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Exploring Motives and Strategies in the Production of Knowledge in the University Context by the Example of Academic Career Trajectories

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Abstract- Current research has shown that the combination of implicit and explicit knowledge among various actors is particularly crucial to the production of knowledge and that the characteristics of social relationships and resulting networks impact on how proficienty is acquired, transferred, absorbed, and applied. Although investigations have suggested that the actors involved in knowledge production are active and strategic agents, who differ considerably in their abilities to incorporate and generate knowledge, they are mostly referred to in terms as nodes or black boxes. In this regard, relationship research has demonstrated that actors differ in terms of motivations and abilities to share information and knowledge. Such motives are often strategic.

But when and how actor's strategic motives affect the flow of information and knowledge while creating and acquiring knowledge, and which role internal knowledge structures play in this process the research has been neglected.

Our objective was to pursue the question of when and how strategic motives and internal knowledge structures affect the appropriation and transfer of knowledge.

To this end, we re-analyzed eight qualitative interviews originally carried out a study on the influence of social relationships on professors' career trajectories in 2015/16. With the help of the documentary method, different strategies and motives were identified. It became apparent that reasons and strategy are closely interconnected, and that knowledge production is closely linked to the respective field in which this knowledge is relevant. In this paper, such field-specific motives and strategies are illustrated by the example of career networks in science.

Keywords: knowledge production, tacit knowledge, university research, social relationships, qualitative research, knowledge transfer, knowledge acquisition, knowledge networks, scientific collaboration, implicit knowledge, explicit knowledge, academic careers, research methodology, qualitative interviews, sociocultural factors.

I. Introduction

While classical approaches mostly centered on formal organization in order to better understand knowledge transfer, more recent research has focused on networks in which knowledge is transferred *(cf. Brennecke, 2020; Phelps et al., 2012; Sousa & Rocha, 2019)*. While the latter perspective concentrates on cooperation as a form of interactive exchange, the network approach may do justice to the complexity of knowledge transfer with a view on intra- and inter-organizational structures, formal and informal forms of exchange, and other interesting perspectives. For example, current research has shown the characteristics of social relationships have an impact on how knowledge is acquired, transferred, absorbed, and applied. In this connection, the actors involved in knowledge production are considered to be active and strategic agents who differ substantially of their abilities to gather and create knowledge. Nevertheless, "with some exceptions, knowledge networks research at all levels treats actors (i.e., network nodes) as black boxes" *(Phelps et al., 2012, p. 1148)*.

Although relationship research has argued that actors differ of their motivations and abilities to share information and knowledge and that such motives are frequently strategic, little attention has been paid to individual actors' roles. At the same time, such inquiries have largely neglected the question of when and how actors' strategic motives affect the flows of information and knowledge among one another in generating and adapting knowledge and as to which role internal knowledge structures play in this context.

Thus, our objective is to explore the issue of when and how strategic motives and internal knowledge structures affect the appropriation and sharing of knowledge. To this effect, we selected the field of science in which knowledge is permanently generated, transferred, and adapted. We reanalyzed eight qualitative interviews originally carried out in the framework of a study on the influence of social relationships on professors' career trajectories in 2015/16. (see Hennig & Federmann, 2018).

First, we enlarge published insights into knowledge networks, forms of knowledge, and various aspects of knowledge production. We then briefly describe our systematic approach and demonstrate, based on multiple interview extracts, which motives and strategies of knowledge production can be identified.

II. State of Research and Theory

Knowledge networks can be seen as sets "of nodes – individuals or higher-level collectives that serve as heterogeneously distributed repositories of

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knowledge and agents that search for, transmit and create knowledge – interconnected by social relationships that enable and constrain nodes' efforts to acquire, transfer and create knowledge" *(Phelps et al., 2012, p. 1117)*. Such knowledge networks constitute the internal knowledge structures in which actors produce knowledge. Knowledge production in such networks depends, in turn, on the network and relationship properties as well as the properties of the individual actors who make up those networks. Before exploring the issue of actors' motives, strategies, and practices regarding exchange processes in knowledge networks, it is important to build up a basic understanding of the structures and flows of knowledge.

a) Knowledge forms

Research into the transfer of bodies or stocks of knowledge has frequently made a difference between implicit and explicit knowledge *(cf. Kind & Hilber, 2006; Phelps et al., 2012; Brennecke, 2020)*. In this regard, tacit knowledge is seen as expert knowledge based on experience, which thus can be explicated to a limited extent *(Kind & Hilber, 2006, p. 3)*. It is never completely put into words, as expertise – i.e., skills – is closely associated with practice *(Kind & Hilber, 2006, p. 3)*. In research practice, expert knowledge is defined as a collection of competencies, including the "perception of the situation, cautiousness, ingenuity, insight, and situational judgment" *(Combe & Kolbe, 2008, p. 870, quoted by Halder, 2019, p. 53; own translation)*. Due to its high degree of specialization, research can be seen as networks, in which, through of implicit knowledge, affirmation, and improvement are possible even though explicit understanding does not cover all contents *(Halder, 2019, p. 58)*. This also includes the ability to assess what has not yet been realized and how such knowledge could be produced in the future *(Halder, 2019, p. 66; Bruns, 2013, p. 73)*. Implicit knowledge falls into oblivion when the respective activities are no longer performed. Correspondingly, such knowledge is transmitted in close social bonds.

Imitation of superiors (experts) is the purest form of implicit knowledge transfer. Subsequent generations learn how to carry out activities by observing and imitating those activities *(Halder, 2019, p. 65)*. Apart from imitation (demonstrating and replicating), concrete methods of transmission also include thinking aloud, which makes decisions more comprehensible, and claiming questions that help illustrate practice *(Kind & Hilber, 2006, p. 5)*.

Unlike implicit knowledge, explicit knowledge is formalized and easily conceived and communicated. Such knowledge can be completely articulated verbally with more or less complex statements, as it does not relate to abilities or the transmission of skills but rather to superordinate concepts or regulations that can be talked about. Explicit knowledge forms a network of interconnected statements, a "nexus of details" (*Halder, 2019, p. 69; own translation)*, which attempts to map knowledge structures. In the course of such mapping, explicit knowledge can be brought into question, discussed, and transmitted. This process facilitates compilation of present knowledge and thus creates new knowledge *(Kind & Hilber, 2006, p. 3)*.

Implicit knowledge is transformed into explicit knowledge in five steps. First, there must be an exchange between actors in which an attempt is made to render knowledge clear. Second, an explicit concept may then emerge from this discourse. Third, this concept is further explained. Fourth, the conception further specifies the implicated ideas as a template for a complete model or a prototype. Finally, after a model has been developed, actors may easily transfer knowledge, as a tangible and explicit stock of knowledge is now available. This phase model refers to the process of concretization, which is typical of the transition from implicit to clear knowledge *(Kind & Hilber, 2006, p. 9)*.

While implicit knowledge requires more profound relationships and strategies to remain transmissible, codified (explicit) knowledge can be exchanged between actors if wanted. As how clear knowledge spreads in knowledge networks are affected by present structures and practices, we will review current insights in the following.

b) Network properties and knowledge production

Structural network research, there are various findings on how the network properties affects the creation, transfer, and adaptation of knowledge in interpersonal relationships (*cf. Phelps et al., 2012)*.

i. *Knowledge creation*

Knowledge creation typically refers to the development of new knowledge in the form of ideas, practices, research work, technical inventions, and products *(Phelps et al., 2012, p. 1119)*. Various network properties affect individuals' incentives to generate their knowledge. In an overview, Phelps et al. (2012) summarized several key insights of network research into knowledge creation. For example, the knowledge-based diversity of actors' direct contacts fosters the generation of new knowledge *(Phelps et al., 2012)*. Furthermore, social cohesion in networks improves knowledge flows. In particular, strong bonds produce intensive knowledge exchanges. As close relationships strengthen trust and mutuality between network members, a higher level of network density can increase individual knowledge production, especially in individuals with different levels of professional knowledge *(cf. Phelps et al., 2012)*. At the same time, collaboration experience between people with diverse expertise facilitates the ability to transfer knowledge to others *(cf. Phelps et al., 2012)*. By contrast, weak ties allow for access to manifold expertise by means of

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bridging structural holes, which in turn improves creativity and enhances the potential for new recombinations of such expertise *(cf. Phelps et al., 2012, p. 1126)*. These results mark a field of tension between bandwidth and structural diversity: While social cohesion increases the flow of information and knowledge, structural holes which create access to diverse knowledge are at once reduced *(Phelps et al. 2012: 1126)*.

