
consistent with some prior empirical studies that demonstrate that solitude spurs creativity (Long et al., 2003) and positively affect individual performance (Larson, 1990). It is, however, worth noticing that highest supervisors’ evaluation scores were received by those members of staff who demonstrated moderately high levels of solitude: on average, 8 points out of 12. It skews the peak of the curve to the right from the mean value, which is 6. Another explanation of unsupported hypothesis could be that in the sample, there were no respondents with maximum preference for solitude (12 points out of 12), and therefore at the moment there is not enough data to prove or completely disprove the inverted U-shaped association.

Figure 1: Paterson network graph

In order to check for multicollinearity, we computed variance inflation factors, and the average score was 1,454 with as cognitive network accuracy as a dependent variable and 2,137 with preference for solitude. Since this number is far below 10, we conclude that multicollinearity is not present in our models.
Discussion

This paper takes an interdisciplinary approach and bridges personality, creativity and social networks. Our findings suggest the novel for management filed association between PfS and creative performance. These results are consistent with conceptual and empirical literature in personality (Storr, 1988; Long et al., 2003). The positive relation we found is partially supporting the idea about inverted U-shaped curve that was proposed. It of course can be attributed to small sample size at current stage of research.

It is crucial to emphasise that the importance of social relations and networking, even though it has been explicitly studied, has never been investigated in its relation to solitude, and inverted U-shaped curve was our attempt to converge and accommodate these theories. Further, we have shown that the accuracy of network perception, that has been proven in previous studies to be one of the keys to better performance, also has positive relation with complex phenomenon of creativity.

We see the potential of this paper to contribute to several streams of research. First of all, it adds up to the young discipline of social networks and personality by introducing a new trait and linking it to creator’s performance. Secondly, we compliment the literature on cognitive social structures, demonstrating that accuracy of perception of overall network rather then its certain components is positively associated with creativity. Lastly, we entwine personal, cognitive and contextual characteristics and claim that this mix constructs individual creativity.

Managerial applications are foreseeable as well. In a way, our findings encourage employers to appreciate and make use of employees’ personal predisposition to solitude, acknowledging its role as creativity driver. This issue is very topical considering universal pressure to networking (Casciaro et al., 2016) and design thinking boom. PfS enhances creativity by the means of deep...
concentration on work-related problem, and at the same time, it does not constrain one's ability to correctly understand interaction patterns and how to take advantage of them.

At the current stage, the size of the sample is the main limitation of the paper. Subsequent data collection and analysis are to be performed before the results can become generalisable. This article can therefore be considered as preliminary one and a first step towards a bigger study with potential to publish. It is convenient to collect more analogous data from similar small enterprises where employees are involved in creative activities, to add it up to the data already collected and to re-run the statistical analysis with a bigger sample. Further, in addition to data already extracted from questionnaires, other sources can be added. In studies with moderate samples, mixed methods can indeed increase rigor, and in our case, interviews with respondents could shed some light on micro-processes affecting both behavioural practices and work outcomes. Lastly, we acknowledge that in this study, creativity was assessed subjectively, which gives room to managers’ evaluation bias. In order to enhance creative performance evaluation, supplementary parameters, such as performance of services and products or creators’ awards.

It is important to test the suggested mechanism in a different industry context, where creative products are more social in nature, and to draw comparisons between the two. It is likely that the advantage of PfS will have different magnitude or direction. The interplay of PfS with network position can contribute to the social networks field and explain the dynamics.

REFERENCES:


