Expertise Development in Clinical Psychology

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Abstract

This study intends to shed light on expertise development in clinical psychology during university studies and beyond. So far, 70 participants at different stages of training have taken part in the study, ranging from psychology undergraduates to expert therapists. All participants completed a computer-based questionnaire consisting of 3 parts: a knowledge test, open-format questions, and case studies. At the expert level, data collection has not yet been finished, but preliminary results can be reported. Participants from different stages of training levels did not differ regarding knowledge about basic principles. However, with increasing training, participants knew significantly more about the application of basic principles to clinical psychology and about clinical psychology itself. In answering the open-format questions, participants differed significantly regarding their use of technical terms. The case studies revealed differences in terms of the quality of recalled items, the correctness of the diagnosis, and the quality of the explanations given for the patients' problems. Preliminary results from the sample of expert therapists indicated a decrease in some of these variables.

Keywords: Expertise development; Clinical Psychology; Knowledge test

Introduction

Teaching and training novices to become experts able to solve complex problems can be seen as a pedagogical challenge in any domain. One starting point for developing instructional measures is to analyze what constitutes expertise in a domain and how this expertise develops. This question is also the main focus of our study, which is embedded in a larger project examining the effects of growing expertise on net-based, interdisciplinary cooperation. In our project, a physician and a clinical psychologist cooperate on a complex patient case making use of a videoconferencing system (cf. Rummel & Spada, 2005). To analyze the effects of our participants' expertise on cooperation, we first need to understand what constitutes expertise in the domain of medicine and clinical psychology, respectively. While in medicine, research on expertise development already exists, in clinical psychology, such research is lacking. The study presented in this paper aims to shed light on this question.

Research on the Nature of Expertise

Research on the nature of expertise has attracted a great deal of attention from the 1960s up until the present day. In a well-known study, de Groot (1965) presented a chess board to experts and novices. After a presentation time of just five seconds, experts remembered more correct figures than novices thanks to their ability to identify meaningful patterns on the chessboard. Since this pioneering work and, later, the work of Chase and Simon (1973), researchers have come to agree that experts of a particular domain are, in general, not more intelligent or talented than non-experts, but they have acquired a vast and well-connected knowledge base, which facilitates retrieval.

Most pioneering work about expertise dealt with well-structured domains like chess (e.g. Chase & Simon, 1973, de Groot, 1965) or physics (e.g. Chi, Feltovich, & Glaser, 1981; Chi, Glaser, & Rees, 1982; Ploetzner & Spada, 1993). There are some common features that experts of all these domains share if compared to novices (VanLehn, 1989): (1) Experts have worked hard to become experts and were engaged in several years of deliberate practice (Ericsson, Krampe, & Tesch-Roemer, 1993). (2) Experts are able to perform faster than novices, (3) solve domain-specific problems better than novices, and (4) are able to recall more relevant items when presented with a relevant situation (de Groot, 1965).

Expertise Development in Medicine

Research on expertise development in the more complex domain of medicine is of particular interest for our purposes. While there are particular differences between what constitutes expertise in clinical psychology and in medicine (see below), the two domains also share commonalities: practitioners from both fields are concerned with diagnosing and treating patients, rely on scientific results about normal and abnormal functioning in order to derive therapy techniques, and need to cooperate with experts (colleagues) and laypersons (patients). Medical expertise has attracted many research activities since the 1970s, resulting in a large research base (e.g. Boshuizen, Bromme, & Gruber, 2004; Boshuizen & Schmidt, 1992; Custers, Boshuizen, & Schmidt, 1996; Elstein, Shulman, & Sprafka, 1978; Rikers, Schmidt, & Moulaert, 2005; Schmidt & Boshuizen, 1993).

In order to examine expertise development in the domain of medicine, researchers usually construct a text-based case study and ask medical doctors and novices to think aloud while working on it (Boshuizen & Schmidt, 1992). After diagnosing the case, participants are asked to elaborate on their assessment of the signs and symptoms.

Boshuizen and her colleagues (Boshuizen, 2003; Boshuizen et al., 2004) postulated three steps in the development of a medical expert: First, medical students acquire large amounts of declarative knowledge about biomedical processes. The representation of this knowledge can be understood as a loosely connected semantic network. With some clinical experience, declarative knowledge is then proceduralized in a process of "knowledge encapsulation". Knowledge encapsulations are higher-order concepts under which lower-order concepts are subsumed. In routine work, experts verbalize only higher-order concepts. However, if asked to do so, or when problems arise, experts are supposed to be able to verbalize lower-order concepts (Boshuizen et al., 2004). Researchers can detect encapsulated knowledge by comparing the experts' post-hoc explanations with think-aloud protocols. If explanations consist of lower-order concepts that are subsumed under the higher-order concepts stated in the think-aloud protocols, this indicates knowledge encapsulation. In a final step, the clinical experience helps the expert to develop illness scripts for each disease. An illness script consists of enabling conditions (conditions and constraints of a disease), the fault (major malfunctions in bodily processes), and consequences (signs and symptoms).

Expertise Development in Psychology

In the domain of clinical psychology, there has been no comparable research on the development of expertise. Studies examining the effects of psychotherapy, for example, control for individual characteristics of the psychotherapists that could obscure the effects of the tested therapy models and treatment procedures (Beutler, 1997). In contrast, we specifically focus on the development of psychological knowledge in the course of formal psychological education and therapist training.

Because medicine and clinical psychology share some commonalities (see above), findings about expertise development in medicine can serve as a starting point for analyzing the development of expertise in clinical psychology. However, three main differences between clinical psychologists and physicians have been described and attributed to differences in their training (Kingsbury, 1987): (1) Medical students learn to view science as a body of facts. Students of psychology, in contrast, learn to view science as a body of scientific methods that help to experimentally test theories. Therefore, psychologists tend to challenge information more than physicians. (2) For physicians, there is a stronger association between particular diagnoses and specialized treatments than for psychotherapists. (3) Medical students usually start their studies with the goal of becoming a physician, and after two preclinical years, students begin with their clinical training. In contrast, the first years of the psychology curriculum in German universities focus on a scientific education in the more general field of psychology. Not until their third or fourth year can students decide to specialize in clinical psychology, and only after finishing their university education can they engage in clinical training. Against the background of the commonalities and differences described, we investigate whether expertise in clinical psychology develops in a similar manner compared to expertise in medicine.

In order to derive hypotheses, it is worth taking a closer look at how the formal training proceeds in this domain. Although the basic structure of the psychology curriculum at university level is prescribed for all German universities, the local curricula differ substantially in their main focus and the sequence of courses. Therefore, we limit our description to the University of Freiburg, where we recruited our sample. In the first two years of their studies, students learn about basic principles of human psychology. They cover topics such as: learning, cognition, emotion, communication, development, and physiology. During their third year, students then learn about the application of these basics. For example, they learn about clinical disease patterns and psychotherapeutic techniques. In the final two years, students can choose a particular area of psychology on which to focus, for example clinical psychology. In this part of their studies, they then begin to solve realistic and complex cases and learn to interact with patients. They are also required to complete internships at psychiatric hospitals or comparable institutions. After graduation, psychologists intending to work as psychotherapists must engage in an extra three to five years of therapeutic on-the-job training. In certified training schools, the psychologists are supervised as they work with patients. Furthermore, they are requested to attend additional theory sessions on specific psychotherapy-related topics. Psychologists who have finished this additional training are then finally allowed to call themselves psychological psychotherapists.

We selected our sample to represent different stages in this education, and designed our materials to reveal knowledge differences between the different training levels.

Goals of the Study

This study was motivated by three main goals. (1) As there is only little research on expertise development in clinical psychology, we aimed to discover which competencies result at different stages of training. A long-term goal will be to help to strengthen competencies and to reduce weaknesses in formal education. (2) We wanted to investigate whether expertise in medicine and clinical psychology develops in a similar manner. One main finding in medicine is that experts encapsulate their knowledge, and are able to recall lower-order concepts if necessary. In the past, such knowledge encapsulations have been measured by comparing post-hoc explanations with recall data or think-aloud protocols of case studies. We employed three methods to measure encapsulations. First, we developed a knowledge test to directly examine whether basic concepts really do remain available for experts who learned these concepts years ago. Second, we measured the use of higher order concepts in the participants' recall of case studies.

And third, as a method to unpack encapsulated knowledge, participants were asked to explain the case studies after diagnosing. (3) As this research is embedded in a project on net-based interdisciplinary cooperation, we aimed at using the results from expertise development in both domains to deduce hypotheses about the quality of such a cooperation.

Method

Participants

Psychologists at different stages of their training participated in our study. Up to now, 55 students (20 novice students, 20 intermediate students, 15 advanced students), 10 trainee therapists, and five expert therapists have taken part. At the moment, we are finishing up the data collection of the expert therapists. For this highest level of expertise, we will examine 10 behavior therapists, who have worked in their profession for at least 10 years. All participants received financial compensation for their participation.

Students and trainee psychotherapists were recruited during lectures. To contact the psychotherapists, we distributed flyers in practices in Freiburg, Germany.

Material

Participants completed an instrument assessing the quality and quantity of their knowledge in the area of clinical psychology. The instrument consisted of three parts: A multiple-choice test measured the availability of knowledge (declarative knowledge test). Open-format questions required participants to freely list what they knew about selected concepts. Finally, participants were given written descriptions of two patients' problems (case studies) and were asked to read, recall, diagnose, and explain the cases. In the following, the parts of the instrument will be described in more detail:

The declarative knowledge test consisted of three subscales. All questions had to be answered by marking one of five answers.

(a) Five questions measured knowledge about basic principles of psychology such as learning theory and cognitive principles, for example: "What is the result of classical conditioning?"

(b) Three questions measured the application of basic principles to clinical psychology. For example, we asked what kind of learning processes are part of Mowrer's two-factor theory of avoidance learning.

(c) Four questions measured knowledge in the area of clinical psychology, for example: "What does Beck call the negatively biased thoughts in depression?"

The second part of our instrument consisted of two open-format questions. Participants were asked to write down everything they deemed important about the two concepts. We chose *schedules of reinforcement,* an important concept for therapeutic work learned early on in university studies, and *schizophrenia*, a well-known mental disease pattern taught later. To analyze the frequency of correct statements, we developed model solutions for each question based on the literature that students and trainees in psychotherapy have to read for exams. We then counted the number of correct statements in participants' answers. Scores were added up for each of the two questions. In addition, we counted the technical terms stated in the answers.

The third and main part of our instrument were case studies. We developed two text-based cases, a more common case (a social phobia) and a more uncommon case (an obsessive-compulsive disorder revolving around obsessive thoughts about suicide). To develop authentic cases, we consulted discussion forums on the Internet and an expert psychotherapist. An example case study is presented in Figure 1.

Participants were asked to first scan the case, and then to recall important information in writing. With this recall phase, we intended to simulate the results on chess expertise (de Groot, 1965): with increasing expertise, psychologists should perceive a whole case as a pattern and thus remember more details. At the same time, we wanted to examine whether increasing experience leads to different structuring of content, i.e. whether more experience leads to an increased use of higher-order concepts. Next, participants diagnosed the patient described in the case study, and finally, they explained signs and symptoms of the disorder they had diagnosed. The explanations were supposed to serve as a method to trigger the "unpacking" of basic knowledge that had been encapsulated. This procedure resembles the procedure used to examine expertise development in the domain of medicine.

> Up to now, I have been able to avoid awkward situations (in my private life, too) by simply leaving the situation if I could not endure it anymore. I rarely attended lectures and courses. Nevertheless, I completed my degrees not too badly. Of course, everybody feels nervous before presentations, but my nervousness is so extreme that I feel ill physiologically. But that is not the main problem. It is my sweating that worries me the most. I do not sweat in comfortable situations, e.g. alone at home or together with my best friends. But if only one person I don't know is present, it begins: My hands get blue and wet; my shirt is drenched with cold, clammy, smelly sweat. I already consulted a physician: there are no medical causes. I ought to do something about this as my job involves a lot of public speaking. Others consider me to be a self-confident person, a fact that I cannot understand, because I feel really tense. In addition to the sweating, my muscles tremble from my legs to my face. When other people are present, I immediately turn pale, and after a while my hair becomes greasy and I feel scruffy although I am actually not. At the moment, I am trying to be assertive and to approach people straightaway instead of waiting till I have to. But afterwards I am really exhausted.

Figure 1: Example Case Study

As dependent variables for the cases, we assessed the number of correctly recalled statements (concepts mentioned in the case study) and the number of higher-order concepts (e.g. *physiological symptoms* can stand for sweating, turning pale, blushing…). For the diagnoses, a score from 0 (false) to 1.25 (correct and additionally

elaborated diagnosis) was assigned. To analyze the explanations of signs and symptoms, we constructed model solutions and analyzed the explanations regarding the frequency of correct statements.

Procedure

Participants completed the first subscale of the knowledge test (*basic principles of psychology*), then answered the first open-format question (*schedule of reinforcement*), and afterwards worked on the first case study (*social phobia*). Next, they completed the second subscale of the knowledge test (*application of basic principle to clinical psychology*), answered the second open-format question (*schizophrenia*), and solved case study two (*obsessive-compulsive disorder*). Finally, they filled out the third subscale of the knowledge test (*clinical psychology*).

Statistical Analysis

To compare the four training levels, one-way ANOVAs were performed ($\alpha = .05$). Since the data collection for the expert therapist sample has not yet been completed, data of this group was not included in the analysis.

Results

Psychologists from the different training stages did not differ with regard to the overall time needed to complete the computer-based questionnaire or with regard to the number of words in both the open-format questions and the case studies. Thus, we assumed that the groups were equally motivated to complete the instrument.

Knowledge Test

The knowledge test consisted of 12 multiple-choice questions measuring knowledge about basic principles (5 questions), about the application of basics to clinical psychology (3 questions), and about clinical psychology (4 questions). For means and standard deviations, please consult Table 1.

Table 1: Means and Standard Deviations (in Parentheses) for the Knowledge Test

Knowledge test	Novices	Intermediates	Advanced	Trainees
Basics	3.85 (1.39)	3.65 (1.14)	3.47 (1.19)	3.40 (0.97)
Application	1.70 (0,92)	2.55 (0.76)	2.53 (0.52)	2.60 (0.70)
Clinical P.	1.65 (1.04)	2.05 (1.00)	2.40 (1.06)	3.40 (0.84)

The training levels did not differ with regard to knowledge about *basic principles* ($F < 1$). However, in the subscale *application of basics to clinical psychology*, significant differences were found ($F(3, 61) = 5.86$, $p = .001$, $\eta^2 = .22$). The novice students scored relatively low, but at the intermediate level, knowledge about the application of basics increased sharply.

In the subscale *clinical psychology*, the knowledge increased continuously up to the advanced students' level. Then, at the trainee level, it increased sharply ($F(3, 61) = 7.10$, $p < .001$, $\eta^2 = .26$).

Open-Format Questions

See Table 2 for the means and standard deviations for the open-format questions.