Similar conflicts have been identified with network density. Dense networks increase the speed, extent, and preciseness of information diffusion in networks and foster the network members' innovative power *(cf. Phelps et al., 2012, p. 1224)*. At the same time, such dense structures minimize the diversity of information *(cf. Phelps et al., 2012, p. 1133)*. While rapid information diffusion improves innovative capacities and network performance, a decrease in information diversity reduces such capacities and performance.

ii. *Knowledge transfer/learning*

Knowledge transfer is closely connected to knowledge creation. This concept refers to the efforts of a source to share information and knowledge with recipients and recipients' efforts to acquire and absorb (i.e., to learn) such information and knowledge *(Phelps et al., 2012, p. 1119)*. Individuals' respective motivations to impart their own knowledge are affected by various aspects. Brennecke (*2020, p. 19*) emphasized informal structures that facilitate the transfer of tacit (implicit)[1] knowledge. As mentioned above, higher flexibility, open networks, and structural holes facilitate innovation and support for problem-solving. Whether structural holes or relationship density in networks are more likely to foster or rather impede information transfer depends, amongst others, on the kind of tasks involved *(Phelps et al., 2012, p. 1123)*. In the context of knowledge transfer, formal structures are assessed as being conducive due to their stability and reliability *(Brennecke, 2021: Slide 3; Soda et al., 2021, p. 28ff.)*. However, the positive impact of network stability weakens the positive effect of both structural holes and the content-related heterogeneity of knowledge and thus has a particularly negative impact on creativity and innovation (*Soda et al., 2021, p. 28ff.*).

iii. *Knowledge adaptation/implementation*

Knowledge adaptation is based on the decision and ability to apply or implement individual knowledge elements, frequently in the form of a product, a practice, or a paper (Phelps et al., 2012, p. 1119). Little is presently known about the motivation to adapt knowledge in social relationships.

Actors' network positions[2] appear to have a key impact on knowledge adaptation. The likelihood of knowledge adaptation has been shown to increase when relationships with actors having adapted knowledge previously are based on social proximity (the quantity and intensity of direct connections) (*cf. Phelps et al., 2012, p.1131*). Moreover, actors' centrality (see footnote 1) affects the ability to absorb knowledge. In the presence of low absorptive capacity, the costs associated with maintaining numerous relationships may exceed their knowledge benefits *(cf. Phelps et al., 2012, p. 1127)*. While this applies especially to codified knowledge, the efficiency of the transferal of implicit knowledge is enhanced through direct relationships (cf. Phelps et al., 2012, p. 1127). The structural equivalence[3] between previous and potential adapters increases the chances of knowledge adaptation *(Phelps et al., 2012, p. 1122)*, and structurally similar individuals in organizations are very likely to learn and know similar things about their organizations *(cf. Phelps et al., 2012, p. 1122)*.

In summary, despite their conceptual differences, the aspects of knowledge production discussed here are closely interconnected. When knowledge is created, cognitive and other resources are required to facilitate its transfer so that implicit and explicit knowledge can be adapted and used in subsequent recombination efforts *(cf. Phelps et al., 2012, p. 1119 ff.)*.

c) *Strategies, Motives, and Practices*

Whether and how knowledge is produced, transferred, or adapted depends particularly on actors' motives, strategies, and practices in knowledge networks.

A key premise in network research is that actors' various interests result from the different positions or statuses they occupy in network structures (*cf. Burt, 1982; Hennig & Kohl, 2012*). In this connection, the term position or status is linked to the role concept (*cf. Hennig & Kohl, 2011, p. 43*). This concept is defined as the entirety of cultural patterns (attitudes, value judgments, and behavioral expectations) connected to a given status (*cf. Hennig & Kohl, 2011, p. 43*). "The social order and one's own position in that order structure the perception of the action situation and affect the actors' interests. Actors in similar structural positions have aligned interests because they occupy homologous positions within the structure. This also holds in the absence of a common reference group. The actors recognize their positions by symbolically playing through others' positions and their benefit evaluations in role play" (*Hennig & Kohl, 2011, p. 44; own translation*).

In the network perspective, actors always assess their behavior to others in similar situations: "The

[1] Tacit and implicit knowledge would be used synonymously in the text.

[2] Individuals' network positions indicate their social proximity to other in a given network. In other words, the term centrality used in this connection indicates the extent to which an individual is both directly and indirectly connected to others in that network.

[3] Structural equivalence is based on the similarity between two actors' network relationship profiles (Phelps et al., 2012, p. 10).

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more similar a position is to one's own, the larger its weight as a reference point for action. In this connection, the similarity is defined as a continuously varying distance between the positions" (*Hennig & Kohl, 2011, p. 45; own translation*). The benefit of individuals' action alternatives is determined by other relevant actors' status positions (*cf. Hennig & Kohl, 2011*). The assumption behind this insight is that actors' structural positions and role sets form their interests while also affecting the evaluation of the situation and resulting action options and the actors' specific actions (*cf. Hennig & Kohl, 2011*). "In turn, the actions themselves can then rebound on and modify the relational patterns" (*Hennig & Kohl, 2011, p. 45; own translation*). Research has shown that simple and codified knowledge (explicit knowledge) transfers more easily than complex implicit knowledge. However, competition may reduce the knowledge exchange between actors (*cf. Phelps et al., 2012, p. 1129*). Actors compete for resources provided by others, which they jointly use. This serves to enhance the incentive to imitate one another in an attempt to ensure that no single actor is at an advantage. While increasing equivalence between previous and potential imitators betters the chances of alignment, increasing equality between members of a given organization sharpens the similarities between what they learn and know about their organization (*cf. Phelps et al., 2012, p. 1122*).

However, research has also suggested that strong inter-organizational bonds can have a negative effect, e.g., previous alliances with the same partners may reduce the current performance output of project alliances (*Phelps et al., 2012, p. 1133*). In addition, increasing trust between partners reduces their innovative power, as they are bound to relationships at the expense of access to new partners' manifold knowledge (*Phelps et al., 2012, p. 1133*).

The "assumption that forms and structures of social relationships lead to similarities in behavior" (*Hennig & Kohl, 2011, p. 45; own translation*) and "[…] that these forms and structures of social relationships can be interpreted leads to a fragmentary explanation only" (*Hennig & Kohl, 2011, p. 45; own translation*) for motives, strategies, and practices in knowledge production.

Bourdieu's concept of habitus can help close this gap as it comprises all facets of social life: "The habitus is not only a structuring structure, which organizes practices and the perception of practices, but also a structured structure" (*Bourdieu, 1996, p. 170*). The effective – structuring – aspect of the habitus is especially crucial to the implementation of knowledge practices. The habitus develops through the internalization of material, cultural, and social conditions of existence and is a both quasi-permanent and flexible system of group-specific patterns of perception, thought, and action (*cf. Hennig & Kohl, 2012, p. 22*). At once, the habitus constitutes actors' forms of practice and associated everyday perceptions. The various manifestations of the habitus depend on individuals' experiences and the social positions they hold in social space (*cf. Hennig & Kohl, 2012, p. 22*). Actors' habitus is entrenched in their bodies and thus largely unconscious to them (cf. Bourdieu, 1990). How people think, perceive, and act depends on the thinking, perceptions, and actions of the social actors with whom they are connected and, or the social networks they are embedded in. With whom they establish contact depends on their thinking, perceptions, and actions. Various things form an interconnection in the habitus, a specific configuration: "[…] how one speaks, dances, laughs, reads, what one reads, what one likes, what acquaintances and friends one has, all of this is closely interrelated" (*Bourdieu, 1992a, p. 32, quoted by Hennig & Kohl, 2011, p. 69; own translation*). The habitus thus comprises "dimensions of taste, lifestyle, physical and emotional attitudes, and patterns of social practice and relationships as well as mentalities and ideological worldviews" (*Bremer & Teiwes-Kügler, 2010, p. 255; own translation*).

