『暗黙知と熟達化』
Tacit knowledge and Expertise

第 4 回京都大学大学院教育学研究科国際シンポジウム

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第 4 回京都大学大学院教育学研究科国際シンポジウム
「暗黙知と熟達化」

日時：２００５年１２月１８日（日）　10 時半－17 時
場所：京大会館（〒606-8305 京都市左京区吉田河原町 15-9）

第一部

基調講演１　　10:30-12:00am（英語講演，日本語解説付き）
Richard Wagner（フロリダ州立大学心理学部／心理学）
Tacit knowledge: Theory and methods from psychological research
暗黙知：心理学からの理論と方法

第二部

基調講演２　　1:30-2:30pm　（日本語講演）
野中郁次郎(一橋大学大学院国際企業戦略研究科/経営学)
組織的知識創造：暗黙知と形式知の綜合
Organizational Knowledge Creation: Synthesis of Tacit and Explicit Knowledge

発表　　3:00-5:00pm（日本語講演，５のみ英語講演・日本語解説付き）

1. 楠見　孝（京都大学大学院教育学研究科／認知心理学）
   管理職の暗黙知と熟達化
   Tacit knowledge and expertise in Japanese manager

2. 松尾　睦（小樽商科大学大学院・商学研究科／経営学）
   日本企業における経験学習と熟達化
   Experiential learning and expertise in Japanese firms

3. 伊東昌子（常磐大学人間科学部／認知心理学／NTT-AT／HCI コンサルタント）
   営業担当者の実践知：意図生成による状況行為の抑制
   How do effective salespeople regulate to trigger situational actions?

4. 平田謙次（産能大学／経営心理学）
   熟達を促す職務経験の内容：IT 技術者の仕事場学習
   Contents of work experience for expertise：Workplace learning on IT engineer.

5. Moisés Kirk de Carvalho Filho　（JSPS Researcher／教育心理学）
   運動学習における運動メタ認知能力と分散練習
   The role of motor-metacognitive ability and practice distribution in motor learning.

基調講演１

暗黙知：心理学的研究からの理論と方法

Richard Wagner（フロリダ州立大学心理学部／心理学）

暗黙知の初期の研究は教室の外, 日常生活や職場での成功を予測するための努力として始まった． 暗黙知の個人差は，さまざまな学校外の領域におけるパフォーマンスを予測するために示された. 第一世代の暗黙知の心理学的理論・モデルは知能テストの分野から借りてきたものであった． 従来の知能あるいは IQ テストは知能を直接測定していない． これらのテストは個人が数年にわたって学ぶ機会があったと考えられる知識をサンプリングしている． 皆が知識を獲得する等しい機会を持っていると仮定することによって, 最も多くの知識を獲得した個人が最も高い知能を持っていると推測した． 同様に，暗黙知の個人差が実践的知能の個人差の一部を反映すると信じられていた． 第一世代の多くの研究の目的は，暗黙知が学校知と異なっていて，実践的知能が従来のまたは学校知能と異なっていることを示すことであった. 暗黙知の測度としての実践的知能についての多くの議論と批判は, 実践的知能が第 2 の知能であるかどうかに焦点が当てられていた． 今日，学校知能と実践的知能の両方の心理測定論モデルの有用性には限界があることははっきりしている． 暗黙知の研究の第二世代はより実りある形で進行中である．すなわち, 第一世代の研究目的である暗黙知が従来の知能理論とどのように異なっていたかを示すということとは異なり，第二世代の研究目的は，暗黙知が認知心理学，発達心理学の既存の理論とどのように関連するかを理解することにある． 第二世代に関する例は以下の 3 つの領域での研究から説明する．第一は，潜在学習である．潜在学習は学習したことに関する意識なしに複雑な情報を偶発的に学習することである． 第二は，潜在記憶である．潜在記憶は先行学習エピソードの想起なしに獲得される情報の記憶である．第三は，熟達化である．その一部には，宣言的知識を自動的に駆動して，手続的知識と行為に変換することをともなう

Keynote lecture　I

Tacit Knowledge: Theory and Methods from Psychological Research

Richard Wagner

Early research on tacit knowledge began as an effort to predict success outside the classroom, including success in everyday life and in occupational careers. Individual differences in tacit knowledge were shown to predict performance in a wide variety of out-of-school domains. The psychological theory or model of tacit knowledge from this first generation of studies was borrowed from the field of intelligence testing. Conventional intelligence or IQ tests do not measure intelligence directly. The tests sample knowledge that individuals had the opportunity to learn over several years. By making assumptions including everyone having an equal opportunity to acquire the knowledge, the inference is made that individuals who acquired the most knowledge had the most intelligence. Similarly, individual

differences in tacit knowledge were believed to reflect in part individual differences in practical intelligence. The purpose of much of the first generation of research was to demonstrate that tacit knowledge was different from the academic knowledge, and that practical intelligence was different from conventional or academic intelligence. Much of the debate by proponents and critics of tacit knowledge as a measure of practical intelligence was focused on whether practical intelligence represented a second kind of intelligence. Today, it is clear that these psychometric models of both academic intelligence and of practical intelligence are of limited usefulness. A second generation of studies of tacit knowledge is underway that is proving to be more fruitful. In contrast to the purpose of the first generation of studies, which was to demonstrate how tacit knowledge was different from existing theories of intelligence, the purpose of this second generation of studies is to understand how tacit knowledge is related to existing theories from cognitive and developmental psychology. Examples of second generation studies will be described from research in three areas. The first is implicit learning, which refers to learning of complex information incidentally without awareness of what has been learned. The second is implicit memory, which refers to memory for information that was acquired during a prior study episode without any recollection of the study episode. The third is the acquisition of expertise, part of which involves transforming declarative knowledge to automatically activated and executed procedural knowledge and action.

Richard Wagner is the Alfred Binet Professor of Psychology and the Associate Director of the Florida Center for Reading Research at Florida State University. He earned a Ph.D. in cognitive psychology from Yale University in 1985. He previously earned a Master's Degree in School Psychology from the University of Akron, and before embarking in his research career, he completed a year of internship and two years of experience as a school psychologist. His major area of research interest is the acquisition of complex cognitive knowledge and skills, which he has pursued in two domains. In the domain of reading, his research has focused on the role of reading-related phonological processing abilities in normal and abnormal development of reading skills, and in the prediction, prevention, and remediation of dyslexia. In the domain of human intelligence, his research has focused on the role of tacit knowledge and intelligence in intellectual performance manifested outside the classroom setting. His work has addressed a variety of measurement issues and practical considerations involving assessment of constructs in the domains of language, reading, and intelligence. He has coauthored a test of practical intelligence called the *Tacit Knowledge Inventory for Managers* published by the Psychological Corporation, and is coauthor of tests phonological processing (*Comprehensive Test of Phonological Processes in Reading*) and reading (*Test of Word Reading Efficiency*) published by PRO-Ed. He has been appointed by the President and confirmed by the Senate to be an advisor in reading by serving on the advisory board of the National Institute for Literacy.

基調講演２

組織的知識創造：暗黙知と形式知の綜合

野中郁次郎(一橋大学大学院国際企業戦略研究科/経営学)

われわれの暗黙知研究は，イノベーションの研究に端を発している．従来の組織論は，ハーバード・サイモンに代表される情報処理モデルが支配的であったが，われわれは組織的知識創造理論を構築しつつある．その根幹にあるのが暗黙知と形式知の相互作用の動態である．この知識創造のプロセスが SECI モデルである．さらに，組織的知識創造理論は知識ベースの企業理論として展開されつつある．それを構成する概念は，知識ビジョン，駆動目標，対話，実践，場，知識資産，リーダーシップなどであり，弁証法がダイナミック・プロセスの方法論である．組織的知識創造理論の現状と事例を紹介する．