In the first question (*schedules of reinforcement)*, the most technical terms were used by the novice students ($F(3, 61) = 3.08$, $p = .03$, $\eta^2 = .13$). Differences in the frequency of correct statements did not reach significance ($F(3, 61) = 1.81$, $p = .16$, $\eta^2 = .08$), although the novice students also wrote down the most correct statements. Interestingly, higher frequencies of correct statements were strongly associated with an increased use of technical terms ($r = .80$)

In the second open-format question about *schizophrenia*, both the frequency of correct statements ($F(3, 61) = 12.13$, $p < .001$, $\eta^2 = .37$) and the frequency of technical terms ($F(3, 61) = 10.12$, $p < .001$, $\eta^2 = .33$) increased with higher training level, again with a sharp increase at the trainees' level. The frequency of correct statements and technical terms again correlated significantly ($r = .82$).

Table 2: Means and Standard Deviations (in Parentheses) for the Open-Format Questions

Open-format questions	Novices	Intermediates	Advanced	Trainees
Schedule of reinforcement				
Correct statements	3.75 (3.92)	2.05 (1.38)	2.13 (1.20)	2.60 (2.35)
Technical terms	2.70 (3.20)	1.20 (1.20)	0.60 (0.74)	1.60 (2.37)
Schizophrenia				
Correct statements	1.10 (1.32)	2.93 (2.57)	3.63 (2.24)	6.35 (3.17)
Technical terms	0.10 (0.45)	1.45 (2.42)	2.27 (2.22)	4.70 (3.53)

Case Studies

See Table 3 for the results on case one (patient with social phobia).

While the groups recalled about the same number of statements from the case ($F<1$), they differed with regard to the frequency of higher-order concepts ($F(3, 61) = 4.78$, $p = .01$, $\eta^2 = .19$). The trainee therapists stated a greater number of higher-order concepts than the students. This result points towards knowledge encapsulation.

The quality of the diagnosis improved sharply at the intermediate level and then levelled off ($F(3, 61) = 8.20$, $p < .001$, $\eta^2 = .29$). A similar picture emerged for the quality of the explanations, again with a rather sharp increase at the trainees´ level ($F(3, 61) = 4.23$, $p = .009$, $\eta^2 = .17$).

The results for case study two (patient suffering from obsessive-compulsive disorder) are shown in Table 4.

The groups did not differ with regard to recalled statements ($F(3, 61) = 1.77$, $p = .16$, $\eta^2 = .08$), although descriptively, the trainee therapists recalled more correct statements than the students. The quality of recalled information differed, with a rather sharp rise in the use of higher-order concepts at the advanced students' level ($F(3, 61) = 3.17$, $p = .03$, $\eta^2 = .14$).

Table 3: Means and Standard Deviations (in Parentheses) for Case Study 1

Case 1 Social Phobia	**No-vices**	**Inter-me-diates**	**Ad-vanced**	**Trai-nees**
Recall				
Correct statements	10.10 (2.94)	11.90 (5.03)	11.27 (5.01)	10.80 (4.49)
Higher-order concepts	1.30 (1.22)	1.60 (1.19)	2.27 (1.87)	3.60 (2.68)
Diagnosis				
Correctness	0.64 (0.36)	0.94 (0.14)	0.95 (0.14)	0.98 (0.18)
Explanation				
Correct statements	0.73 (0.45)	1.20 (0.90)	1.20 (0.64)	1.75 (1.07)

Table 4: Means and Standard Deviations (in Parentheses) for Case Study 2

Case 2 Obsessive disorder	**No-vices**	**Inter-me-diates**	**Ad-vanced**	**Trai-nees**
Recall				
Correct statements	6.85 (2.89)	8.45 (3.28)	8.53 (4.49)	9.70 (2.67)
Higher-order concepts	1.50 (1.28)	1.25 (1.16)	2.27 (1.62)	2.60 (1.43)
Diagnosis				
Correctness	0.45 (0.45)	0.74 (0.45)	0.77 (0.41)	0.78 (0.38)
Explanation				
Correct statements	0.13 (0.21)	0.79 (0.83)	0.77 (0.66)	1.03 (0.99)

Correctness of the diagnosis rose sharply at the intermediate level and then levelled off ($F(3, 61) = 2.36$, $p = .08$, $\eta^2 = .10$). The rise at the intermediate level was also found regarding the explanations ($F(3, 61) = 5.21$, $p < .003$, $\eta^2 = .20$). There was an additional increase at the trainees´ level.