As a modus operandi, the habitus does not only confine social actors' practice forms but creates a space of possibilities for those actors. The habitus sets the conditions for the strategic knowledge practices with which actors structure and manipulate their environments. It determines how practices can be implemented via internalized "schemes of perception, conception, and action" (*Bourdieu, 1990, p. 60*). It sets a framework in which motive-guided strategies can be implemented with a certain degree of flexibility (*Bourdieu, 1990, p. 61f.*). Habitual characteristics affecting this practice include individuals' gender and positions within a hierarchy.

In the university context, the role of gender finds expression in the construction of scientific personalities and especially professorships. The construction of the typically male role of the professor as a creative genius is associated with the premise that women do not share these characteristics and are situated outside of this constructed role. Thus, they are excluded from the personality construction that creates the image of the professor in the first place (*Engler, 2000, p 139f.*). This exclusion is relevant to the production of knowledge in that the premise of research, guiding who is to be seen as a legitimate actor, excludes certain groups. Thus, actual performance in knowledge-producing fields is not in accord with associated recognition in the individual actors' personality construction (*Engler, 2000, p. 143ff.*). Not only does the question arise as to how knowledge is created, transferred, and adapted, but also how visible precisely these processes are and in what way the resp. work underlying such knowledge practices is perceived and appreciated, whereas the perception is associated with gender-specific habitus.

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Moreover, other aspects of the habitus are reflected in the case of professorships, which are connected to the actors' positions in the university context. Professorships bring together capital in terms of recognition, financial means, and formal and micropolitical influence on university processes. In this position, professors dispose of means they distribute, thus impacting knowledge production at universities and particularly among their own non-tenured staff (*Hüther & Krücken, 2010, p. 168*).

The diverse forms of capital solidify in the habitus and affect processes at the universities. Professors thereby take a special position within knowledge production, with which the creation of new knowledge can be strategically controlled. For example, professors may use doctoral theses as a monitoring tool applied to maintain the homogeneity of contents and to curb the production of opposing stocks of knowledge (*Bourdieu, 1988, p. 153f.*). By sustaining the specific academic habitus, knowledge production thus remains a "cultural production for the purposes of reproduction" (*Bourdieu, 1988, p. 224*).

The manifold strategies applied to implement knowledge practices shown in research originate in actors' various habitus and scientific settings. In this connection, knowledge practices refer to those that specifically administer knowledge to assert individuals' own interests. In the following sections, we will present some of the known knowledge strategies to demonstrate how people steer knowledge fluctuation in interactions with peers and the motives that drive such strategic practices.

Research has identified information exchange in groups as a cooperative process. However, individual group members' information in groups is often not exchanged or bundled. Therefore, information exchange can be seen as embedded in a mixed-motive conflictual setting (*cf. Steinel et al., 2010*). Depending on social motivations, actors decide strategically whether to share their knowledge (to do the good thing) or rather to keep it to themselves and hide it (to do the bad/ugly something) (*cf. Steinel et al., 2010*). While individuals with prosocial motivations (also referred to as prosocial) make their undivided information available to their groups, thus contributing importantly to group decisions, egotistical motives may lead to deliberately withholding or even concealing and distorting undivided knowledge (also referred to as proselves).

Research in knowledge hiding[4] has shown such action to frequently be associated with interpersonal distrust (*Connelly et al., 2012*). Especially in situations marked by competitive incentives, shared information is mainly bundled in the group. In this connection, bundling pre-shared information can prove to be functional since other group members thereby confirm the validity of the information. Thus, confidence in the information others provide can be strengthened, and relationships and information exchange be fostered (*Steinel et al., 2010*).

According to Blau's social exchange theory, positive relationships are based on the norms of reciprocity and expectations regarding trust, honesty, and mutual assistance (*Blau, 1968; cf. Blau, 1964; Buller & Burgoon, 1996)*. Individuals who voluntarily and spontaneously engage in positive behavior towards others implicitly elicit similar yet unspecified reciprocal behavior. Exchange expands over time as ongoing obligations are fulfilled, and new obligations are established, thus reinforcing trust between the parties (*Blau, 1964; Blau, 1968*). "When obligations for benefits received are discharged by providing benefits in return, both parties profit from the association, and their exchange of rewarding experiences fortifies the social bond between them. A man who helps others earns their gratitude and appreciation, and he puts them into his debt, which promises to bring him further rewards in the future" (*Blau, 1968: 453*). Consequently, sharing knowledge for prosocial motives may encourage others' prosocial behavior, whereby all those involved in that knowledge exchange profit from new information.

At the same time, the reciprocity norm of exchange theory also implies the obligation to reciprocate the benefits gained in exchange. If this social obligation is not fulfilled, others are deprived of the incentive to continue the cordialities (i.e., knowledge sharing; *Blau, 1968, p. 452*). Accordingly, hiding or with holding knowledge in response to prosocial behavior can lead to distrust[5], future pro-self behavior, and subsequently ineffective social exchange (*Connelly et al., 2012, 68; cf. Blau, 1964*).

Moreover, social exchange generates context-specific power inequalities and status boundaries between those concernced. This is because by giving assistance or a present (i.e., knowledge sharing), a claim is implicitly made to a superordinate status, whereby the addressee is forced to compensate (by using appropriate gratefulness or assistance in return) and "strengthen bonds of indebtedness" (*Blau, 1968, p. 454f.*). "If they return benefits that adequately discharge their obligations, they deny his claim to superiority, and if their returns are excessive, they make a counterclaim to superiority over him. But if they fail to reciprocate with benefits that are as important to him as his are to them,

[4] Connelly et al. (*2012, p. 65*) defined knowledge hiding as "an intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person".

[5] Distrust is often defined as a "lack of confidence in the other, a concern that the other may act as so to harm one, and that the other does not care about one's welfare, intends to act harmfully, or is hostile" (*Grovier, 1994, p. 240, quoted by Connelly et al., 2012, p. 68*). Distrust develops when "an individual or group is perceived as not sharing key cultural values" (*Sitkin & Roth, 1993, p. 371, quoted by Connelly et al., 2012, p. 68*).

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they validate his claim to superior status" (*Blau, 1968, p. 455*). Thus, information sharing can serve the purpose of being able to claim future support or information by using of a superordinate role and thereby secure advantages (pro-self).

Knowledge hiding can manifest itself in various ways: While knowledge hoarding refers to accumulating knowledge to be shared or not later, knowledge hiding describes the deliberate concealment of knowledge requested by others (*cf. Connelly et al., 2012, p. 66*). Thus, knowledge hiding is not simply seen as the simple absence of sharing but rather as a conscious attempt to withhold and conceal knowledge. While knowledge hiding may be subject to various motives (e.g., prosocial, instrumental, idleness, or egoism), deficient knowledge exchange is probably to be ascribed to insufficient knowledge itself (*Connelly et al., 2012, p. 67)*. Connelly et al. (2012) identified three strategies applied to hide knowledge among the staff of a company: 1. Playing dumb: staff feigned "dumbness" and ignorance upon being requested to provide a specific piece of information; 2. Evasive hiding: team passed on false information or made delusive promises to deliver complete answers in the future, although this was never their intention; and 3. Rationalized hiding: staff offered reasons for failing to supply the requested knowledge as it could not be provided (e.g., confidential information to be held under lock and key) or by blaming others.

Individuals' positions within a knowledge network may also encourage the strategic withholding of knowledge. Cohen and Levinthal (1990, p. 132) suggested that, in the case of differences between external expertise and expertise within an organization, individual members of the group are likely to adopt a gatekeeping role, comprehensibly transmit crucial information to the internal staff, and monitor the external environment for helpful information. In such positions, these individuals or nodes in the network can consciously and strategically transmit or withhold information to pursue their interests. However, as the central position may lead to actors' information transmission being overloaded, passing on and withholding information need not always be strategically intended (*Schilling & Fang, 2014, p. 10*).