Keynote lecture　II

Organizational Knowledge Creation: Synthesis of Tacit and Explicit Knowledge

Ikujiro Nonaka

In contrast to the dominant theoretical view of firms as static information processing machines in organizational economics, and organization science, the organizational knowledge-creating theory is based on the belief that knowledge inherently includes human values and ideals. The process of knowledge creation starts with the accumulation of personal, hard-to-externalize, subjective, and contextual tacit knowledge, which is converted through the overlapping phases of *Socialization* (a phase in which new tacit knowledge is formed from old tacit knowledge), *Externalization* (a phase in which new explicit knowledge is formed from new tacit knowledge), *Combination* (a phase in which new tacit knowledge is formed from old explicit knowledge), and *Internalization* (a phase in which new tacit knowledge is formed from new explicit knowledge) (SECI) into more objective explicit knowledge.

In recent theoretical extensions, knowledge creation is described through the shared context of interaction (*ba*), visions, driving objectives, dialogues, and practices. Ba is a phenomenology based concept of shared context of meaning creation, which exists at several ontological levels. Visions provide a direction for knowledge creating activities, and driving objectives, actualized in concepts, numbers, and collective discipline, orchestrate the visions, dialogues, and practices into a dynamic coherence. Dialogues and practice enable reflection in action as well as means to express ones knowledge and develop it through social interactions.

The method organizational knowledge creation in practice is described through a case study of a Japanese pharmaceutical company, Eisai Co. Ltd. In contrast to the dominating perspectives in organizational economics and organization science, the case indicates that firms are not static, objective

entities that exist without values and sense of mission to create good. Instead, the case shows that knowledge-based firms are dynamic entities which exist for idealistic visions and committed employees to attain these visions. Ideals, subjectivity, and contextual meanings that subjective humans possess and share through social interactions can explain changes and knowledge creation.

Ikujiro Nonaka is a professor at the Graduate School of International Corporate Strategy at Hitotsubashi University in Tokyo. Nonaka received both his MBA and Ph.D. in business from the University of California at Berkeley and has long been one of Japan's foremost authorities on developing and using the intellectual capital of workers to create and expand business knowledge. With co-author Hirotaka Takeuchi, Professor Nonaka wrote *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation* (Oxford: 1995), which was awarded the "Best Book of the Year in Business and Management" by the Association of American Publishers Professional and Scholarly Publishing Division. The book introduced the issues of tacit and explicit knowledge, and also the important role of individuals in the creation of organizational knowledge. These views have gained a strong position in current management and organization theory and practice and resulted in a knowledge-based view of the firm.

Cited from *http://www.dialogonleadership.org/Nonaka-1996.html*

発表

1　管理職の暗黙知と熟達化

楠見　孝（京都大学大学院教育学研究科／認知心理学）

本研究の目的は，日本企業における管理職の暗黙知の構造と獲得過程を検討することである．Wagner(1985)ほかの一連の研究に基づいて，管理職の暗黙知質問紙の日本版を作成した．調査1では，370名の社会人に対して，暗黙知質問紙（6つの場面の経営問題解決）を実施し，因子分析の結果，「他者管理」「自己管理」「タスク管理」の構造を見いだした．暗黙知得点は，管理職経験年数との相関が見られた．調査2では，228人の社会人に対して，経験からの学習態度（30項目）についての調査をおこない，「挑戦性」「柔軟性」など5因子を見いだした．管理職には，挑戦し，環境の変化に柔軟に対応して学習する態度が重要であった．調査3では，ある事務機器メーカーにおける153人の従業員に対して，暗黙知，経験からの学習，類推的思考に関する質問紙を実施した．その結果，40代従業員で，管理職に昇進している人は，そうでない人よりも他者管理の暗黙知得点が高かった．30代従業員で，将来管理職として，期待されている人は，そうでない人に比べて，挑戦性と類推的思考の得点が高かった．そして最後に,管理職が経験や類推から暗黙知を獲得するモデルを提案した．