Expert Therapists

So far, data of five expert therapists have been gathered and analysed. Results point to a strong decrease compared with the trainees in *basic knowledge* and a slight decrease in *application of basic knowledge* and *clinical psychology*. This result contradicts the findings in medical expertise development that even after several years of practical experience, basic knowledge can be recalled if required. In the two open-format questions, also, the expert therapists wrote down fewer correct statements and fewer technical terms than the trainees. The same picture was found in both case studies regarding the use of higher-order concepts during recall and the number of correct statements in the explanations given. In contrast, the expert therapists diagnosed slightly better than or as correctly as the trainees.

Discussion

The goal of the study was to shed light on the expertise development in clinical psychology during university studies and beyond. Novice, intermediate and advanced students, trainee therapists and expert behaviour therapists completed a knowledge test measuring declarative knowledge, open-format questions measuring quality and quantity of free recall, and two case studies. As data collection on the expert therapists has not yet been concluded, the statistical analyses presented in this paper referred to the remaining levels. For the expert therapist level, we presented preliminary results.

In the knowledge test measuring basic psychological principles, no significant differences between the levels were found. However, with increasing experience, knowledge about the application of basic principles to clinical psychology and knowledge about clinical psychology increased. Preliminary results of the expert therapist sample indicated a strong decrease in knowledge about basic principles and slight decreases in knowledge about the application of basics and in clinical psychology. In both open-format questions, participants differed in their use of technical terms. Interestingly, higher frequencies of correct statements were associated with a greater use of technical terms. In both questions, the expert therapists wrote down fewer correct statements and fewer technical terms. Results in the open-format questions resemble the results in the corresponding subscales of the knowledge test. In the more basic concept the novice students scored best, and then knowledge decreased and finally increased at the trainees' level. In contrast, knowledge about the clinical concept increased with each expertise level. In the case studies, students and trainee therapists recalled about the same frequency of statements from the case. However, participants on the different levels differed in the quality of their recall, particularly in the frequency of higher-order concepts. This is an indication for knowledge encapsulation. With increasing training level, more correct diagnoses were derived. The explanations increased from novice students to trainee therapists, but decreased at the expert therapists´ level.

With regard to the first goal – the investigation of expertise development in clinical psychology - we can summarize that basic psychological and clinical knowledge as well as the ability to infer correct clinical diagnoses begin to develop in the second and third year of studies.

Knowledge and competencies increase strongly at the level of the trainee therapists. Therefore, we can conclude that therapist training is successful. Regarding the expert therapist sample, preliminary results indicate decreases in the availability of knowledge and in recall and explanations of the case studies. However, it should be noted that these experts did not engage in certified training after university studies because in Germany, this was not obligatory until 1998. Training for practitioners would probably help to keep their knowledge up to date and counteract the trend we found. In the diagnoses, the experts achieved similar results to the trainees' group. This may be due to the fact that diagnosing is an activity that is very familiar for expert therapists. In comparing our results with findings from the domain of medicine (Goal 2), we can summarize that knowledge stays available up to the trainees' level, and decreases afterwards. The increased recall of higher-order concepts with increasing training level points to knowledge encapsulations similar to expertise development in medicine. However, on the level of expert therapists, only some indications of knowledge encapsulation were found. The results concerning expertise development in clinical psychology together with the findings in the medical domain have important implications regarding our goal of examining the effects of growing expertise on net-based, interdisciplinary cooperation (Goal 3). Knowledge encapsulation and increased use of technical terms may complicate communication. This issue will be taken up in a further study.

Conclusion

To summarize, our results show that basic and clinical knowledge and the ability to diagnose correctly start developing early on during university studies and increase up to the level of trainee therapists. However, data from five expert therapists indicate that knowledge acquired during studies does not outlast ten years of therapeutic practice.

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