Another strategy of knowledge acquisition develops in providing assistance with work-related problems. According to Shah, repeatedly giving assistance, e.g., in problem-solving, increases the helping actors' levels of performance (*Shah et al., 2018, p. 427*). For this reason, it may prove useful to consider assistance in knowledge networks not only as a disadvantage but also as a chance to enhance one's stock of knowledge. Moreover, actors may profit from becoming involved with "difficult" actors in networks and requesting assistance, as they thus gain access to exclusive understanding and advantages (Brennecke, 2020, p. 36). In both cases, networks can be instrumentally utilized to achieve targeted learning or obtain exclusive information.

Actors apply various strategies in knowledge production, whether passing on or appropriating knowledge. They hide and transfer information, and they impede or actively steer the flow of knowledge according to their interests. Such practices are closely associated with the given habitus of the knowledge producers and their networks. This is because the framework and scope of action governing which practices may come into question in the first place develops in this context. Therefore, knowledge production does not consist merely in receiving and passing on new or known knowledge between actors. Rather, it reflects a process guided by habitus, which yields various strategies, practices, and motives in generating, adapting, and transferring knowledge.

III. Interviews: Science and Knowledge Networks

Based on qualitative interviews, various motives, strategies, and practices applied in knowledge creation among scientists in the natural and social sciences while taking the habitus into account were worked out. To this end, we re-analyzed eight interviews based on a study on the influence of social relationships on professors' career trajectories in 2015/16[6] (Hennig & Federmann, 2018). The participants in this problem-centered interview were four women and four men, each holding professorships at various German universities, who reflected on their careers and the actors involved in those trajectories. The transcribed interviews were analyzed in three steps.

First, working definitions that captured the features of motives and strategies were generated from the theoretical considerations. As research had shown motives and strategies to be difficult to distinguish, theoretical reasons and theoretical strategies were connected in the working definitions.

Initially inspecting the interviews, the working definitions served as a guide to identify relevant text passages, and each interview was individually considered. The text passages identified were documented according to knowledge type and with a reference to strategies and, or motives, as well as a brief

[6] The survey included people who influenced on career development. For this purpose, the interviewees were given an empty numbered list, and whenever they thought of certain people during a career phase, they were asked to write them down on the list in front of them. Furthermore, when the interviewees noted down a person, they were asked to tell why this person was important to them and what role they had played in the career phase addressed. To do this, they were always asked to state the (newly) noted number aloud so that the persons named in the interviews could later be linked to the questionnaire via the numbers to the quoted statements. A detailed description of the data collection can be found in Hennig & Federmann (2018).

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elucidation of the passage contents and network members mentioned. These passages were then discussed in our research group roundtable with a focus on our joint understanding of the conceptualities and resulting working definitions.

Second, the interview segments were individually reviewed about the following questions: What are the motives guiding actors in acquiring knowledge? What are the strategies they apply to achieve their goals?; and How are the strategies and motives to be seen in the light of relationships? Reviewing the interview passages resulted in a fully differentiated set of categories which was divided into strategies and motives. Following the documentary method, (Mannheim 1964, quoted by Asbrand 2011, zitiert nach Asbrand Jahr) the initially general distinction between strategies and[7] motives was further refined and complemented by inspecting the material and working out, particularly succinct aspects.

We differentiated between main motives, general reasons, and knowledge regarding field-specific issues. The main motives related to field-specific positionings or becoming acquainted with field-specific intricacies. These motives were not only repeatedly identified in individual text passages, but in part, ran through entire interviews. In turn, general motives rather reflected the interviewees' general objectives, while various field-specific practices were addressed in terms of knowledge regarding field-specific issues. The strategies were categorized in a similar fashion, and a distinction was made between general and field-specific strategies. About the latter, a focus was on the knowledge strategies applied within the respondents' respective academic subjects. Thus, the multifaceted categorization of interview contents replaced the preceding general allocation of individual passages to strategies and motives.[8]

Third, in examining the developed analytical draft of categories, the knowledge types, strategies, and motives becoming visible in the selected interview passages were linked to the creation, adaptation, and transfer of knowledge, as described in the theoretical section of this article.

We allocated the interview passages that illustrated specific knowledge types (implicit or explicit) to knowledge creation. By contrast, knowledge adaptation was seen to describe the appropriation of tacit knowledge, which comprised various forms – knowledge regarding field-specific issues, including expertise of how research proposals are written, which quality criteria come to apply, how groups organize themselves, how research topics are identified, how staffing is carried out, and the role of dealing with and the proximity to others in these processes.

"Transfer of knowledge" combines various strategies and motives that cannot be clearly distinguished from one another. Rather, these strategies and reasons overlap and therefore are meaningfully merged. Explanations were only found implicitly in the subjects' statements when they reflected upon the backgrounds of specific actions or described goals, such as in the following passage dealing with the objective of earning a doctorate:

> "Do a PhD, of course, right? So, do a Ph.D. Then I thought, 'Okay, how will I going to do that now? What's an interesting topic?' I put out my feelers to place 2 and got in touch with a professor, number four now, and also worked with her for a year, and then, sort of, to do my Ph.D. with her." (Interview 3, lines 91-95; own translation)

First, we see here how the interviewee described that her motive for earning her doctorate had been based on the strategy to acquire the knowledge necessary to this end. The strategy underlying this motive involved in acquiring field-specific knowledge regarding relevant actors and topics. Another strategy was subsequently applied to establish contact with such an actor and work on-site to collect field- and topic-specific experience. Thus, this individual motive was based on various strategies structured in tiers. In this way, each passage in the interviews was reviewed, and descriptions of specific actions were inspected as to the motives or objectives outlined for the applied actions. The active actions were finally labeled as strategies applied to implement particular motives. After this step, the following motives underlying knowledge transfer were elaborated:

- To acquire tacit knowledge
- To deal with competitors (minimize competition)
- To impart knowledge (from higher to lower ranks)
- To collect (field-specific) experience

In turn, these motives were associated with strategies with which the transmission of implicit knowledge was stimulated and implemented.

The strategies underlying the motive "to acquire tacit knowledge" described actors' active action to accomplish this goal and were summarized as follows:

- To seek personal proximity to superiors/lecturers and mingle with professional and personal contacts

[7] The documentary method is a procedure of reconstructive social research and goes back to Karl Mannheim (1964) and asks how social reality is produced.
The research with the documentary method aims to see the social world from the perspective of the actors. Thereby, the analysis of the practical knowledge of action is the central object of the reconstructions.

[8] We used MAXQDA 2022 (VERBI Software 2021) for our categorizations.

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- To gather one's own experience by means of autonomy, one's own projects, and learning by doing
- To engage in exchange among peers
- To observe/imitate
- To claim answers to questions, to ask for advice.

"To hide knowledge" and "prosocial and pro-self motives" as strategies were seen to be associated with the motive "to deal with competitors". In contrast, the motive "to impart knowledge" described the passive receipt of knowledge. Without much action on their part, actors receive knowledge from other actors. These are strategies used by different actors to support the given respondent. Strategies associated with the motive "to impart knowledge" include "to ask for advice" (referring to the transmission of experience-based knowledge, mostly from superiors to subordinates), "to take along to conferences", and "to involve in research projects". The strategies applied to implement the motive "to gather (subject-specific) experience" were "to write to relevant people", "exam strategies and colloquia", and "test publications".

Habitus was seen to play a rather higher-level role in the analysis and proved to be particularly visible in interview passages that described sympathies.

IV. Motives and Strategies in the University Context

In the following section, the motives and associated strategies will be presented with excerpts from the scientific material and interrelated to the theory.

a) Strategies concerning the motive "to acquire tacit knowledge"

First, implicit knowledge and tacit knowledge were seen to commonly constitute field-specific knowledge which can only be acquired in the respective scientific field[9].

1. One strategy in this context was the search for "personal proximity to superiors/lecturers". As shown in the following interview passage, professional and personal contacts were frequently mingled:

> "I have to say, I personally was also very naïve in going up to the matter. [...] So, I had a BREAKING experience, if you will, because I thought, I was a straight-A student [...] I thought, 'Yes, that's how it's going to stay' (laughs). And then I suddenly noticed that, first, nobody's waiting for me and, second, uhm, the people, suddenly everything was about things that were COMPLETELY different from what I thought everything was about all along. So, there was no such thing as the qualifications that I thought were important, they were suddenly COMPLETELY unimportant. By contrast, what played a role was, uhm, how you, how close you are to people like researcher X who now had a significant impact [...] The game just went like I have to get a lot closer to this person intellectually, methodically, but also socially." (Interview 2, lines 130-141; own translation)

This passage illustrates the process of disillusionment in a respondent who believed in the merit principle and realized that, in her scientific field, it is important to effect performance, but above all, to personally become visible by bringing oneself in the proximity of decision- makers. However, it is less personal closeness to such decision-makers, but rather similar theoretical positions, methodical approaches, and social attitudes to be signaled. The assumption was that orientation towards, and imitation of the decision-makers' scientific habitus is more promising than merely providing evidence of scientific qualifications. In other words, the example postulates that proximity to certain individuals is significant in generating field-specific knowledge, which can be a condition for strategic knowledge practices.