Tacit knowledge and expertise in Japanese manager

Takashi Kusumi

This study explored the structure and the acquisition process of tacit knowledge of company managers in Japan. Based on a series of studies by Wagner, we drew up a Japanese version of the tacit knowledge inventory for managers concerning situations where workers in managerial positions solved problems. Three surveys were conducted to examine the structure of tacit knowledge and their acquisition. In the first survey, 382 Japanese workers were presented with six simulated work-related situations designed to measure their tacit knowledge. The structures of tacit knowledge were found to include skills useful in managing oneself, others, and one's tasks. The score of tacit knowledge was related to years of management experience. In the second survey, 228 workers answered a questionnaire about their attitude of learning from experience. Five factors were derived from the ratings: **c**hallenge spirit, flexibility, safety-oriented, stubbornness, and seeking-feedback. The scores of high-level managers in the first two factors were significantly higher than those of their counterparts. In the third survey, 153 workers in a company answered a questionnaire about their analogical reasoning in business, learning attitude, and tacit knowledge. As a result, promoted workers in their 40’s had higher scores in tacit knowledge for managing others than unpromoted workers. Moreover, workers in their 30’s are who are highly expected to reach managerial positions presented higher scores for “challenge” and analogical reasoning. It was concluded that the process of acquiring tacit knowledge for managers is a kind of non-formal learning mediated by individuals’ attitude of learning from experience and use of analogy.

Takashi Kusumi was an undergraduate and did his PhD at Gakushuin University in Tokyo. He is now an Associate Professor at Graduate School of Education, Kyoto University. He is a cognitive psychologist whose research is on metaphor, analogy and tacit knowledge. His research interests have wide interdisciplinary application to human-computer interaction, critical thinking and decision making. His coedited Japanese book is entitled *"Eminent white-collar: Industrial and organizational psychology"* Kyoto: Kitaohji shobou (1995).

2　日本企業における経験学習と熟達化

松尾　睦（小樽商科大学大学院・商学研究科／経営学）

本研究は，定性的・定量的な調査を通して，顧客と接する従業員の経験学習プロセスを検討することを目的としている．調査対象は，大手 IT 企業 6 社のコンサルタントとプロジェクトマネジャー，および自動車販売会社と不動産販売会社の営業担当者である．分析の結果，次のような発見があった．すなわち（１）業績につながる知識やスキルを得るには 10 年の年月がかかっていた，（２）領域が異なると経験学習のパターンも異なっていた，（３）「顧客志向」および「目標達成志向」という２つの仕事の信念が経験学習の効果に影響を与えていた，（４）組織風土が仕事の信念に影響を与えていた．以上の分析結果は，領域の違いにかかわらず，仕事の信念が経験から学習する能力として働いており，組織文化が仕事の信念を決定する基盤となっていることを示している．

Experiential learning and expertise in Japanese firms

Makoto Matsuo

The purpose of this research is to examine the experiential learning process of customer-contact employees in Japanese firms. Both qualitative and quantitative data was used in this research. I interviewed IT consultants and project managers in six major companies, and submitted questionnaire surveys to automobile and real estate salespersons. The primary research findings are: (1) it takes about 10 years to acquire expertise; (2) experiential learning patterns are different in different types of occupation; (3) two types of task specific beliefs (customer orientation and goal-achievement orientation) have an impact on experiential learning; and (4) organization climate influences member's task specific beliefs. The results show that member's beliefs work as the ability to learn from experience, and organizational climate play an important role in facilitating the ability to learn from experience, regardless of the task domain.