Proximity to individual people plays an important role in theory. For instance, knowledge-related networks have been seen to be positively affected by strong ties (*Phelps et al., 2012, p. 1124*). In the example above, Ego profited from being close to her superior, both on a personal and an intellectual level, which was associated with observing and imitating the professorial habitus. However, it should be noted that proximity to other people and the related mingling of personal and professional contacts are not to be understood as exclusively vertical, but rather that it is also implemented horizontally in terms of colleagues, as the following interview passage shows:

> "I once believed that, but it proved to be the wrong conclusion or too one-sided, because it was so easy, so simple, well, it wasn't like THAT either. There are OTHER possibilities, too [...] Anyway, the moment I, when you always look up, but of course you also have to look horizontally, right?" (Interview 2, lines 142-144; own translation)

2. This leads us to the next strategy, "exchange among equals", in which tacit knowledge is generated in study or work groups.

> "Well, I suddenly had access to BOOKS, and we read Foucault and all sorts of stuff. [...] We went to the bookshop regularly and just bought books and that was our studying, right? Studying was not about attending seminars, but I did that along the way [...] So I additionally studied what I thought was right and important. But that was also very coincidental, and well, I got to know people while studying who supported me. So, [...] there were always WGs, that is,

[9] The concept traces back to Bourdieu. "Social fields develop and exist whenever people driven by common interests agree on rules of the game, along the lines of which they play for and, or fight over valuable goods and, or capital [...] Social fields are the areas in which these concrete situations of exchange take place: Here, people as interested parties get together to apply their capital in the best possible way and to achieve the best possible relationships" (Hennig & Kohl, 2012, p. 25; own translation). The field concept implies a space of practice in which actors are involved in interactive relationships (cf. Bourdieu, 1996).

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work groups that talked through the stuff. So, it was like studying alongside studying, if you will." (Interview 2, lines 28-40; own translation)

In exchange among equals – in our case, organizing study groups – new knowledge is generated jointly and exchanged. As people voluntarily and spontaneously engage positively with others, they react with non-specified reciprocal behavior. As described by Blau (1968), exchange among peers is based on positive relationships guided by the norms of reciprocity and expectations regarding trust, honesty, and mutual aid, thus showing prosocial characteristics (*Blau, 1968; Connelly et al., 2012, p. 68; cf. Blau, 1964; Buller & Burgoon, 1996*). This process does not only include exchange, as resources are also bundled and shared in order to establish new knowledge stocks. Moreover, exchange among peers as organized in study groups also yields information and results in the adaptation of implicit knowledge about field-specific strategies of positioning within knowledge networks.

"[...] but by my being able to participate in this [...] circle, I got acquainted with other things that became important to me [...] not only intellectually, but also how you bring yourself into the game in the first place. That was the issue. If you're a Ph.D. student, you have to see to it that you get into the right, that you press every button to gather more knowledge, whether you have a chance at all, how to apply further, where you can land IN THE FIRST PLACE, which other people could be interesting, yes." (Interview 2, lines 119 -125; own translation)

Positioning within a network, in particular, is crucial to one's courses of action, assessment of given action situations, as well as interests and resource allocations, as the structural network perspective emphasizes.

1. "Own experience": Autonomy, focus on one's projects, and learning by doing are important strategies for gaining tacit knowledge.

"So number 5 came into play. A colleague, whom I had known for some time, was studying with me at about the same time [...] but then a great opportunity arose because we had an idea together [...] And then we had a project idea together and did the project together. [...] uhm, that somehow got quite a lot of media attention, this project. [...] We were somehow quite present in all kinds of media [...] with our, uhm, with our project and, uhm, we both took something into our own hands for the first time without our boss, and I think we benefited from each other enormously. Because as a young scientist, you're relatively used to somehow fulfilling tasks that you're given and somehow doing projects that you have to participate in, but you're actually told what to do, and that was different, because we were, on an equal level, if you can put it that way, because we had an idea together and then, yes, for the first time we did something on our own, and then we did something right away that was also connected with incredible risk." (Interview 12, lines 142-169; own translation)

Here, Ego and Alter were able to collect their own experiences during their time as young scientists, which also included the danger of failure. In doing so, they generated implicit knowledge, since they could not fall back on any research experience of their own, as emphasized in this passage.

2. "Observation/imitation" is one of the purest forms of implicit knowledge transfer (*see Halder 2019*). In the example below, it becomes clear that considering one's autonomy, one weighs up which of the observed methods seems to make the most sense. The focus is on classifying the information. The associated strategy is to obtain ideas for one's actions by observing others.

"So I didn't see it in the sense that if he advises me to do it, then I should do it, but I think it's always good to know the ideas other people have and to be able to compare and classify them somehow, whether they're crazy or normal or whatever." (Interview 1, lines 209-212; own translation)

Emphasizing that tacit knowledge in the form of expert knowledge relies on experience, Kind & Hilber (2006) described expert knowledge as a collection of skills such as "grasping the situation, prudence, skill, insight, and situational judgment" (Combe & Kolbe, 2008, p. 870, quoted by Halder, 2019, p. 53; own translation).

Another example illustrates how knowledge about conducting and giving lectures is acquired through observation and, to some extent, imitation. Nevertheless, emphasis is placed on independence by using newer methods to convey the contents of the lecture, which enable the students to distinguish themselves from their superiors.

"I think I had already oriented myself a bit towards number 4, because, uhm, I already somehow found that good, so he was able to talk so freely, and that was all quite entertaining, uhm, I then of course, also tried, uhm, but it wasn't that I somehow asked 'So how should I do that?' or 'Can you give me your lecture?' That didn't work because he still held his lecture with slides, and of course, I didn't want to show up with slides, but rather do it as a PowerPoint." (Interview 12, lines 520-526; own translation)

In this context, Halder (2019) outlined that superiors possess expert knowledge largely based on experience. This experiential knowledge is usually implicit and is transferred to subsequent generations by imitation. In our example, the supervisor gained experience in adequately designing and giving lectures by practicing lecturing and teaching for many years. Younger lecturers adapt such useful knowledge in a slightly modified form through observation and imitation.

3. "To claim answers to questions / ask for advice"

Another strategy to obtain tacit knowledge is "to claim answers to questions" or "to ask for advice". The following passage describes a strategy to gain advice from supervisors and other doctoral students.

"[I did it myself - I did it - I decided on it myself]. I mean, I told them afterward, and I told them that, I mean, you also

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> speak so openly at work group parties or otherwise, or you get advice, right? The other is Person 7 (writes). And he would tell you afterward: 'Don't do that' or 'that's good, just do that' or 'I'd pursue that'. It's not like you just live there without communicating, it was just a group, my boss must have had a total of 150 doctoral students, that's just kind of a network, isn't it?" (Interview 8, lines 446-452; own translation)

The example we cited from interview 8 emphasizes that advice is taken from supervisors as well as from other doctoral students. This takes place in both horizontal and vertical communication. Preference is given to semi-private contexts, such as work circle parties or informal colleague conversations g. This strategy alings with the findings mentioned above published by Kind & Hilber (2006), who, in addition to imitation, defined active requesting of advice or questions as a concrete method of implicit knowledge transfer.

Even if the strategies that serve to generate tacit knowledge were initially considered separately from one another, they also were jointly applied in many text passages or were mixed, as the following example illustrates:

> "[...] I remember a workshop on the weekend with a woman who gave us career advice, so to speak. So there was, so to speak, I still remember, 'What do we actually want to achieve someday?', so, for all I know, privately and also professionally, 'Where do we want to go?', and so on. That was quite a good thing. We didn't have that, so to speak, in the Ph.D. colloquia in the narrower sense, but we did it with, so we somehow organized it ourselves, so to speak, with these six women, so to speak." (Interview 3, lines 175-180; own translation)

Here, an exchange about future goals initially took place among equals, which led to independent workshops and colloquia being organized – in this case, among female students. At the same time, however, it was emphasized that advice is gained from experts to participate in the career experiences of other women. Here, three strategies were mixed, namely exchange among equals, learning by doing, and seeking advice from experts.

The given examples illustrate that the creation of knowledge is closely linked to the respective field in which such knowledge is relevant. While the motive to gain tacit knowledge seems to be field-unspecific at first, the strategies to implement this motive depend on the structure and the framework conditions of the respective field. In a hierarchical system, such as the university, it is important to be familiar with the field-specific rules to participate in the game for positions, power, and resources (*cf. Bourdieu, 1992*).

Here, the strategies essentially serve to reproduce the system and are primarily based on career expectations (*cf. Bourdieu, 1988*). The interview passage on the strategy of "seeking personal proximity to supervisors/instructors" illustrates very well the "illusio" (*cf. Balösius, 2011, p. 100*) of the scientific field. The illusio in fields means that unknowing participants or, in our case, young scientists are under the deception that the university field is only about the field interest itself and that "awarded certificates and titles standardize the chances of access [...] and guarantee corresponding chances of employment" (Barlösius, 2011, p. 100; own translation). In our example, the issue is a promising placement for further career. The deception consists in the belief that the positions in the scientific field are assigned "solely based on scientific excellence, based on unconditional dedication to scientific knowledge, not based on personal gain" (Barlösius, 2011, p. 100f; own translation). This conceals that in science, the struggles for power and position also co-determine scientific careers (*cf. Barlösisus, 2011, p. 100ff.*). During such careers, and through various educational institutions, a habitual adjustment is necessary to complete these stages successfully (*cf. Barlösius, 2011*). Each change of field is connected with "[...] habitual transformations, which are reflected in patterns of perception, evaluation, and thinking, as well as in forms of practice, without, however, fundamentally changing them" (*Barlösius, 2011, p. 90; own translation*). This is also shown in the examples given here. Thus, in observation/imitation, forms of practice or ideas are evaluated and adapted by one's habitus without fundamentally changing them. On this basis, the social practices within the field are generated, which maintain the field's existence and contribute to the reproduction of the scientific system. This process requires implicit knowledge about the rules and experiences in the respective field, as our examples show.

b) Strategies concerning the motive "to deal with competitors"

This motive can be associated with the strategy "to hide knowledge" as well as "prosocial and pro-self motives".

In research, group information exchange is regarded as a cooperative process (*cf. De Dreu et al., 2008*). But the struggle for positioning in the academic field simultaneously leads to competitive behavior among the actors involved, since in a hierarchical system such as the university, successful and adequate positioning becomes increasingly difficult with increasing qualification. Thus, the following example shows a pro-self strategy that results from the motive to minimize dealing with competitors.

1. "Pro-self"

In the following interview passage, competition in the academic world explains the pro-self motive. The pro-self motive is based on a lack of professorships in Germany.

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> "It was a bit more competition-oriented and not nearly as cozy, as you would say in new German, uhm, as previously. That was the first time I really experienced what competition is, not cooperation [...] we all applied at the same time for the 20 professorships that became vacant in Germany." (Interview 11, lines 297-304; own translation)

In this context, we identify a structurally conditioned strategy, which does not arise from an intrinsic motivation of benefit.

2. "To hide knowledge."

Another strategy for dealing with competition is "to hide knowledge". The following passage is narrated from the perspective of an individual from whom information was hidden. The hiding consisted of deliberately not communicating information so as not to be suspected of passing on confidential information.

> "Uhm, yes, well, I have, uhm, I hadn't even received an application from him to read, uhm, in preparation. I know that at some point he gave me, but it wasn't no, in another context, I once got to see an application from an established colleague, but that was later, but not in connection with an application. But that is also sometimes related to the fact that I've never experienced that here in the company, and that's also related to the functions that one or the other colleague holds anyway, so that you don't want to blame yourself because you deliver so many expert opinions yourself, to pass on information accordingly. I later got information sometimes. [...] I never got information in advance. But there are always colleagues in chemistry who don't do that, right? And, uhm, there may be cases, but then these are often very personal, close relationships between a, uhm, doctoral supervisor and a, uhm, well, or a mentor in the case and a junior scientist and from dependencies are also often the result, right?" (Interview 4, lines 149-164; own translation)

The strategy of "hiding knowledge" can be related to the theory of Connelly et al. (2012). As mentioned above, three strategies of knowledge hiding were identified: 1. to pretend to be "dumb" and ignorant; 2. to pass on false information; and 3. rationalized hiding, finding a reason for not having passed on knowledge. In our example, however, there was no clear strategy that fitted the ones mentioned in the theory. In interview 4, Ego simply stated that the information was not shared in advance. In some cases, it was passed on afterward. It is impossible to speak of deliberate deception through false information or playing dumb. The most likely explanation would be rationalized hiding since the information was passed on afterward anyway (*see Connelly et al., 2012*). Noteworthy in this context is Ego's statement, according to which information transfer is a) linked to close personal relationships, and b) linked to the position of the person who passes on the knowledge (vertically), so that dependency relationships arise between superiors and junior scientists. Consequently, it can be stated that the strategy of hiding knowledge seems to be related to the strategy of mingling professional and personal contacts.

3. "Prosocial"

The prosocial strategy is also a strategy to deal with competition. Prosocial strategies play a significant role in scientific material. This is particularly evident in the context of gender and the goal of being successful. The gendered motive as a prosocial strategy is apparent in the following interview passage.

> "[That builds up] that builds up there, of course, when two women are then together, who then, so we never wanted to prove that to the men negatively, that's not what it was about. But maybe rather prove to ourselves that we can do it, right? Uhm, and that, I believe, was a vital decision for us." (Interview 9, lines 63-67; own translation)

In this case, cooperation eclipsed competition. One allies to prove it to oneself. The underlying motive was to minimize competition, while the associated strategy was to help prosocially and join forces.

The following example from interview 12 reinforces the fact that collaboration displaces competition. The prosocial strategy to minimize competition is to publish together and carry out joint projects.

> "Yes, yes. Today, he's a professor at Location 3, and I think we helped each other a lot in the further steps of our careers. Well, we did various studies, various books together, various papers, our first publications in very prominent American journals, we actually did everything together and, uhm, that was alright, so we were really, now we're, so we're still good friends, but of course, we don't see each other very often, because we're at different locations now, but so, uhm, let's say, so that was 2002, so at least until 2010, we really, uhm, did incredibly much together." (Interview 12, lines 187-204; own translation)

According to Dreu et al. (2008) as Steinel et al. (2010), prosocial strategies have to be considered in a differentiated way with regard to the exchange of information. Depending on the respective motivation, strategic decisions are made as to whether and how knowledge is shared. In the passage from interview 12, Ego and Alter supported each other on their career paths by publishing together and conducting several research projects until they reached their goals of obtaining professorships. In the process, the collaboration led to friendship. This blending of professional and personal contacts turn, strengthened the relationship (*cf. Phelps et al., 2012, p. 1124*). Here, consequently, the two strategies are connected and cannot be separated.

Another structural and habitual aspect of the prosocial strategy – the gender effect – is seen in interview 9. The development of the prosocial strategy based on gender sameness is attributed to the prevailing extent of gender inequality in the scientific community. Thus, the two women mentioned above motivated and helped each other to succeed in a male-dominated field. In this context, Engler (2000) described the professorial position as being associated with the

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image of an omniscient genius and as being denied to women. As the latter are excluded from the personality construction that creates the image of the professor in the first place (*Engler, 2000, p. 139f.*), they are not considered as legitimate actors in the context of knowledge production (*Engler, 2000, pp. 143-145*).