Makoto Matsuo is an Associate Professor of Management in the Graduate School of Business at Otaru University of Commerce, Japan. He received his PhD in Management Learning from the University of Lancaster. His research interests include the cognitive approach on expertise, organizational learning, and organizational innovation. His European Journal of Marketing article was selected as the most 'Outstanding Paper' in the 2002 volume.

3　営業担当者の実践知：意図生成による状況行為の抑制

伊東昌子（常磐大学人間科学部／認知心理学／NTT-AT／HCI コンサルタント）

本研究では，状況行為抑制のための意図生成に焦点を当てた．有能者と非有能者の商談に向けた実施意図の差とその差の状況行為への影響を調べた．実験には高成績者と平均的成績者が参加した．彼らは架空組織の営業方針と新規顧客の概要を学んだ後に，初回訪問に向けて行う準備行為を報告した．次に，彼らは初回商談のビデオ映像を視聴し，登場した営業担当者の行為を診断すると共に，自らが行う行為を報告した．その結果，事前行為に関しては，初回商談の行為目標と趣旨が主要な意図として生成され，高成績者では顧客の問題状況を把握するための情報収集と売込みの姿勢を見せないという実施意図が明確であった．平均的成績者は，顧客のニーズに焦点を当て，また上記の姿勢を抑制する意図が不明瞭であった．商談時では高成績者のみが診断内容と自らの行為に関し一貫性を示した．

How do effective salespeople regulate to trigger situational actions?

Masako Itoh

This study focused on the advantage of effective salespeople in generating intentional resources that regulate to trigger the activated schemas and their subordinate actions in order to make a coming business meeting under his/her control. We investigated how differently effective and less effective salespeople generate preliminary intentions and how the difference influenced their situational behavior. In the experiment, after effective and less effective salespeople were given an organizational policy of selling and a prospective customer, they reported what they would prepare to do for the first meeting. Then they watched a video picture of the meeting and assessed a model salesperson's behavior as well as reporting the actions that they would have made. Results showed that action goal and purport of the meeting were the important resources to regulate future behavior, and that the two groups of people differed in the implementation intentions that were reported. Those of the effective salespeople were to collect any information to understand the customer's problem situation and not to show any selling and pushing attitude. The less effective ones tried to find the customer's needs and were week in forbidding the attitude. Effective salespeople showed consistently controlled behavior and less effective ones did not in the meeting scene.

Masako Itoh is now an Associate Professor at Human Science Dept., Tokiwa University. She did her PhD in Hiroshima University. She is a cognitive psychologist whose research is on learning, writing to learn, tacit knowledge, and communication. In 1994 she helped to start Human Interface Assessment and Design Center in NTT Advanced Technology Corporation, the purpose of which was development of new communication services from users' point of view. She has been a principal HCI (Human-Computer-Interaction) consultant and co-developed new communication services with NTT engineers, one of which was awarded as the outstanding paper in Japanese Human Interface Society in 2003. The research that is presented today is the first study in this domain, the focus of which is based on her ten year business experiences.

4　熟達を促す職務経験の内容：IT 技術者の仕事場学習
平田謙次（産能大学／経営心理学）

実務上の問題解決では，問題の解決方法は複数存在する．また，いずれの方法でも既有の知識を思い出し，適用するだけでなく，たくさんの知識とさまざまなタイプの知識を獲得し，統合しなければならない．いわば，熟達者は問題解決しながらその場で状況知を創り出しているといえる．実験では，プロジェクトマネジメント研修の中で，実際の問題を用いながら，ワークシートやツールを介して，問題解決場面での知識を収集した．参加者は全員，情報システム企業に勤務している．収集した知識をカテゴリー分類し，高業績者（H 群）と一般業績者（A 群）間での違いを分析した．まず，固有の問題状況に対応させるために，知識を創造していることを明確にした．そして，A 群では顧客が言った問題をそのまま鵜呑みにするのに対して，H 群では，問題を捉え直し，長期や将来的な観点から捉え，さらにはプロジェクト全体の影響から問題を捉えていた．