Another aspect of the gender effect can be reduced to a different gender-specific habitus, which causes another way of dealing with competition. For example, the goal of the two women in interview 9 was not to enter into direct conflict with men but to prove to themselves that they could hold their own in such a male-dominated field just as well as their male colleagues. This approach may succeed with the prosocial strategy. However, it can also be inferred from the formulation that male colleagues do not shy away from the competition in the field. All in all, the inequality-forming structures described are seen as the motivating factors from which the prosocial strategy arises.

c) Strategies concerning the motive "to impart knowledge"

Related strategies for the motive "to impart knowledge" include "to give advice", "to take along to conferences", and "to involve in research projects".

1. "To give advice"

Another strategy for dealing with tacit knowledge can be the assistance of superiors (cf. Shah et al., 2018). Applying such a strategy, exclusive knowledge may be gained, and advantages provided to the members of a network. In the academic field, for example, this includes passing on knowledge to its junior scientists, as the following interview passage expresses:

> "I ALREADY experienced career advancement, but less explicitly, less in terms of 'you have to do this and that'. Uhm, that was ALSO, so I was then NATURALLY advised 'You have to make contacts and you have to hold, uhm, lectures here and there, and that's whom you have to turn to, and that's where you have to present', and of course I was also let forward, so I was also allowed to do the whole thing, right? So, uhm, there was this supervisor, also very, uhm, relaxed and had little, uhm, for himself so want, but also passed everything on to me, right? I was allowed to do everything. That was certainly a career advancement in my mind. And, of course, also the clues on where to go, where to show yourself. But there was also a lot of implicit career advancement, in that you have this mixture of friendship networks and professional networks that somehow worked, so that these boundaries weren't evident in some cases." (Interview 2, lines 390-399; own translation)

Here, the form of knowledge transfer refers to the giving of advice, which is related to the formation of networks. The interviewee also associated with the resulting social relationship with her supervisor and colleagues. On the one hand, knowledge is passed on by giving advice, and on the other hand, a friendship network is created, which is based on a prosocial motive.

Other forms of knowledge acquisition include encouraging young scientists to be independent and to take care of their projects, and not work too closely on their superiors' topics. This is described in the following interview passage:

> "It doesn't depend on the fact that he selects a person now, but, uhm, the selection takes place because this person unambiguously solicits, uhm, funds, for himself in the initial phase, over longer periods also and for the first coworkers anyway, actually throughout. And, uhm, that, Uhm, leads to the fact that you speak about it as to what topics you want to go to, how you will orient yourself. At that time, completely clearly, the default popped up, uhm, to make, uhm, to HAVE to do something completely different, because he had already at that time, uhm, experiences, uhm, had experienced that there can be difficulties, if, uhm, the new generation sticks to their research areas too narrowly. Yes, that was unambiguous at that time, and that doesn't mean that my doctoral supervisor was, uhm, a stickler for principles and that, uhm, he kept on like that for over twenty years of promoting young researchers (laughs)." (Interview 4: lines 84-93; own translation)

The motive on the part of the supervisor to promote junior staff here led to the strategy of motivating the junior scientist to acquire money to finance their position or future staff positions. The motive "to give advice" cannot be easily separated from the prosocial and pro-self motives. Prosocial motives are based on a willingness to pass on one's knowledge and be involved in advancing young scientists' careers along with them. Pro-self motives serve to avoid competition within one's ranks, as described here by the compulsion to focus on one's topic, but also the acquisition of additional staff positions.

2. "To take along to conferences"

The strategy of including young scientists at conferences serves both to introduce them to the scientific community and to present tand position them in the networks.

> "And of course, those were very, very important connections, because we attended all the conferences, and the, let's say, older woman professors supported the younger, sort of, junior scientists and we were there, sort of, together at the conferences and that was since, let's say, the early 90s, when we were, so to speak, in THOSE circles." (Interview 3: lines 199-203; own translation).

Here, knowledge was transferred vertically from top to bottom and served to promote young researchers. The aim was to create a platform for exchange and at the same time to give young scientists the opportunity to get in touch with other actors in the field. The following passage illustrates this particularly well.

> "He said, just take a look at what you want. He also helped me in a certain way, because if you want to get

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scholarships, you must have some people for external references, and then he told me, 'Well, there's a conference right here. I'll just show you two or three people, talk to them, and explain to them what you want and then make sure that you get an expert opinion from them. And that was, of course, the 'watch' variant, so let's say, 'I'll help you, but then you have to see to it that you get ahead, because you can't always be carried through life'. And then you would talk to the people and, uhm, they would finally write you an expert opinion and it was obviously an expert opinion and not a bad one, because you got the scholarship." (Interview 8: lines 298-306; own translation)

In this case, individuals are taken to meetings to get in touch with others. The higher-ranking person determines the appropriate behavior for the situation by giving instructions or recommendations to approach the "right" people at conferences to build up the necessary social relationships for the further course of one's career.

This strategy can be correlated with field-specific positioning and learning of field-specific nuances. As described above, young scientists are introduced to the field by attending conferences to position themselves in the field and build up a network, as well as to acquire field-specific knowledge. This process has been referred to in terms of a causal chain, the origin of which lies in the participation in conferences and the effect of which ultimately leads to learning field-specific nuances and, thus, to a transfer of knowledge.

3. "Involvement in research projects"

Here, the planning and execution of research projects facilitate knowledge transfer through the assumption of one's own responsibility under the guidance of an experienced professor.

"So, I didn't have a lot of freedom at first, but I learned a lot because we were constantly doing research projects together, big research projects, surveys, content analyses, and I was pretty much solely responsible for realization. But you can't say that I had to do it alone. So, he told me how it works and how to do it, and we agreed, but I was able to do a lot of it on my own." (Interview 12: line 103-109; own translation)

The transfer of knowledge is vertical but is marked by a high degree of autonomy for the young scientist.

The motive of knowledge transfer in the university context is based on supervisors' various strategies, including giving advice, taking students to conferences, and involving them in research projects. It becomes apparent that the motive of knowledge sharing cannot be separated from other motives, such as prosocial or pro-self motives. Sharing knowledge and information is initially prosocial on the part of the supervisors, who may also benefit from the junior scientists' successful career paths, since it improves their reputation in the academic field, so knowledge sharing can also be based on pro-self motives. The same applies to the strategies of taking them along to conferences, where supervisors introduce their junior scientists to the circle of the academic field, and the latter learn field-specific nuances in the process as they are embedded in the academic network. Here, too, supervisors can benefit from the junior scientists if the last present and position themselves professionally at the conferences. This in turn, increases their standing in the academic field. In the strategy of involvement in research projects, junior scientists are introduced to the research field in thematic terms, while at the same time, work is taken off the shoulders of research management, and its workload is reduced. Again, pro-self and prosocial motives are mixed: the young junior researchers can contribute new ideas to the project and take over the tasks, which can be based on a pro-self motive, and at the same time, implicit knowledge is passed on or acquired, which suggests a prosocial motive. In addition, everyone also benefits from obtaining research funds or grants, which are often associated with research projects.

d) Strategies about the motive "to collect (field-specific) experience"

Three strategies were categorized under this motive. First, "to write to relevant people", followed by "exam strategies and colloquia", and finally "test publications".

1. "To Write to relevant people"

The following example is about soliciting funding for grants through work group leaders:

"[Well, uhm, as it was] always, uhm, always done at that time. You write to different, uhm, workgroup leaders, uhm, and of course, they pay attention to it, things have been published, courses quickly done and so on. And then, first, you only get a job promise, and then you must apply again for, uhm, the appropriate funds, uhm, for the postdoctoral fellowship. That was always predetermined, it only goes through scholarships, because scholarships are an award." (Interview 4: lines 122-127; own translation)

The strategy of "to writing to relevant people" illustrates professors' micropolitical decision-making power, whose degree of effectiveness can be seen here in the academic field. Hüthers and Krücken (2018: 168) addressed the influence that superiors in this field have on mid-level faculty, as they can decide on the use of financial resources. In our case, the job-seeking Ph.D. student wrote into many work group leaders. The job- and fund-raising activities described here are not to be understood solely as career-relevant contacting, but rather as knowledge practices in which the researcher gained important experience regarding the academic field. By dealing with the details of the individual procedures, she learned how to write to important people and institutions in her field. In addition, the previously acquired knowledge comes into play in cover letters. The persons to be contacted both emerged

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"from the conversation with the [...] academic family" and were indirectly derived from "professional conversations" (Interview 4: 108, 116; own translation). "To Writing to relevant people" can therefore be understood as a strategy that requires specific information and which itself contributes to the accumulation of discipline-specific experiences.