Contents of work experience and workplace learning for experts in IT industry
Kenji Hirata

On problem solving in real workplace, there are various ways to solve one problem. Each way is needed not only to recall and to apply knowledge that they have, but also to gather and to integrate a lot of knowledge and many types of knowledge. So it can be said that expert creates situational knowledge on problem solving. The experiment was produced for about 23 subjects who attend project management training at 2003. All participants were workers in information system and service companies. We used some work sheets and its system tool, that could be reflected real situation, in order to acquire their knowledge used on problem solving. Categorizing and comparing content of its knowledge between high performer and average one, we could observe the state of creating knowledge on problem solving in real world. They tried to create situational knowledge in response to their specific situation. While the average performers receive and understand information as it is that client said, the high performers tend to review and to reorganize the problem on situation. They retrieved and researched client base needs again, they considered with an aspect of long term or future influence, and they replaced information from the viewpoint of whole project.

Kenji Hirata was received B.A. from Waseda University and his Ph.D. from Tokyo Institute of Technology. He is an associate professor and a consultant of school of management & information science at Sanno University. His researches have an integrated approach of psychology and engineering for knowledge, skill, ability, competency and learning of workers. He also has some official roles, a member of national committee of skill standard for IT industry, director of skill assessor division at ITSS user association, vice president of HR-XML Japan. Co-project editor of ISO/IEC 19796-3. Related papers: Hirata,K. Ikeda,M. & Mizoguchi,R. 2001. Total Resolution for Human Resource Development Based on Competency Ontology, *Proc. of ICCE 2001*. et al.

5．運動学習における運動メタ認知能力と分散練習

Moisés Kirk de Carvalho Filho　（JSPS Researcher／教育心理学）

新しい課題に取り組む際，学習を最大限まで高めるには，後の制御行動のベースとなるモニタリング判断を行う必要がある．アカデミックな学習に関する先行研究によると，こうしたモニタリング判断は重要であるにもかかわらず，学習者の判断は往々にして正確さに乏しく，時には間違っており，多くの場合過信傾向にあるという．また，学習者のモニタリング判断の総合的な正確さは，彼らのメタ認知能力のレベルに直接関係することが明らかとされている．一方，運動学習の領域では，運動スキルのトレーニング段階で行われる課題の熟達化と分散練習のタイプが，運動課題におけるパフォーマンス・レベルに関わる 2 つの変数であることが知られている．しかし，メタ認知的モニタリング過程に影響する要因については，殆ど分かっていない．そこで，本研究では，運動課題における熟達化，運動メタ認知能力のレベル，および分散練習のタイプが，学習の転移を必要とする運動課題でのパフォーマンスやモニタリング過程に影響するかどうかを検討した．本研究の結果から，単純な課題から複雑な課題への知識の転移効果の重要性や体育教育への示唆について考察した．

The role of expertise, motor-metacognitive ability, and practice distribution in motor Learning

Moisés Kirk de Carvalho Filho

In order to maximize learning when engaged in a new task, individuals need to make several monitoring judgments on which they base their subsequent regulatory behaviors. Previous studies concerning academic learning have shown that despite of their importance, those judgments are usually less than accurate, sometimes wrong, and often overconfident. They have also shown that the overall accuracy of individuals' monitoring judgments is directly related to their level of metacognitive ability. In the realm of motor learning, although task expertise and the type of distribution of practice done during the training phase of the physical skill are two of the variables that are known to be related to performance levels in motor tasks, very little is known about factors that may affect one's metacognitive monitoring processes in those tasks. In this study, it was investigated whether individuals' expertise in a physical task, their levels of motor-metacognitive ability, and the type of practice distribution undertaken would affect their performances and monitoring processes in a motor task in which transfer-of-learning is required. Results are discussed focusing on the importance of the effects observed for transfer of knowledge from simple to more complex motor tasks and on their implications for physical educational.

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