This also applies to applications for professorships.

2. "Exam strategies and colloquia"

The following example shows how taking part in an appointment procedure for a professorship was used to acquire discipline-specific experiences:

> *"And I thought:* 'Well, it's quite a good opportunity, and number 5 and I, we went there together and said, 'So, we'll just apply here now, let's see what happens'; we were actually both invited to the audition and then neither of us made it, of course, because it was clear that someone else would get it and it was quite funny to see how it works. I think it was also quite helpful to simply see what kind of questions were asked, for example, in such conversations." (Interview 12: lines 543-550; own translation)

This interview passage shows how the two actors gained knowledge about the procedures of the selection process by applying. It should be noted that the two "applicants" planned and implemented their applications together. Knowledge was strategically collected by collaborating with two peers who took the initiative. Consequently, planning such an operation can also be seen as an "exchange among equals", which is preceded by the audit strategy. Like the strategy of "writing to relevant persons" mentioned above, the preceding exchange is the prerequisite for implementing further knowledge strategies. However, in this example, supervisors initially played a less important role, as the process was more generally seen as a test. Nevertheless, the role of participation in the appointment process was perceived as a "reference point for their actions" (*Hennig & Kohl, 2011, p. 43; own translation*) since the long-term aim was to obtain a professorship.

The motive is, therefore, primarily to gain discipline-specific experience in appointment procedures to be more successful in subsequent applications for professorships. The following section also describes an examination strategy for such practices, in which the relationship with the supervisor was more important:

> "I gave the presentation in the group for rehearsal, but it wasn't quite ready then. HOW to apply or, well, I assume that she had looked at the application when I sent it in. I, don't know, but I would think that's how she answered questions from the commission chairman. But I know that, uhm, at least one other person had applied for the job, which I'm sure was also very strongly considered, where she had a similar relationship to him. So that's now, I can't imagine she made a CLEAR statement, so to speak, about how the decision should be made." (Interview 1: lines 302-309; own translation)

In this case, the supervisor was involved in the rehearsal presentation and gave the applicant tips on "HOW to apply". A hierarchical relationship is expressed that changes the meaning of the exchange. It is not only important what is practiced, but also who is involved in the exercise and provides advice for the actual exam. Since it was supposed that the supervisor may have an influence on the outcome, the knowledge exchanged was precious. However, the applicant put this effect into perspective by pointing out that another applicant was similarly important to the supervisor. Although the strategy of the rehearsal test fulfilled the goal of gaining exclusive knowledge, the proximity of the other applicant to the supervisor somewhat weakened the advantageous character of this knowledge in the competitive relationship. The difference to the previous strategy is the exchange with a person of higher rank. While the two applicants from the first example gained knowledge from the real procedure, the examination knowledge in the second example developed with a sample lecture and the superior's hints. The two examination strategies in the examples reflect two different types of knowledge acquisition, which can be distinguished: Collecting (subject-specific) knowledge both through one's initiative and through exchange with one's supervisor.

3. "Test publications"

The final strategy we identified was the possibility of "test publications", which will be illustrated with a passage from Interview 11.

> "My supervisor back then used to proofread it when I said, 'Gee, can you look over it again? Does it make sense?' in the first journal publications. He said, 'Yes, sure'; took the time, really (laughs) dissected it for me, so meticulously, that I am grateful today, it was good, uhm, and partly [...] So it was more my urge and, uhm, when I had that too, he said, 'Well, I'll take a look at it. If you're already writing it, we'll get it out reasonably." (Interview 11: lines 207-223; own translation)

The cited passage exemplifies the important role the production of "research papers" (cf. Phelps et al., 2012, p. 1119) plays in collecting subject-specific experience. The interviewee wrote a text, submitted it to the supervisor for proofreading, and through the feedback received, gained knowledge about scientific standards that would be implemented in future papers. Thus, not only are independently written scientific papers relevant in collecting subject-specific knowledge, but above all, the dialogue with experienced scientists. Here, correcting the manuscript was not exclusively author's interest, but was seen by the supervisor as a process in which the qualitative demand on the paper is expressed. It becomes clear that the supervisor had an interest in the paper becoming "reasonably" submitted and saw it as the joint task to fulfill the scientific quality criteria by using a mutual feedback process. From this, it can be inferred that proofreading manuscripts for publication is to be seen as an exchange in which

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scientific standards are to be met and learned by those being evaluated.

The interview excerpts provided in this section revealed various strategies for collecting subject-specific experience. A prerequisite for this process, however, is active participation in the respective scientific field. For example, writing cover letters and resulting experiences about application and funding practices require knowledge concerning relevant people or names (explicit field knowledge). In addition, strategies in gaining field-specific experience may be related in their effectiveness to one's relationship with other actors. In the relationship with superiors, tacit knowledge is exchanged through trial presentations and feedback on scientific papers, which can be particularly benefit to actors for the reasons mentioned above. However, knowledge sharing does not only take place with superiors, but also in work practice and knowledge strategy planning with equals who share similar interests.

V. Conclusion

The aim of this article was to explore when and how both strategic motives and internal knowledge structures influence the creation and transfer of knowledge in the university context. The analysis shows that motives are closely related to actors' strategies. The examples underline that knowledge production is closely linked to the field in which this knowledge is relevant. In this context, the strategy for implementing a motive depend on the structure and framework of that field. It became clear that in a hierarchical system such as the university, it is important to know the field-specific rules to participate in the game for positions, power, and resources (cf. Bourdieu, 1992). In this context, the strategies essentially serve to reproduce the system.

Furthermore, it became apparent that unknowing participants – in our case, junior scientists – fall subject to the illusion that the university field is only about field interests. However, while acquiring knowledge about field rules, the subjects become quickly aware that struggles for power and position also play a role in determining scientific careers in academia (see also Barlösisus, 2011, p. 100ff.). Progressing through different educational institutions and facilities affects the habitus and leads to adaptations necessary to complete multiple career stages successfully.

This, in turn, means that the various changes between universities and institutions alter patterns of perception, evaluation, and thinking, in addition to the forms of practice through the respective field-specific experiences, as the examples show. Thus, in "observation/imitation" forms of practice or ideas are evaluated and adapted in accordance with one's own habitus without fundamentally changing them. In collecting field-specific knowledge, the habitus plays an implicit but important role as a "structuring" and "structured structure" (Bourdieu, 1990, p. 52). The habitus is structured by the collecting experience in the field, while the practices underlying these experiences in turn, have an impact on subsequent motives and strategies.

In the field of science, motives are primarily derived from the goal of gaining the best possible position, power, and resources in the field. For this purpose, it is necessary to obtain implicit knowledge about the rules of the game in the field, but also to minimize competition, acquire advice and support, and gain field-specific experience. These motives are implemented strategically, but how and in what way this is done is usually not a rational decision but rather depends on the actors' habitus. Thus, permanent competition can promote pro-self strategies to successfully achieve one's goals even if a prosocial strategy would be more rational since resources are combined here and one could reach the goal faster together.

Prosocial strategies are also found in the scientific domain due to prevailing gender inequality. This leads to women developing common strategies and pooling resources to improve their positions in the struggle to assert themselves in such a male-dominated field. Even though we are still at a relatively early stage of research, the potential of using in-depth qualitative interviews to trace actors' motives and strategies in the creation, transfer, and adaption of tacit knowledge in social relations is evident, as this not only captures the relationships between actors in the context of knowledge production but also serves to consider the structures and their effects.

Finally, we must point out some limitations of our study. First, we re-analyzed data that were collected retrospectively with a different objective. And second, the results of the eight interviews cannot be generalized. They give us only exemplary indications of motives and strategies about different forms of knowledge production.

Therefore, in the Future, research will need to identify on a larger scale the difference between motives and strategies in the knowledge production process in an attempt to develop a typology of which motives lead to which strategies in creating, transferring, and adapting tacit knowledge. Perhaps it would be possible to identify the necessary potential for improvement to eliminate the glass ceiling effects in science that make it difficult for women to move up the career path.

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